



An Integrated Perspective on
Musculoskeletal Disorders and Serious
Incident and Fatalities Prevention

Executive Summary

Musculoskeletal disorders (MSDs) are the leading cause of workplace injury yet are often excluded from serious incident and fatality (SIF) prevention frameworks, a blind spot that can cause organizations to miss opportunities to intervene before MSDs escalate into severe, life-altering harm. This study surveyed 180 experienced environmental health and safety professionals to establish the first empirical baseline of how practitioners perceive, and act on, the relationship between MSDs and SIFs. Survey results found strong alignment among respondents, with 92% recognizing ergonomics and human factor-related risk factors as contributors to SIFs and potential SIFs and 79% classifying at least one MSD as a SIF, potential SIF or both. However, these findings also revealed a gap between recognition and integration. Inconsistent definitions, fragmented evaluation processes and reporting barriers keep MSD and SIF prevention largely parallel rather than unified, even though organizations already use similar methods for hazard identification, risk assessment, investigation and worker engagement. The opportunity lies not in greater awareness alone but in integrating current consensus standards, including the recently updated American Society for Testing and Materials (ASTM) E2920-26, which provides a comprehensive framework for identifying, managing and preventing serious incidents and fatalities, along with practical tools such as the [NSC SIF Prevention Model](#). As with many safety initiatives that have evolved from awareness to standardized practice through ASTM and other consensus standards, the next step may be to systematically incorporate MSD-related SIF risks into established SIF prevention processes. Together, these resources offer a practical pathway to standardize definitions, strengthen evaluation and embed MSD prevention within SIF prevention efforts, with the potential to reduce serious workplace incidents and fatalities.

Key implications from the survey findings:

- Recognition of the MSD-SIF connection is broad but doesn't reliably translate into organizational practice.
- MSD prevention is under emphasized relative to its burden and its role in preventing serious incidents.
- Risk assessment is a natural point of integration, though technology adoption differs across the two domains.
- Organizations with more formal MSD-SIF processes show greater integration and earlier risk identification.
- Context matters – a single integration approach won't fit every organization.
- Organizational culture may be limiting early identification of MSD and SIF risk before serious harm occurs.



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Introduction

Jill and Rob are construction workers who are routinely engaged in lifting and other material handling activities, often completing the work in awkward, twisted postures. Like many workers in physically demanding roles, their job exposes them to well-documented musculoskeletal disorder risk factors, including high force, repetition and non-neutral postures.

Over time, Jill and Rob began comparing notes about the aches they felt at the end of their shifts — Jill described lower back soreness and stiffness, while Rob talked about nagging, localized shoulder pain and fatigue that worsened throughout the day. Both brushed it off as part of the job. Jill mentioned that her back pain was starting earlier in the day, while Rob admitted he had begun avoiding overhead lifts and certain reaching tasks because of sharp twinges in his shoulder. Despite these warning signs, neither reported their symptoms, and no changes were made to their tasks or work conditions. Continued exposure to awkward postures and heavy loads without proper intervention led to the gradual development of musculoskeletal disorders — Jill's in her lower back and Rob's in his shoulder.

Jill's back pain becomes severe and debilitating, involving nerve compression and significant functional impairment. She requires medical intervention and is unable to return to her previous role. As Rob's shoulder symptoms persist, he experiences increasing physical fatigue and reduced strength and coordination. During one shift, while guiding a heavy load into place with a co-worker, Rob experiences a sudden increase in pain in his shoulder combined with fatigue-related loss of grip strength. His reduced capacity and delayed reaction time cause him to lose control of the material. The load shifts unexpectedly, striking Rob and causing a severe, life-threatening injury.

Together, Jill's MSD progressing to a debilitating but nonfatal outcome (i.e., permanent functional impairment that is career-ending) and Rob's MSD progressing to a sudden, acute, life-threatening serious incident and fatality event (i.e., struck by shifting load) demonstrate the range of severity MSDs can escalate to when precursors go unaddressed.

This scenario above highlights how unrecognized and unmanaged MSDs can progressively escalate into a SIF when early signals are missed and no preventive controls are implemented. Also, the scenarios described above are not uncommon. Terms such as serious, career-ending, life-altering, life-threatening and life-ending emphasize the severity and potential consequences of these events. This potential for an injury to progress from an MSD to a SIF highlights the critical need to recognize the connection between MSDs and SIFs. Failure to identify and intervene early in this progression also reflects broader systemic gaps. Addressing these risks requires coordinated engagement from multiple stakeholders, including environmental health and safety (EHS) professionals, organizational leadership, operational teams and frontline workers — to move beyond reactive responses and establish proactive, system-level MSD prevention strategies that could subsequently have positive impacts on SIF prevention efforts.

The Magnitude

Data from [Injury Facts](#)[®] indicate that in 2024, preventable injuries became the third leading cause of death in the United States, disproportionately affecting individuals during their working years. Consistent with this burden, Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses data of 2023-2024 shows that cases involving days away, restricted work or job transfer had a median duration of 14 days, while job transfer or restriction cases alone required 15 days, compared to eight days for all lost-time cases reported by Injury Facts.

For example, a laceration or contusion heals, and the worker returns to full duty, but a strained back or injured shoulder results in weeks of modified duty, lifting restrictions and reduced capacity. This difference reflects a defining feature of MSDs: workers often return to work before fully regaining capacity, resulting in prolonged restricted duty, reduced productivity and elevated reinjury risk.

As a result, MSDs are both highly prevalent and disproportionately time-intensive, creating a substantial burden that is not captured by lost-time metrics alone. This pattern is reinforced by the Liberty Mutual Workplace Safety Index, which for over 25 years has consistently identified overexertion — such as lifting, pushing, pulling and carrying — as the leading cause of disabling, nonfatal injuries (Liberty Mutual Insurance, 2025). Despite an approximate 40% decline in injury rates, workers' compensation costs have increased by approximately 30%, with serious injuries costing \$58.78 billion annually.

Overexertion alone accounts for \$13.7 billion, nearly 27% of the top 10 injury costs, indicating that reductions in injury frequency have not translated into proportional reductions in economic burden (Liberty Mutual Insurance, 2025). A key reason for this is that MSDs arise from cumulative exposures embedded in work design (e.g., force, repetition, posture and duration across thousands of cycles) rather than discrete hazards that can be addressed through single-point engineering controls (e.g., machine guarding, lockout/tagout or fall protection). Consequently, effective prevention requires system-level interventions, including job design, work organization and participatory approaches. Overall, the evidence suggests that MSDs can result in serious and lasting harm, yet they remain largely absent from SIF prevention frameworks. This is not simply a matter of classification but a structural blind spot driven by gaps in evidence, leadership attention, metrics and event-based risk assessment approaches.

Underrepresentation of MSDs and the Missing Pathway to SIF Outcomes

Despite their substantial burden, MSDs remain underrepresented in SIF frameworks (e.g., Bayona et al., 2023; Inouye, 2020). SIF prevention has traditionally focused on acute, high-energy hazards, such as falls, struck-by incidents and electrical exposures, that align with visible catastrophic potential. In contrast, MSD-related risks are cumulative and gradual, making them difficult to classify within existing SIF taxonomies. Although the Campbell Institute resource (Sannito et al., 2022) emphasizes the need for cumulative risk assessment, MSD exposures are still largely excluded from SIF classification systems. This exclusion persists despite evidence that MSDs follow fatigue-failure mechanisms, in which repeated biomechanical loading leads to progressive degradation and eventual complete failure, similar to mechanical failure (Gallagher & Schall, 2017). While fatigue failure is conceptually aligned with SIF precursor pathways, this perspective has not been integrated into prevailing SIF frameworks, raising a critical question: Are we missing potential SIFs (pSIFs) by not integrating MSD risks into SIF prevention models?



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Despite MSD prevention not being fully incorporated into SIF prevention efforts, MSDs are undoubtedly leading to significant, serious outcomes for workers. For example, low back pain is the leading cause of years lived with disability globally (GBD 2021 Low Back Pain Collaborators, 2023), and musculoskeletal conditions are strong predictors of permanent work disability (Abásolo et al., 2012). Social Security Administration (2025) data further show that MSDs account for 34.1% of disabled-worker beneficiaries, indicating that roughly 1 in 3 disability cases are MSD-related. Even when workers return to employment, long-term consequences persist: earnings losses of approximately 10.9% have been observed up to 10-14 years post-injury (Dworsky & Powell, 2022). Importantly, severity doesn't always follow typical injury categories — long-term conditions like carpal tunnel syndrome can have a greater overall impact than sudden injuries like fractures (Foley et al., 2007). Further, factors such as early opioid use after an injury can also affect recovery outcomes (Franklin et al., 2008). Together, these findings support a systems perspective in which severe, life-altering MSD outcomes emerge from the combined effects of cumulative exposure and post-injury response rather than a single discrete event, as is often assumed for SIFs.

The relationship between MSD severity and SIF potential is not well established, and as stated, current frameworks continue to emphasize acute, energy-based hazards (Inouye et al., 2018; Inouye et al., 2020; Sannito et al., 2022; Hallowell et al., 2017; Bayona et al., 2025). Data shows this gap clearly: OSHA Severe Injury Reports show that exertion-related events account for only 2.9% of severe injuries, with most attributed to heat illness (Morrissey et al., 2023), leaving musculoskeletal exposures largely absent from surveillance systems. This underrepresentation is not due to lack of consequence but rather to how severity is defined. Leading SIF classification frameworks scope serious injury to acute, high-energy events (Edison Electric Institute, 2024) and explicitly exclude harm from “long-term or repetitive exposures” exactly the mechanism through which cumulative MSDs arise. Because severity in these frameworks is operationalized as instantaneous energy transfer rather than eventual outcome (Hallowell et al., 2017; Bayona et al., 2025), a disorder that produces permanent impairment gradually, without a discrete high-energy event, falls outside the criteria regardless of how disabling its endpoint. As a result, MSD-related risks remain outside SIF detection systems, creating a structural blind spot.

Addressing this gap requires expanding SIF frameworks to explicitly recognize cumulative exposure pathways and their potential to produce serious and life-altering outcomes.



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Organizational and System-Level Barriers to Integrating MSD Risk into SIF Frameworks

A fundamental barrier to integrating MSD risk into SIF prevention lies in how [organizations are structured](#). In many EHS functions, ergonomics is managed within health or human-resource domains, while SIF prevention is housed within safety functions focused on energy-based hazards. This structural separation limits interaction between the two, such that ergonomics practitioners are often excluded from SIF analyses, while personnel focused on SIF prevention may lack ergonomics expertise.

Leadership priorities further reinforce this divide. Although leadership is critical to the success of ergonomics programs (Schall & Michel, 2020), workers' perceptions of what leaders prioritize strongly shape safety behavior and outcomes (Zohar, 1980; Zohar, 2010). When MSD risks are treated as less urgent than SIF risks, it signals that MSD prevention is a lower priority — affecting how resources are allocated, how training is delivered and how supervisors manage safety. Most recent survey evidence from the NSC MSD Solutions Lab reflects these consequences: safety leaders consistently rate organizational safety culture, communication and worker involvement more positively than frontline workers, while nearly 30% of workers experiencing pain do not report it (Reynoso et al., 2025). This gap is not merely a communication issue; it reflects a lack of shared understanding that MSD-related exposures can lead to serious, long-term and potentially life-altering outcomes.

Disconnect in MSD and SIF Risk

A key barrier to integrating MSD and SIF prevention lies in how organizations measure and manage risk. MSDs and SIFs are typically tracked through separate systems: MSDs through occupational health and workers' compensation metrics (e.g., Days Away, Restricted, or Transferred, lost-time cases). SIF data, by contrast, moves through safety management systems organized around severity-weighted lagging indicators; precursor analyses; and high-energy leading indicators, such as the High-Energy Control Assessment, which measures the proportion of high-energy hazards mitigated by a direct control (Oguz Erkal & Hallowell, 2023; Edison Electric Institute, n.d.). Because these systems look at risk differently — i.e., cumulative exposure versus single high-energy events — they rarely connect, leaving shared causes largely unnoticed. This separation is further reinforced by fragmented EHS data systems, in which reporting, inspections and training records exist in isolation. Although integrated management approaches such as ISO 45001 (International Organization for Standardization, 2018) and ANSI/ASSP Z10 (American Society of Safety Professionals, 2019) emphasize embedding health and safety across organizational processes, MSD and SIF risks continue to be measured and prioritized separately in practice. This disconnect also reflects dominant safety thinking.

Heinrich's safety triangle (Heinrich, 1931), which suggests that reducing minor incidents reduces major events, has long shaped safety thinking. However, research shows that serious injuries often follow distinct pathways (Manuele, 2008). Evidence from mining operations indicates that higher-severity nonfatal events, such as permanently disabling injuries, are stronger predictors of future fatalities than minor incidents (Yorio & Moore, 2018). Yet MSDs, which can have deleterious, long-term impacts, are still commonly placed at the base of the triangle, viewed as frequent but low risk, obscuring their potential to contribute to serious outcomes. As a result, MSD symptoms are often managed individually rather than escalated as serious risk indicators. This dynamic is reflected in underreporting: organizational culture and trust strongly influence whether workers report MSD-related symptoms (Kwon et al., 2023), and many workers manage these conditions independently without organizational support (Skamagki et al., 2023). This limits early detection of cumulative exposures that may lead to severe outcomes.



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SIF literature increasingly recognizes organizational factors, including fatigue, overtime, staffing levels, and production pressures along with physical energy hazards (Alexander et al., 2017; Bayona et al., 2024), and these conditions also shape MSD risk: fatigue and workplace stress were among the non-physical contributors to MSDs reported by frontline workers (Reynoso et al., 2025). Together, this suggests that both injuries are impacted by some of the same underlying organizational conditions but through separate systems and frameworks. Efforts such as NIOSH's Total Worker Health approach (National Institute for Occupational Safety and Health, n.d.) and the MSD Solutions Index (National Safety Council, 2024) emphasize integration within safety and health. However, extending this integration to bridge MSD and SIF prevention remains an unresolved gap.

Risk Assessment Limitations in Identifying MSD-SIF Potential

A fundamental limitation in current risk assessment practices is the separation between ergonomic hazard analysis and SIF classification. While Job Hazard Analyses and ergonomic assessments are widely used, they rarely are used to inform SIF potential. SIF potential more typically considers energy-release hazards, such as falls, electrical exposure and moving equipment (Inouye et al. 2018; DEKRA, 2021), thereby excluding biomechanical loading and ergonomic risks. For example, DEKRA's event-based decision model explicitly classifies overexertion as "not SIF potential" unless linked to a high-energy event. This exclusion contrasts with the framework's own definition of a "life-altering" injury as one involving permanent loss of function (DEKRA, 2021), a criterion that severe MSDs clearly meet. However, because SIF classification is based on whether a single event could have resulted in worse outcomes, cumulative MSD pathways are excluded by design. High-consequence ergonomic exposures, such as sustained force, repetition and awkward posture, that often lead to MSDs are therefore overlooked, not due to low severity but because the framework cannot detect gradual harm.

This gap is further reinforced by limitations in ergonomic assessment tools. Methods such as Rapid Upper Limb Assessment, Rapid Entire Body Assessment and the National Institute for Occupational Safety and Health Lifting Equation estimate the likelihood of developing an MSD but do not assess severity of potential outcomes (McAtamney & Corlett, 1993; Hignett & McAtamney, 2000; Waters et al., 1993). Conversely, SIF risk matrices emphasize severity but are rarely applied to ergonomic exposures. As a result, neither system captures cumulative exposures that may lead to permanent impairment, despite clear severity equivalence. This creates a structural mismatch: SIF systems detect acute hazards, while ergonomic risks accumulate outside their field of view.

While prior research establishes the existence of many gaps, it does not capture how EHS professionals actually perceive both MSDs and SIFs and respond to this relationship in practice. This report introduces findings from a survey designed to understand practitioners' perspectives: specifically, whether they recognize links between MSDs and SIFs and how MSD-related risks are currently classified and managed in their organizations. Establishing this practitioner baseline is essential for determining existing perceptions of overlap between MSDs and SIFs and subsequently developing effective frameworks, improving data systems and advancing risk assessment approaches. Ultimately, the survey represents a first step toward addressing a systemic gap that continues to result in preventable, long-term harm to workers.



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Survey Methodology

Survey Instrument

Survey items were developed by the MSD Solutions Lab, reviewed by subject matter experts and iteratively refined to produce the final questionnaire. The final survey included 27 substantive items, in addition to demographic items, and incorporated a mix of multiple-choice (single-select and multi-select), Likert-scale and open-ended response formats. Informed consent was obtained electronically prior to participation. The questionnaire was organized into four sections: Organizational Context and Priorities (11 questions), Safety Culture (six questions), MSD-SIF Relationship Awareness (six questions), and Risk Assessment and Evaluation (four questions).

Participants

The survey was conducted online by a third-party vendor using a blend of consumer and business panels. Respondents were required to be age 18 or older; serve as an EHS professional at their organization with knowledge of MSDs and SIFs; and be directly responsible for OSHA record keeping, MSD/SIF classification, ergonomics or MSD prevention programs, or incident investigations. As an additional layer of validation, respondents were asked to answer two open-ended questions designed to assess their familiarity with MSDs and SIFs: "In your own words, what does your organization consider to be an MSD? Please describe the types of injuries or conditions your organization includes in the definition." And "How does your organization distinguish a SIF from other types of injuries or incidents? Please describe the criteria used (e.g., severity, potential outcomes, required response)." The research team reviewed these qualitative responses and excluded individuals whose answers indicated they were unfamiliar with the terms or demonstrated an inaccurate understanding of MSDs and/or SIFs. A total of nine respondents were removed through this screening process, resulting in a final sample of 180 qualified participants. Fieldwork was conducted from February 25 to March 19, 2026.

Statistical Analysis

After survey closure, data was reviewed for completeness and cleaned prior to analysis. Analyses were conducted using Statistical Package for the Social Sciences version 30 (SPSS, Chicago, IL). Descriptive statistics were used throughout the analysis to summarize respondent and organizational characteristics and to describe response distributions across all survey items. Cross-tabulation analyses were conducted to examine patterns and differences across organizational size and industry groups. When relevant, chi-square tests and z-tests were used to identify statistically significant subgroup differences. A significance level of $p < 0.05$ was used for all statistical tests.

Associations between key survey variables were examined using correlation analyses appropriate to the level of measurement. Spearman's rank-order correlation coefficient (ρ) was used to assess relationships between ordinal variables, Somers' D was used to examine associations between dichotomous and ordinal variables, and the Phi coefficient (ϕ) was used to assess associations between dichotomous variables.

Because the number of respondents within individual industry sectors was insufficient for meaningful statistical comparison, industries were combined into four broader categories for subgroup analyses: Industrial & Infrastructure (manufacturing, construction, utilities, mining, transportation and warehousing, agriculture, forestry, fishing, and hunting); Healthcare & Education (healthcare, social assistance and educational services); Professional & Knowledge Services (professional, scientific and technical services; information; finance and insurance; management of companies and enterprises; administrative and support, and waste management and remediation services); and Consumer & Other Services (accommodation and food services; arts, entertainment and recreation; retail trade; and other services, except public administration).

Survey Findings and Discussion

Sample Characteristics

The sample consists of 180 EHS leadership professionals, representing a range of organizations and industries. Detailed demographic and characteristic breakdowns can be found in the appendix.

Survey Respondents

The sample represents predominantly white (78%), male (78%) and middle-aged professionals (59% in 40-59 age range), reflecting diversity gaps typical of traditional industrial safety fields. Respondents are experienced practitioners spanning mid-career to veteran levels, with 98% having been in EHS leadership for at least three years. Respondents reported varying responsibilities across key EHS functions, the most commonly cited being ergonomics and MSD prevention programs (78%) and incident investigation (73%). While all respondents had at least a basic understanding of MSDs and SIFs, the majority of respondents indicated they could confidently explain the terms MSD (69%) and SIF (76%). Together, these findings demonstrate respondents' direct involvement in both MSD and SIF management and support the credibility of their insights.

Industry representation is concentrated in high-hazard sectors: Industrial & Infrastructure and Healthcare & Education represent ~63% (Figure 1; see detailed industry breakdown in the Appendix). Participants are drawn from a balanced range of company sizes, suggesting the findings reflect informed perspectives from professionals operating within well-developed and generalizable EHS infrastructures.

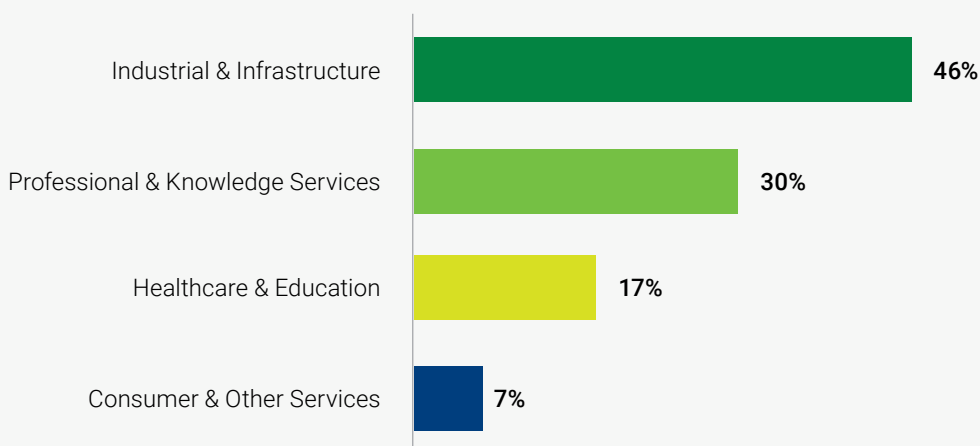


Figure 1. Distribution of respondents by industry category



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MSD and SIF Prevention Context

Represented organizations were largely described as having mature safety management approaches, with 85% of respondents characterizing their organization's approach as proactive or higher – meaning safety risks are identified and addressed before incidents occur, with safety integrated into operations, culture and/or decision-making. The vast majority (93%) reported having a dedicated ergonomics and/or MSD prevention program. EHS leadership most commonly reviewed MSD, SIF and pSIF metrics on a monthly basis, with weekly and quarterly review cadences reported at comparable frequencies among the remaining respondents (Figure 2).

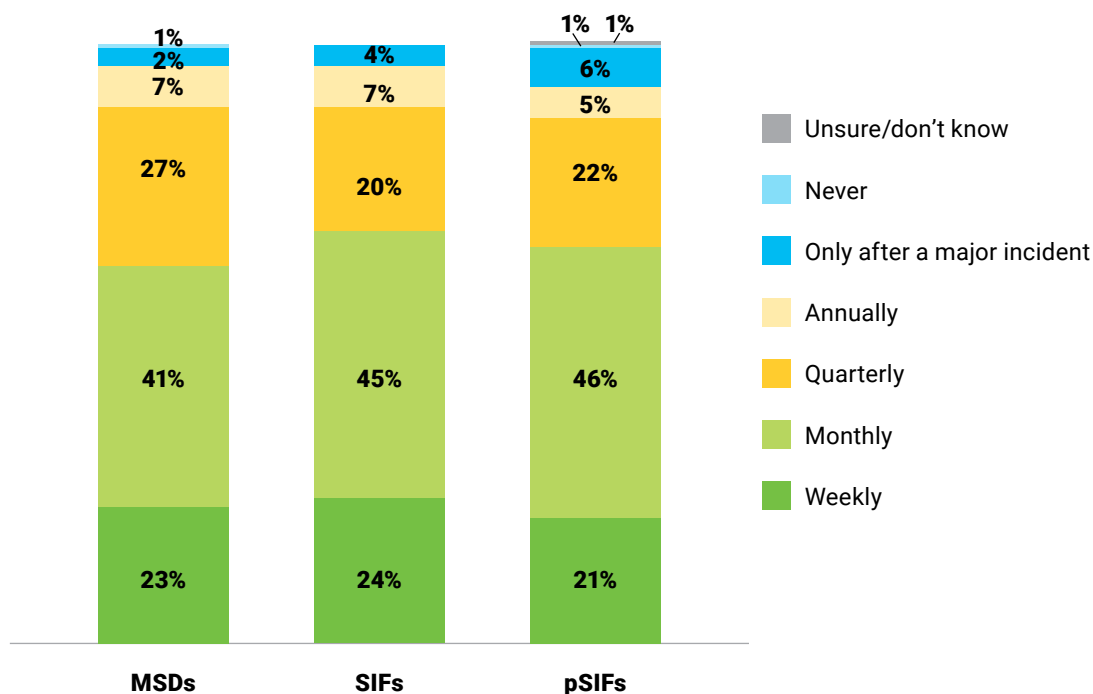


Figure 2. How often EHS leadership reviews metrics related to MSDs, SIFs & pSIFs

Prioritization of MSD and SIF prevention was most often reported as comparable (54%). However, organizations were more than four times as likely to prioritize SIF prevention over MSD prevention (29%) than to prioritize MSD prevention over SIF prevention (7%) (Figure 3).

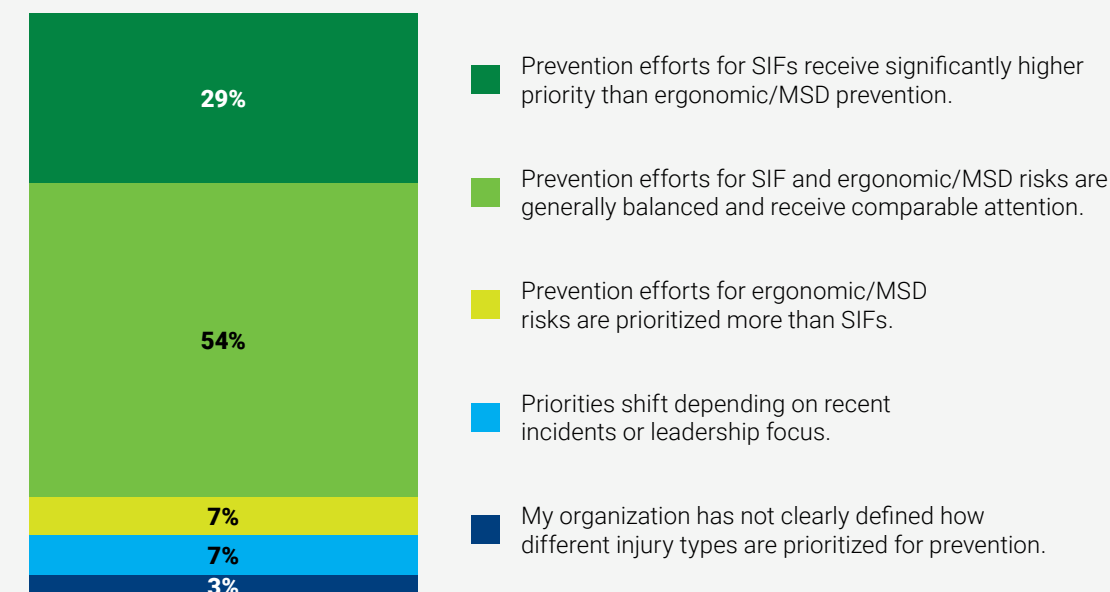


Figure 3. Organizational prioritization of MSD and SIF prevention



Barriers to Reporting

Barriers to reporting musculoskeletal discomfort were common. The most frequently cited barrier was the expectation that symptoms or injuries would improve on their own (71%), followed by fear of blame, discipline or job loss (53%) and productivity pressures (47%) (Figure 4). Large organizations (1,001+ employees) more frequently selected lack of training or awareness of reporting policies (43% vs. 19%), uncertainty about how to report (46% vs. 24%), perceived management non-responsiveness (46% vs. 28%), and productivity pressure (55% vs. 40%) in comparison to small and midsize organizations (<1,001 employees) ($p < 0.05$). This could reflect some structural difficulty in maintaining reporting clarity and psychological safety across large, geographically distributed workforces (Zohar & Luria, 2005; Edmondson, 1999).

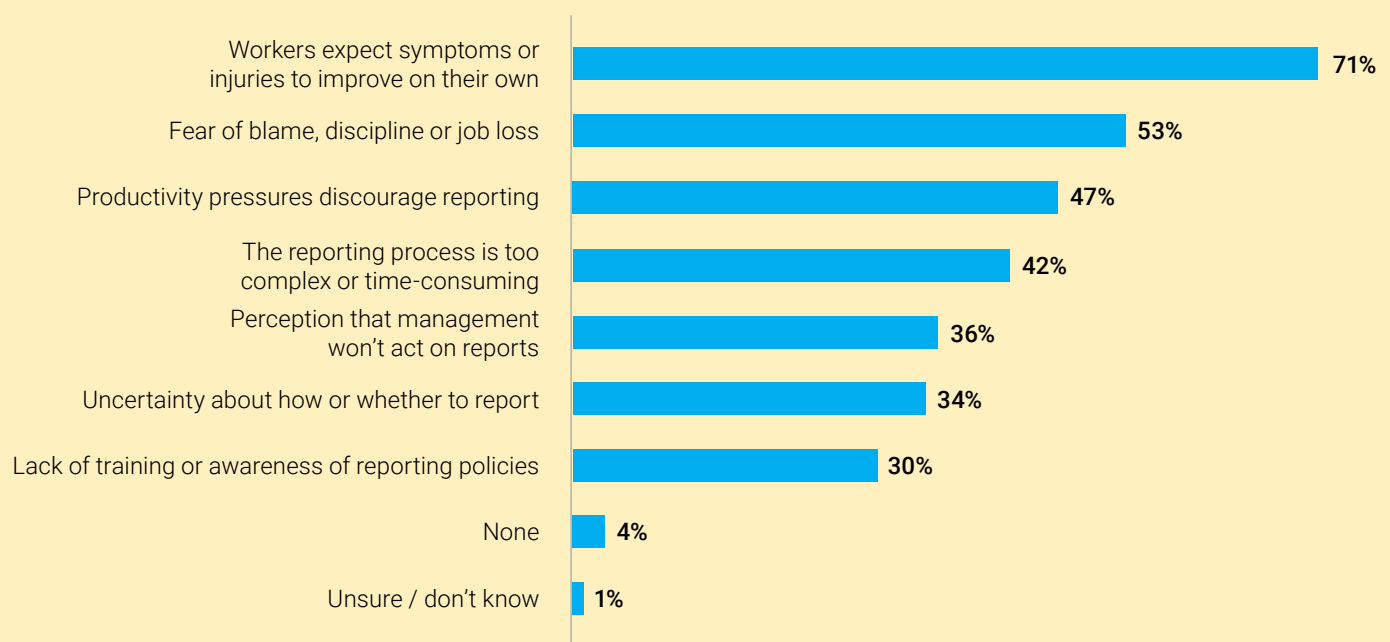


Figure 4. Barriers limiting consistent reporting of nonfatal work-related injuries or musculoskeletal discomfort from the perspective of an EHS leader (item was 'select all that apply')

Definitions and Classification Patterns of MSDs, SIFs and pSIFs

Organizations most often defined MSDs (73%), SIFs (72%) and pSIFs (63%) formally, in alignment with regulatory or industry standards. The remainder relied on informal or case-by-case definitions, with pSIFs having the largest share of informal or case-by-case definitions. While 81% of organizations reported identifying at least some pSIFs before an injury occurs, fewer than one-third reported that this is true for most pSIFs, highlighting a substantial opportunity for more proactive identification (Figure 5). A weak but statistically significant association was observed between having formal pSIF definitions and identifying pSIFs before incidents ($d = 0.21, p < 0.01$), indicating that organizations with formal definitions tended to identify pSIFs earlier.

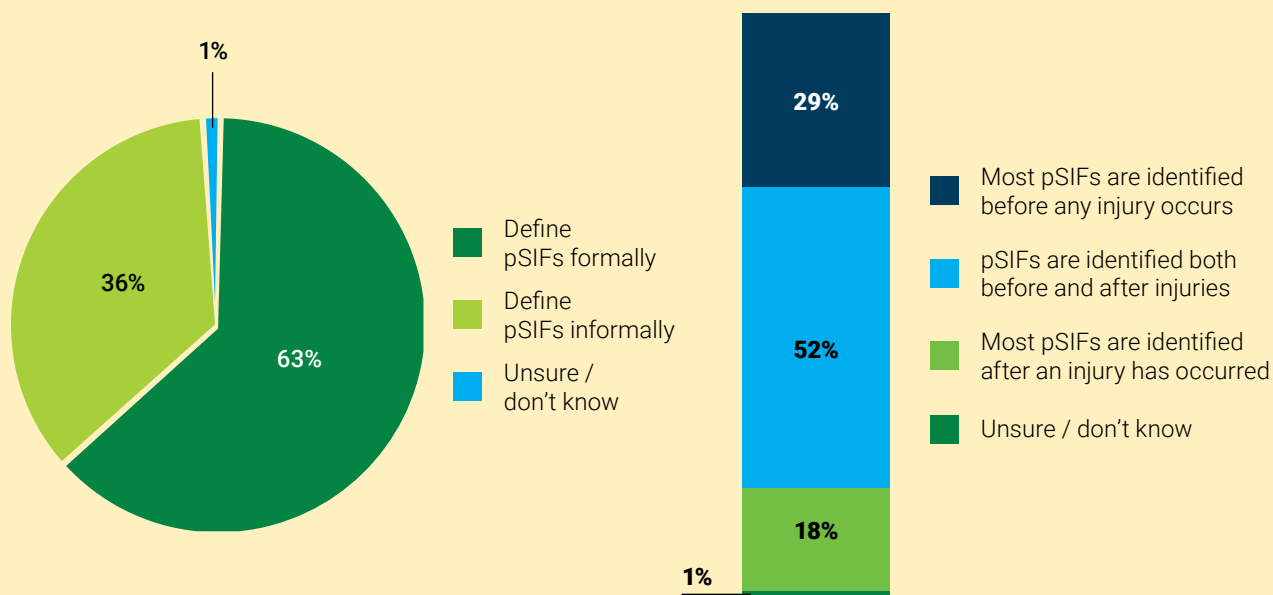


Figure 5. Formality of pSIF definitions and timing of pSIF identification among represented organizations

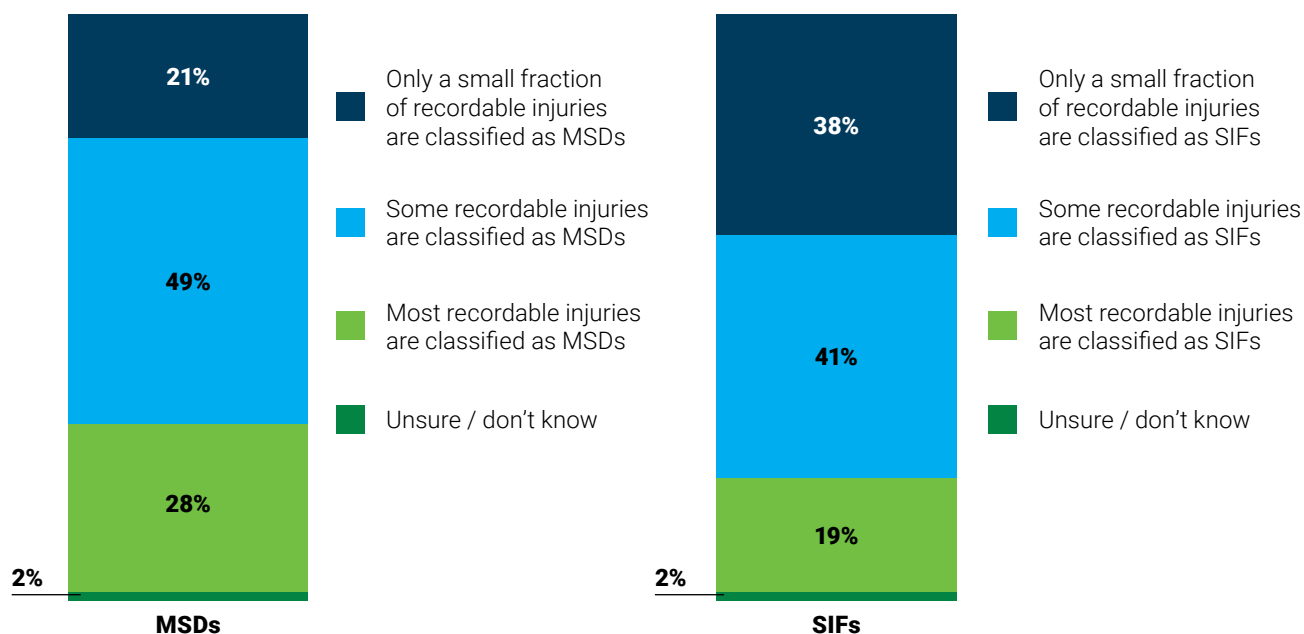


Figure 6. Proportion of recordable injuries classified as MSDs and SIFs at represented organizations

Figure 6 suggests that organizations perceived MSDs to make up a larger share of recordable injuries than SIFs: 28% reported that “most” recordables were MSDs, versus 19% for SIFs, while 38% reported that only a small fraction of recordables were SIFs, versus 21% for MSDs. Because the response options were not numerically anchored, however, this should be interpreted as a descriptive rather than a formally tested comparison.

Notably, responses to the MSD and SIF prevalence items were strongly correlated ($r_s = 0.60, p < 0.001$), indicating that organizations reporting a greater share of MSDs among their recordable injuries also tended to report a greater share of SIFs. This pattern may reflect overlap between the two classification systems, although it may also be related to the 37% of organizations that reported lacking a formal definition for MSDs, SIFs or both.

MSD-SIF Relationship Awareness

Classification of MSDs as SIFs

Respondents were asked whether their organizations had classified an MSD as a pSIF or an actual SIF (Figure 7). Across industries, most (79%) reported having classified an MSD as a SIF and/or pSIF, indicating that many organizations already recognize a relationship between MSDs and SIFs in practice: 64% had classified an MSD as a pSIF and 41% as an actual SIF.

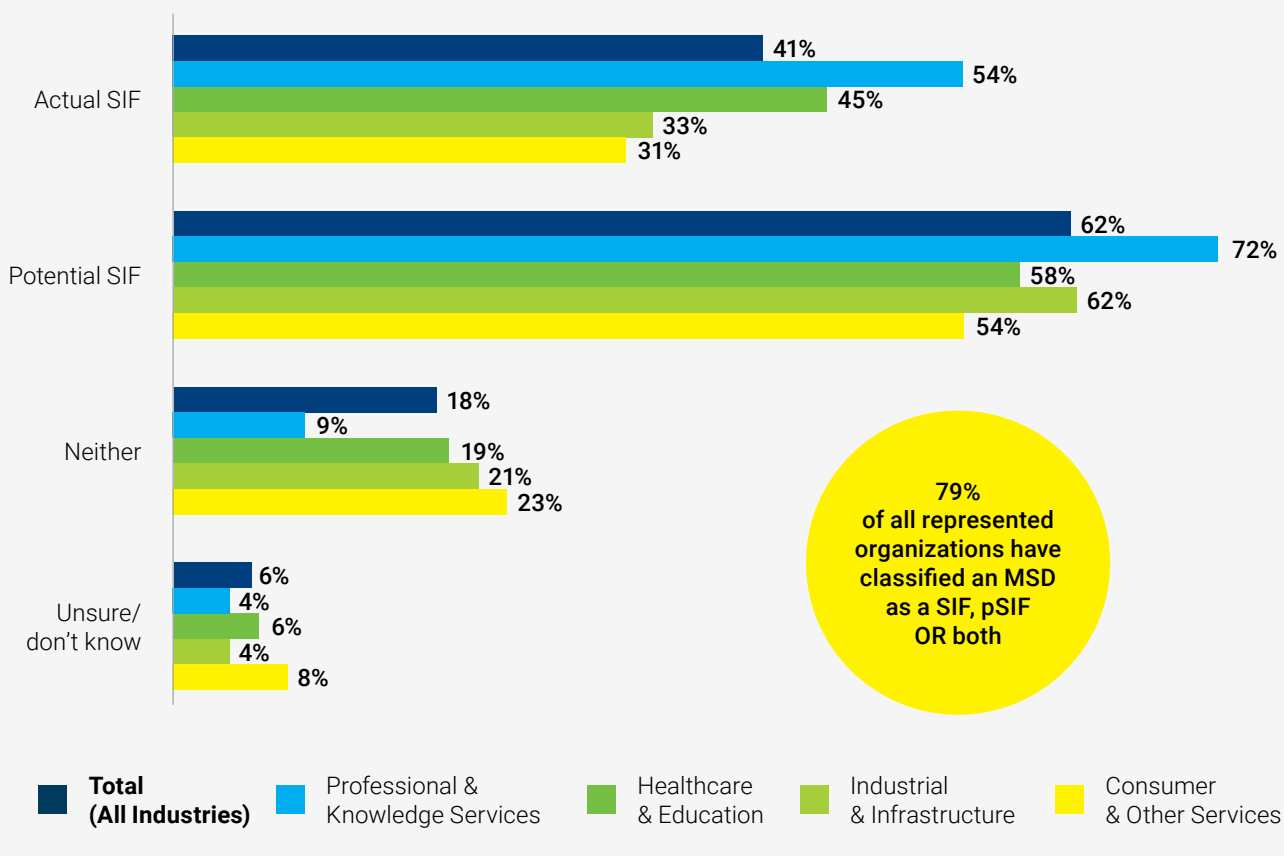


Figure 7. Percent of represented organizations that have classified an MSD as a SIF and/or pSIF, shown as overall total and broken down by industry category (item was ‘select all that apply’)

In response to open-ended responses describing how organizations would classify an event resulting in severe, long-term musculoskeletal impairment, about one-third of respondents (32%) explicitly stated that such cases would be treated as a SIF or pSIF, and 49% indicated that the injury would be classified based on severity. Respondents emphasized lasting impact (39%), permanent disability (32%), chronic pain (14%) and an inability to return to full duty (8%) as key factors in determining whether an MSD should be escalated to a SIF or pSIF designation.

For example, an experienced EHS professional from a large Professional & Knowledge Services organization explained that injuries resulting in “permanent loss of a body function, permanent work restrictions or chronic pain that needs long-term clinical management” are classified as SIFs, with consideration centered on “how the condition changes people’s lives rather than how they got hurt.”

A mid-career respondent from a large manufacturing organization reported that MSDs involving “chronic pain, disability or lasting functional limits” are treated as serious recordable injuries and are often reviewed as pSIFs because of their enduring impact on workers.

An experienced respondent from a very large health care organization described a similar approach, indicating that MSDs with potentially chronic or long-term health consequences are frequently classified as pSIFs when they stem from “a severe failure or series of failures in either work practices or ergonomic design.” This response highlights how some organizations apply a SIF prevention lens to MSDs by focusing on potential long-term injury outcomes and also on the seriousness of the underlying organizational and system failures.

However, this view was not universal. An experienced respondent from a small transportation and warehousing organization indicated that severe MSDs are generally not considered SIFs within their organization. As the respondent explained, lower-back pain in truck drivers “does not usually have an injury ‘date’ or a direct injury associated with it” and is instead “a gradual onset of continued pain and discomfort that eventually becomes too much for the driver to handle/manage.” The respondent further noted that there are “usually other contributing factors to the lower-back pain outside of their job duties.” Although these cases are still reported and managed through workers’ compensation, the respondent emphasized that they are not viewed “the same as a catastrophic SIF from a specific event,” highlighting an alternative perspective that views MSDs and SIFs as fundamentally different categories of injury despite the potential for similarly serious outcomes.

Professional Consensus on Ergonomics Contribution to SIFs

Ninety-two percent of respondents agreed or strongly agreed that human factor and ergonomics-related issues contribute to SIFs or pSIFs in their organizations. When asked to explain their reasoning in an open-ended follow-up, respondents most commonly pointed to fatigue and poor design or equipment as key contributors, with repetitive motion, overexertion, physical strain and impaired judgment also mentioned as contributors (Figure 8). Several respondents elaborated on these themes in more depth, describing the reasoning behind the connection – particularly how physical fatigue from ergonomic issues can impair both physical and cognitive performance, degrade judgment and hazard recognition, and increase the risk of accidents or errors:

“Human factors and ergonomics are the main causes of ‘SIF precursors.’ Based on what we’ve seen, physical overexertion and poorly designed equipment make it necessary to find ‘workarounds’ that often ignore important safety barriers. We also see fatigue as more than just a risk for MSDs; we see it as a cognitive impairment that makes it harder for a worker to see hazards that are high-energy. By not designing tasks to fit what people can do (ergonomics), the organization makes it more likely that a catastrophic system failure (SIF) will happen.”

"Human factors and ergonomics are root causes, not just secondary symptoms. In our manufacturing environment, we recognize that physical fatigue from repetitive overexertion significantly degrades a worker's cognitive function and reaction time. When an employee is physically exhausted from poor workstation design or excessive manual lifting, they are far more likely to make a critical error."

"Human factors and ergonomic issues can significantly contribute to serious injuries in health care environments. In clinical settings, staff frequently perform physically demanding tasks, such as patient lifting, repositioning and prolonged standing, which can lead to overexertion or strain. Fatigue from long shifts, workspace design limitations and repetitive movements can increase the risk of accidents."

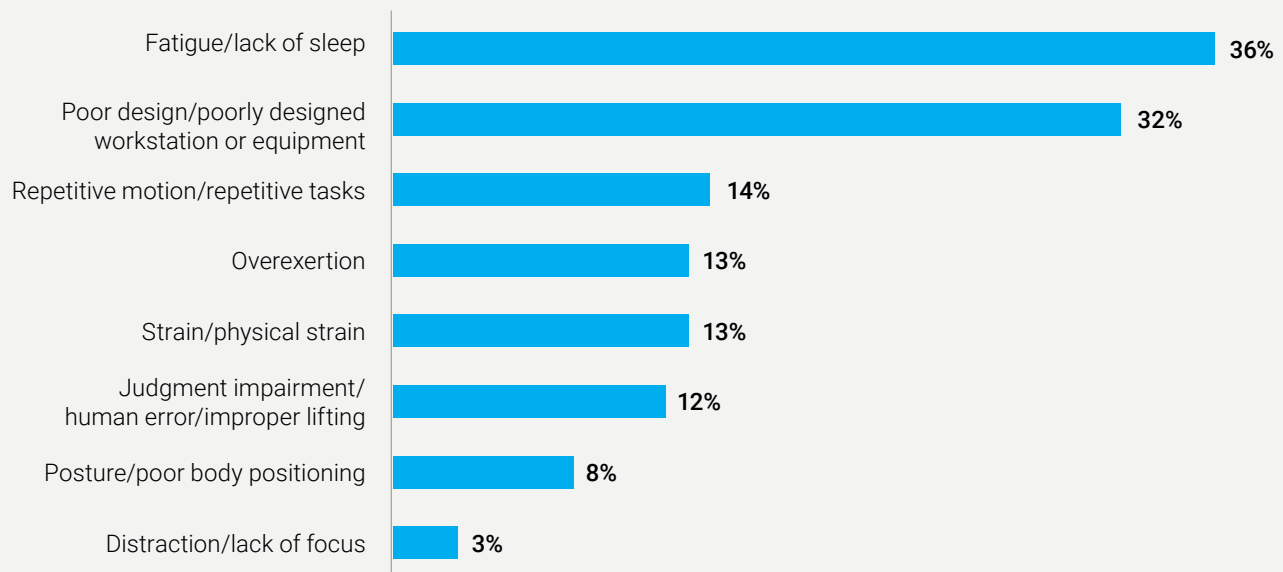


Figure 8. Themes identified in open-ended responses on "why human factors and ergonomic issues contribute to SIFs/pSIFs"; all themes reflect responses from the 92% of respondents who agreed or strongly agreed that these issues contribute to SIFs in their organizations

Estimated Attribution of SIFs/pSIFs to Ergonomics-Related Causes

Respondents were asked to estimate the proportion of SIFs and pSIFs in their organization attributable to ergonomics-related causes (three respondents who disagreed that ergonomics is a contributing factor to SIFs did not respond to this item). Overall, most respondents (54%) estimated a moderate proportion, though this varied somewhat by industry (Figure 9), indicating that the strength of this estimated contribution may depend on industry context, task exposure, and how organizations define or identify ergonomics-related precursors.

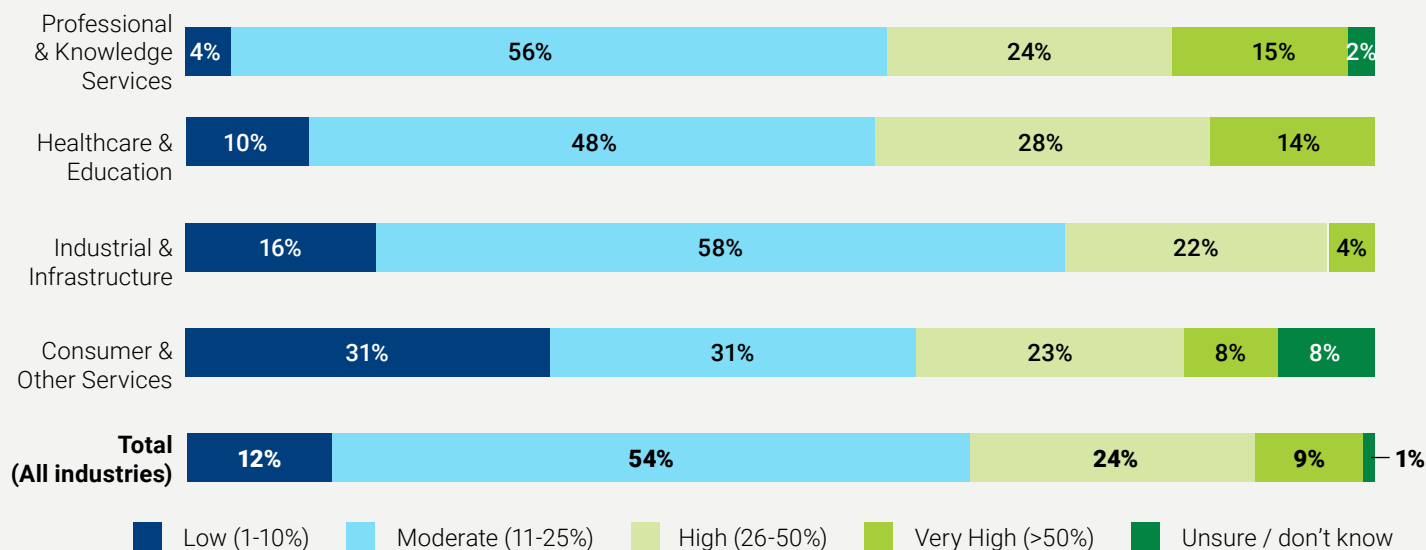


Figure 9. Estimated proportion of SIFs or pSIFs at least partially attributable to ergonomics-related causes (e.g., fatigue, design issues, physical strain, overexertion) by industry

The estimated proportion of SIFs/pSIFs attributable to ergonomics was positively correlated with a higher proportion of recordables classified as SIFs ($r_s = 0.43, p < 0.001$), and a higher proportion of recordables classified as MSDs ($r_s = 0.36, p < 0.001$). This finding suggests that while most respondents agreed that ergonomics-related causes can contribute to SIFs and pSIFs, organizations with greater MSD and SIF burden tend to report that ergonomics is a larger driver of severe events.

Risk Assessment and Evaluation

Risk Identification and Control: Overlap and Differences

After assessing organizations' recognition of ergonomics' contribution to SIFs, respondents were also asked what methods their organizations use to identify and control MSD risk and, separately, SIF/pSIF risk (Figures 10 and 11). While these methods were not asked using identical response options, several clear thematic parallels emerged, pointing to areas where MSD and SIF risk management efforts may already overlap or could be more deliberately consolidated. Table 1 presents conceptually related MSD and SIF/pSIF risk-identification and control methods side by side, reporting the percentage of organizations using each method and the correlation between use of the paired methods.

Table 1. Usage rates and correlations between paired MSD and SIF/pSIF risk identification and control methods

MSD risk identification and control method	SIF risk identification and control method	MSD usage %	SIF usage %	Correlation
Standardized ergonomic risk assessments or job hazard analyses	Job hazard analyses and pre-task risk assessments	78%	66%	0.52**
Incident, injury and near-miss data reviews focused on MSDs	Incident and near-miss investigations with SIF focus	68%	63%	0.35**
Safety walk-throughs and audits	Safety walk-throughs and audits	66%	49%	0.51**
Training and education programs on ergonomics	Training and education programs on safe work practices	66%	56%	0.48**
Worker involvement and participatory ergonomics programs	Worker participation in hazard identification	59%	59%	0.17*
Emerging technologies (e.g., wearable sensors, exoskeletons, AI-driven tools, analytics)	Safety technologies (e.g., sensors, analytics)	38%	50%	0.32**

Note: Correlation represents the Phi coefficient (ϕ), a measure of association between two binary variables. ϕ values of approximately 0.10-0.29 indicate weak association, 0.30-0.49 indicate moderate association and ≥ 0.50 indicate strong association. In the correlation column, a single asterisk indicates $p < 0.05$, and double asterisks indicate $p < 0.001$.

The clearest overlap is at the assessment stage: Standardized ergonomic risk assessments / job hazard analyses were the most commonly used method for identifying MSD risk (78%), paralleling job hazard analyses and pre-task risk assessments as the top method for SIF/pSIF risk (66%), with a strong correlation between the two. This, paired with the separate finding that all organizations using standardized ergonomic risk assessments use them to inform SIF prevention in some capacity, shows that some organizations likely have the capacity to integrate these risk management strategies.

Incident and near-miss review processes showed a similar pattern, used by a majority of organizations for both MSD (68%) and SIF (63%) risk identification and moderately correlated. Although the survey did not determine whether organizations conduct these reviews through a fully integrated process, the shared reliance on incident and near-miss reviews is promising because these reviews create a practical point of connection: MSD incidents and near misses can be examined for SIF precursors, and ergonomic contributors identified during MSD reviews may help explain or prevent the root causes of subsequent SIF events.

Worker involvement/participation programs stand out as an exception to this pattern. While used at the exact same rate for both MSD (59%) and SIF (59%) risk identification, and having a statistically significant association, the correlation between the two was weak. The weak correlation suggests that comparable levels of use do not necessarily translate into application across MSD and SIF risk management, though the equally high utilization of these approaches in both domains points to a significant opportunity for alignment. When organizations have already established effective worker engagement and trust in one area, those foundations could potentially be leveraged to support a similar approach to identifying and managing risks in the other area.



Differences in technology use are also notable. Safety technologies such as sensors and analytics were used by half of organizations for SIF/pSIF risk (50%), compared to just 38% reporting use of emerging technologies for MSD risk, despite the substantial and growing utility of wearable sensors, motion capture, and other ergonomic-specific technologies for identifying and addressing musculoskeletal risk. The moderate correlation between the two suggests some overlap between organizations adopting technology in both areas, but the adoption gap itself points to ergonomic risk management lagging behind SIF prevention in leveraging technology-driven approaches.

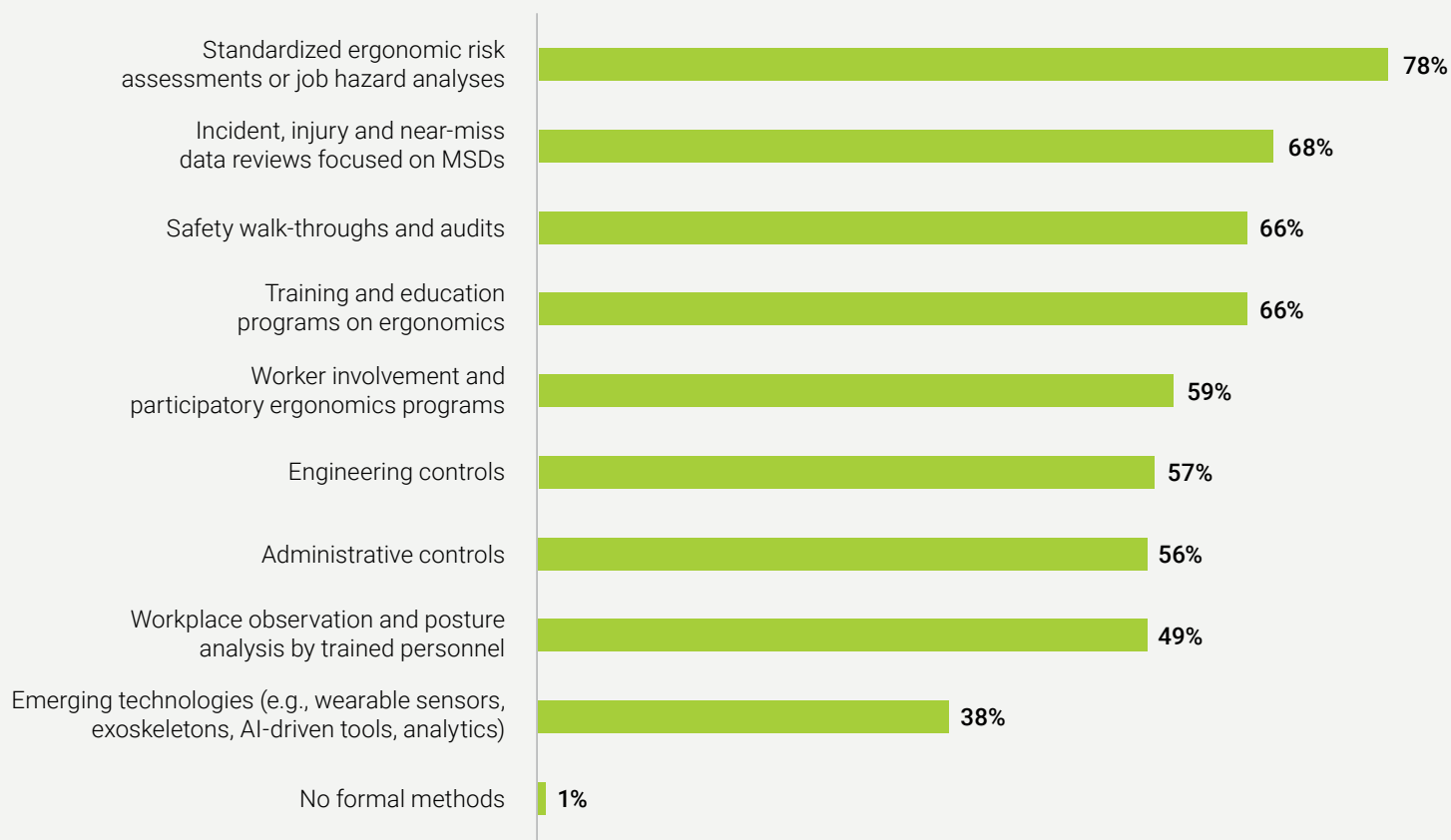


Figure 10. *Methods used to identify and control MSD risks*

Integration of MSD-and SIF-Related Interventions

Most organizations reported evaluating the bidirectional effectiveness of interventions across MSD and SIF prevention: 88% evaluate whether ergonomic interventions lower SIF potential (61% formally, Figure 11), and 86% evaluate whether SIF controls lower MSD risk (58% formally). Design and engineering controls (e.g., automation, lifting aids, workspace redesign) also showed substantial cross-application, with 85% of organizations reporting use of these controls to address both SIF and MSD prevention, though 36% reported that MSD and SIF risk reduction from these controls are managed separately (Figure 12).

Although some variation was observed across industry categories, the overall pattern was consistent, with the exception of the Consumer & Other Services category more often indicating that ergonomic interventions are evaluated against MSD outcomes only and that engineering controls primarily address MSD risks. This increased focus on ergonomics might reflect the generally low SIF risk in that industry category.

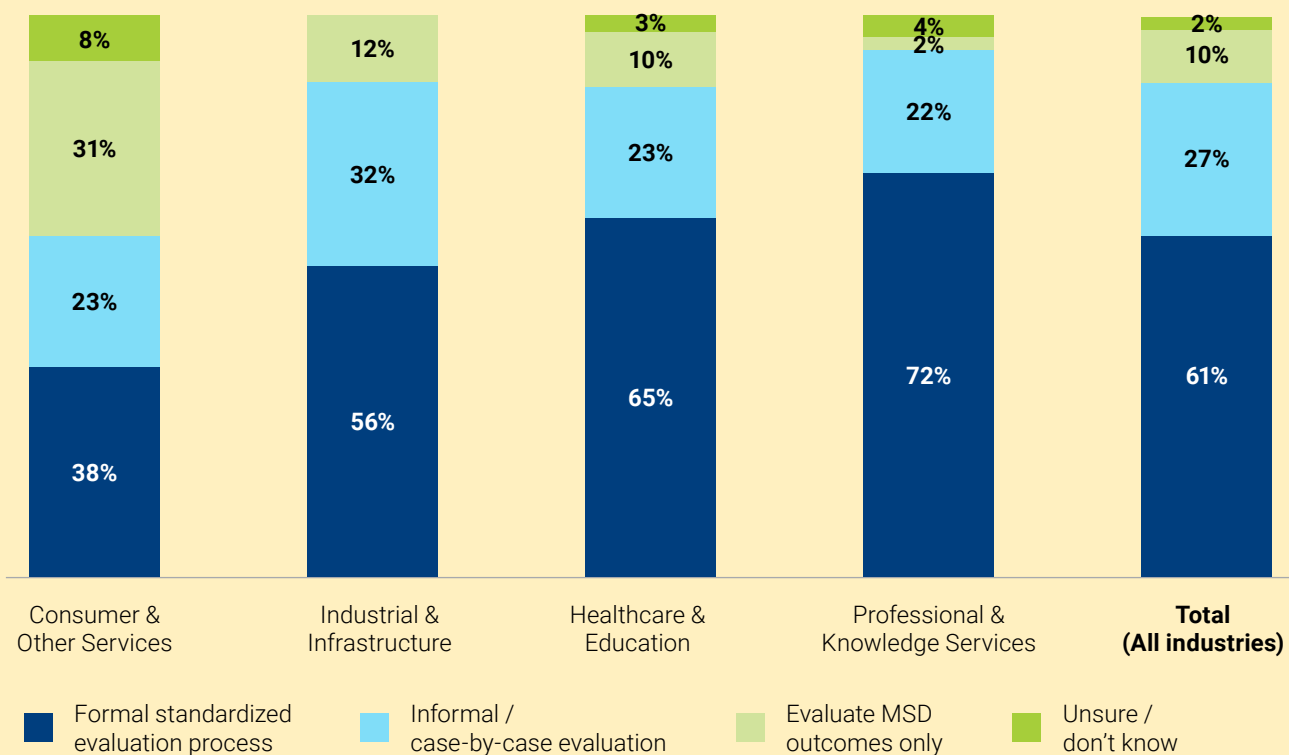


Figure 11. Evaluation of ergonomic interventions lowering SIF potential by industry

Overall, the results suggest that integration of MSD and SIF prevention is common across organizations. Most organizations use ergonomic risk assessment findings to inform SIF prevention, evaluate whether ergonomic interventions affect SIF risk, and apply design and engineering controls to address both MSD and SIF risks. The key differences lie in the formality of these evaluation processes and the extent to which MSD and SIF prevention are managed as a single, integrated effort versus separately. Notably, among the 110 organizations with formal, standardized processes to evaluate the impact of ergonomic intervention on SIF risk, 67.3% reported fully integrating design and engineering controls for both SIF and MSD prevention, a significantly higher proportion than among organizations with informal or no evaluation processes ($p < 0.05$).

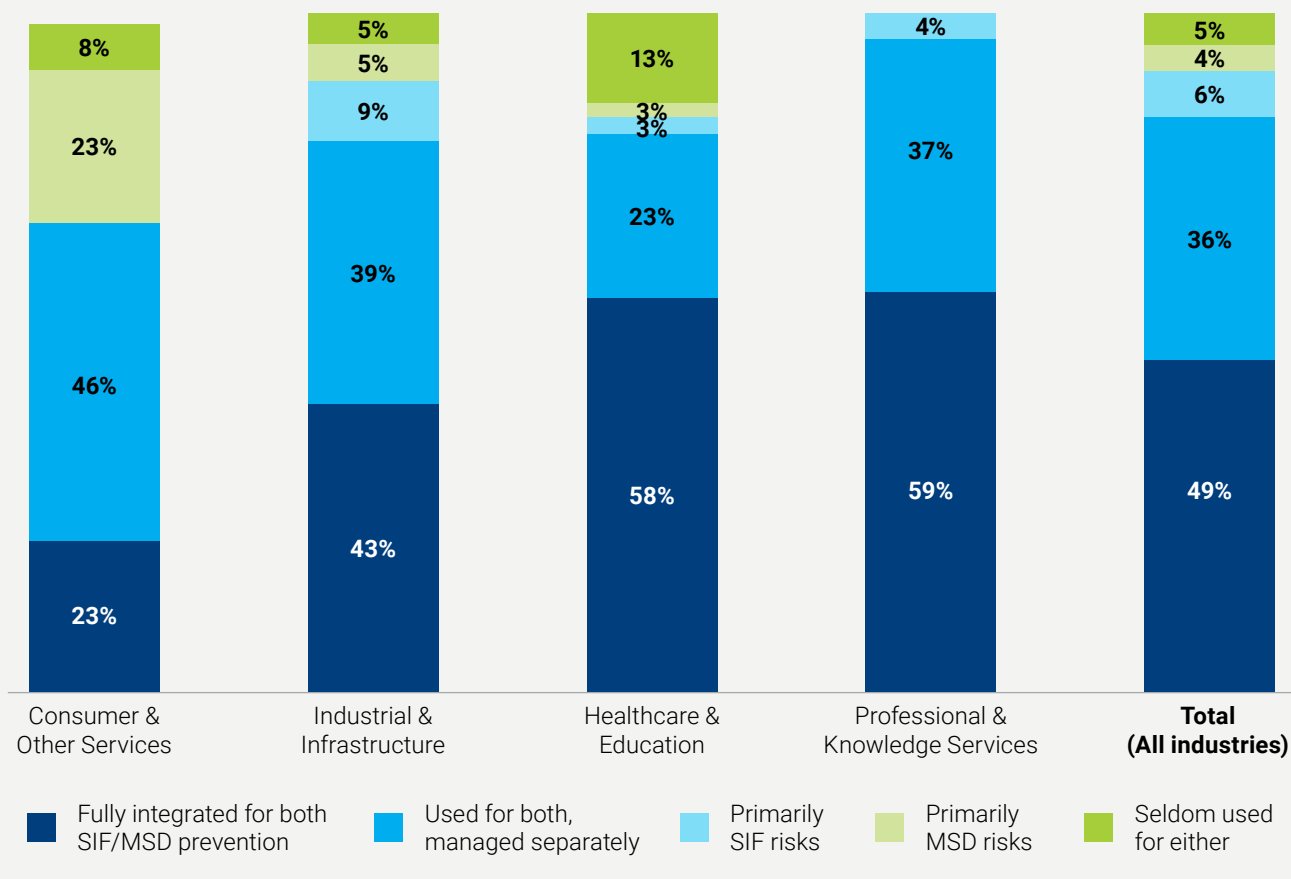


Figure 12. Use of design and engineering controls such as automation, lifting aids or workplace redesign to address SIF and/or MSD Risks by industry

Limitations

The findings are based on self-reported responses from individual EHS professionals and therefore reflect respondents' perceptions and experiences rather than independently verified organizational practices. Because only one respondent represented each organization, the results may not fully capture the perspectives of other stakeholders, including frontline workers, supervisors or organizational leadership. In addition, this study was designed as an exploratory, nonrepresentative, cross-sectional study on whether EHS professionals understand and organizations act on integrating MSD and SIF concepts. It is not an evaluation of organizational safety performance; accordingly, objective safety metrics and formal validation of reported practices were beyond its scope. As such, the findings should be interpreted as insights into current attitudes, experiences and reported approaches to MSD-SIF integration, and observed associations and differences across subgroups should not be interpreted as evidence of causal relationships or confirmed distinctions.

Key Implications, Action Items and Conclusion

Key Implications

Drawing on both the survey findings and existing literature, several key implications emerge that are particularly relevant for assessing and learning from the overlap between MSDs and SIFs.

- 1. Broad consensus on the recognition of the MSD-SIF connection was observed among survey respondents, but that does not necessarily translate into organizational practice.** The challenge does not appear to be a lack of awareness of the connection between MSDs and SIFs but the absence of standardized definitions, evaluation processes, prioritization frameworks and early-warning systems needed to consistently act on that understanding.

MSD-SIF Integration Gap

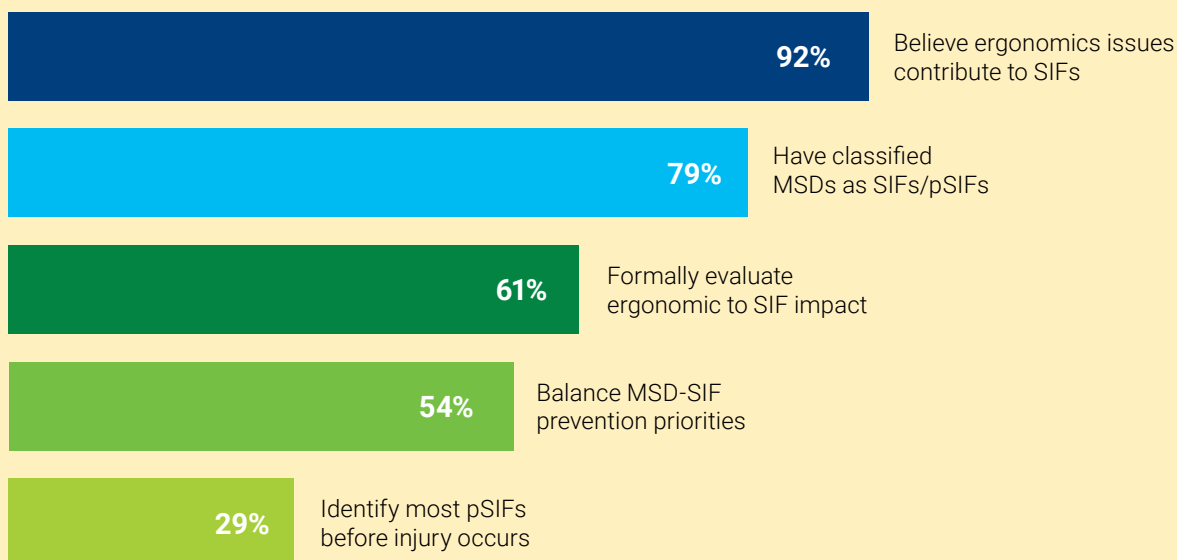


Figure 13. Progression from recognition of ergonomics contributions to SIF risk to preventive practice.



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As shown in Figure 13, there was a clear decline from recognition to implementation: While 92% of respondents believed ergonomic factors contribute to SIF risk, progressively smaller proportions reported classifying MSDs as SIFs/pSIFs, formally evaluating the effects of ergonomic interventions on SIF risk, prioritizing MSD and SIF prevention equally, and identifying most pSIFs before an injury occurs.

2. MSD prevention is underemphasized relative to its burden and potential role in preventing serious injuries.

Overexertion is the leading driver of U.S. workers' compensation costs (Liberty Mutual, 2025), and MSDs appeared to account for a larger share of injuries than SIFs within this sample. Still, organizations were more than four times as likely to prioritize SIF prevention over MSD prevention as they were to prioritize MSD prevention over SIF prevention. These findings suggest that MSDs are often viewed as frequent but lower-consequence events, despite their potential to result in permanent impairment and contribute to serious injury pathways through fatigue, reduced physical capacity, impaired judgment and poor work design.

3. Risk assessment practices represent a natural point of integration between MSD and SIF prevention.

Despite frequent organizational separation between ergonomics and SIF programs (Oguz, Erkal, & Hallowell, 2023; Edison Electric Institute, n.d.) and the fact that cumulative-exposure injuries do not align neatly with traditional event-based SIF classification frameworks (Edison Electric Institute, 2024), there are several parallels in methods used to identify risk across both domains. Standardized ergonomic assessments, job hazard analyses, worker involvement, incident reviews and safety observations were commonly used to identify both MSD and SIF risk. Notably, every organization that conducted standardized ergonomic assessments reported using those findings to inform SIF prevention to some degree, suggesting that substantial integration already occurs in practice even when organizational structures remain separate.

This integration, however, has not extended evenly to technology adoption: Half of organizations reported using safety technologies such as sensors and analytics to identify SIF/pSIF risk, compared to just 38% reporting use of comparable emerging technologies (e.g., wearable sensors, motion capture, exoskeletons) for MSD risk. Given the substantial and growing utility of these tools for identifying musculoskeletal risk specifically, this gap suggests that MSD risk management continues to lag behind SIF prevention in adopting technology-driven approaches, even in an area in which established methods otherwise overlap closely.

4. Organizations with more formal MSD-SIF processes demonstrate greater integration and earlier risk

identification. Consistent with evidence among safety professionals that pSIF classification is not standardized and subject to interpretation (Hallowell & Spencer, 2024), fewer represented organizations formally defined pSIFs compared to MSDs or SIFs. However, organizations with formal pSIF definitions were more likely to identify pSIFs before injuries occurred.

Likewise, organizations with formal, standardized processes for evaluating the impact of ergonomic interventions on potential SIF risk were significantly more likely to integrate design and engineering controls for both MSD and SIF prevention. Most organizations recognize the connection between MSD and SIF risk and act on that knowledge in some capacity, but those with more formal definitions, evaluation processes and decision-making frameworks are better positioned to translate that recognition into consistent prevention practices and earlier identification of serious risks.

5. Context shapes the degree and form of integration; therefore, a single integration model is unlikely to fit all organizations.

The pattern of MSD-SIF integration was not uniform across organizational contexts. Some organizations were more likely to classify MSDs as both potential and actual SIFs, while others focused primarily on MSD outcomes when evaluating ergonomic risks and interventions. These differences suggest that the extent and nature of MSD-SIF integration are influenced not only by exposure to serious incident risks but also by organizational maturity, industry, safety management practices and professional capability. As a result, integration frameworks may need to be flexible and adaptable to organizational context rather than assuming a one-size-fits-all approach.

6. Organizational culture may be limiting opportunities to identify and address MSD and SIF risk before serious harm occurs. The most commonly cited barriers to reporting musculoskeletal discomfort were the expectation that symptoms would improve on their own (71%); fear of blame, discipline or job loss (53%); and productivity pressures (47%). These findings suggest that many organizations may be losing valuable early-warning information about cumulative exposures and deteriorating work conditions. When discomfort, fatigue and physical strain are normalized or left unreported, opportunities for early intervention are missed, allowing risks to persist until they result in more severe MSD outcomes or contribute to SIF pathways through reduced physical capacity, impaired judgment or delayed reactions. The challenge extends beyond ergonomics program design and reflects broader cultural factors that influence whether emerging risks are recognized and acted upon.

Action Items

To support both organizational learning and leadership engagement, the following action items mirror many of the key implications and are structured around two priorities: increasing EHS leaders' visibility into their organizations' MSD-SIF awareness and maturity and building a compelling case for action among senior decision-makers.

Understanding Your Organization's MSD-SIF Awareness

1. Diagnose where you sit on the recognition-to-practice progression. Don't assume that organizational belief in the connection between MSDs and SIFs automatically translates into organizational practice. Consider where your organization currently sits along the following progression:

- Does your organization recognize that ergonomics can influence SIF risk?
- Has an MSD ever been classified as a SIF or pSIF?
- When ergonomic improvements are implemented, is the potential effect on SIF risk discussed or considered?
- Are potential SIFs typically identified before an injury occurs?

Organizations often find themselves at different points along this continuum. Identifying where your organization's practices begin to diverge can provide insight into opportunities for greater integration between MSD and SIF prevention efforts. It may also be helpful to examine how MSDs, SIFs and pSIFs are defined and classified within the organization. In many cases, the challenge is not limited awareness or belief but, rather, the absence of shared definitions and consistent classification criteria, which can lead to variability in how events are interpreted and managed.

2. Quantify your organization's actual MSD burden versus its prioritization. Consider reviewing your recordable injury data to better understand the relative contribution of MSDs and SIFs within your organization. Comparing those patterns with current prevention priorities and resource allocation can provide a useful perspective. For example, if MSDs account for a substantial portion of injuries, workers' compensation claims or associated costs but receive relatively less attention than SIF prevention initiatives, that difference may highlight an opportunity for discussion and evaluation. Another useful area to explore is overexertion-related workers' compensation costs. Many organizations find that these costs are more significant than initially expected. Understanding their magnitude can help frame MSD prevention in terms that align with existing business and financial performance measures, creating a common basis for conversations about risk reduction and investment priorities.



3. Map your existing risk assessment overlap. It may be helpful to take stock of the approaches your organization currently uses to identify MSD and SIF/pSIF risks and consider them side by side. In many organizations, there is already some degree of overlap through activities such as risk assessments, incident reviews, workplace observations or worker involvement processes. Recognizing these existing connections can help highlight opportunities to build on practices that are already in place rather than creating entirely new ones.

As part of this review, consider how information from MSD risk assessments is shared and used within the organization. For example, are findings that could have implications for serious injury risk routinely brought into SIF prevention discussions, or is that connection made more informally when individuals recognize it? Understanding how these linkages occur today can provide insight into where additional coordination may be beneficial.

4. Assess whether your classification criteria are outcome-based or event-based. Consider how your organization currently evaluates whether a severe MSD warrants additional review within existing SIF or pSIF processes. In some organizations, decisions are influenced primarily by the circumstances of the event, while others may also take into account outcomes such as long-term functional limitations, chronic pain, permanent impairment or challenges with returning to full duty.

Exploring which factors carry the most weight in your organization's decision-making can help clarify how MSDs are currently viewed within broader risk management efforts. When opportunities for improvement are identified, they may relate to specific aspects of classification or escalation criteria rather than requiring a complete overhaul of definitions or processes.

5. Understand your organization's reporting culture, not just its reporting policy. It may be valuable to better understand the factors that influence reporting of MSD-related discomfort within your organization. In some cases, employees may view symptoms as a normal part of the job, expect them to resolve on their own or be hesitant to raise concerns. In other cases, reporting may be influenced by organizational factors such as unclear reporting pathways, inconsistent follow-up or uncertainty about how concerns will be addressed.

Exploring these influences can help identify approaches that are most relevant to your organization's circumstances. While both individual and organizational factors can play a role, their relative importance often varies across workplaces. For larger or more geographically distributed organizations, for example, reporting challenges may sometimes be associated with the complexity of communication and response processes. Understanding the local context can help inform efforts to improve early identification and management of MSD risks.

Building Senior Leadership Buy-In

1. Lead with the burden argument, not the belief argument. Given the broad recognition among practitioners that MSDs can influence serious injury risk, organizations may find greater value in focusing discussions on how risks and resources are currently aligned rather than revisiting whether a connection exists. One useful perspective is to compare the relative burden associated with MSDs and SIFs, such as injury frequency, workers' compensation costs, lost work time or operational impacts, with current prevention priorities and investments.

In some organizations, this comparison reveals that MSDs account for a substantial share of injuries and associated costs while receiving a different level of organizational attention than other safety initiatives. Examining these patterns can help inform conversations about where existing resources are directed and whether current priorities reflect the organization's overall risk profile. Framing the discussion in terms of risk burden, business impact and resource allocation can often provide a practical basis for exploring opportunities to strengthen prevention efforts.

2. Translate ergonomics into the executive's existing risk vocabulary. One approach is to consider ergonomics, thus MSD-related risk factors, such as fatigue, workstation design and physical strain, within the broader context of serious injury prevention rather than as entirely separate risk categories. Doing so may help organizations identify where existing safety and risk management efforts already intersect and where opportunities for greater coordination may exist.

Many organizations have established processes and resources dedicated to reducing the likelihood and consequences of serious injuries. Exploring how risk reduction for MSDs contributes to those same objectives can help position MSD prevention as a complementary element of existing risk management strategies rather than as a competing priority.

Discussions can also be informed by examining the business impact of MSDs, including workers' compensation costs, lost productivity and employee wellbeing. Overexertion-related costs, in particular, are sometimes larger than expected when reviewed in aggregate. Understanding these impacts can provide a practical perspective on how ergonomic improvements contribute to both safety and organizational performance, helping support informed decisions about prevention investments.

3. Make the case for formalization using your own near misses. If your organization has encountered a severe MSD that raised concerns about serious injury potential, it may be useful to reflect on how that situation was evaluated and discussed. Real-world examples from within the organization can often provide valuable context for conversations about risk recognition and management, helping illustrate how MSDs may intersect with broader serious injury prevention efforts.

These discussions can also provide an opportunity to examine whether current definitions, classification approaches or evaluation processes consistently support the identification of potentially serious outcomes. Rather than focusing on adding procedures, organizations may find value in considering how existing processes support the early recognition of important risk signals and how opportunities for learning and prevention can be captured more consistently.

Framing the conversation around visibility, learning and early risk identification can help connect these efforts to goals that many organizations already share: recognizing emerging risks sooner, improving decision-making and strengthening overall prevention capabilities.

4. Anchor the ask in existing risk assessment infrastructure. Many organizations already use some form of risk assessment, workplace observation or risk evaluation process to identify and address MSD risks. In some cases, the information generated through these activities also contributes, either directly or indirectly, to broader serious injury prevention efforts.

Where these connections already exist, there may be value in recognizing and building upon practices that are currently working. Conversations with senior leadership can focus on understanding how existing risk assessment and prevention activities support multiple organizational objectives, including both MSD and serious injury risk reduction.

Framing the discussion around enhancing the visibility, consistency and sustainability of established practices may help highlight opportunities for greater alignment without requiring entirely new programs or systems. This approach can also provide a practical way to consider how current resources, processes and expertise contribute to overall risk management objectives.

5. Consider organization-and industry-specific context when demonstrating the relevance of integration.

Organizations vary considerably in their exposure to different types of risks and injuries, which can influence how MSDs and SIFs are viewed and prioritized. In some settings, serious injury prevention may naturally receive greater attention, while in others, lower rates of SIF events can make the connection between MSDs and broader injury prevention efforts less immediately apparent.

In these situations, it may be helpful to view MSD-SIF integration not as a shift in priorities but as an opportunity to gain a more complete understanding of workplace risk. Considering MSDs and SIFs together can help organizations explore common contributing factors, identify areas in which prevention activities already overlap and better understand how different types of risks fit within the overall injury prevention landscape.

This perspective may also reveal opportunities to improve coordination across existing safety, health and operational processes, allowing organizations to leverage current efforts more effectively while supporting a broader range of risk management objectives.

6. Bring reporting-culture data to leadership as a business risk, not just a worker-experience issue. Reporting of MSD-related discomfort can also be viewed as an important source of information about emerging workplace risks. Survey findings suggest that employees sometimes expect symptoms to resolve on their own or may be reluctant to report concerns, which can limit visibility into issues before they develop into more significant injuries or operational challenges.

Exploring the factors that influence reporting can help organizations better understand the extent to which existing processes support the early identification of potential MSD risks. From a leadership perspective, these reports may represent valuable insights into conditions and trends that could otherwise remain unnoticed until more serious outcomes occur.

Considering MSD-related discomfort reports as part of a broader risk monitoring and learning process can help shift the focus from individual reporting behaviors alone to the organization's overall ability to recognize, understand and respond to emerging risks. This perspective highlights the value of timely information in supporting prevention efforts, resource decisions, and continuous improvement across safety and health initiatives.

Conclusions

This study represents a first step in understanding the current relationship between MSD and SIF prevention efforts, establishing what EHS professionals currently believe, do and lack with respect to MSD-SIF integration rather than inferring it from organizational frameworks alone. This survey provides evidence that MSD and SIF prevention are already intertwined in practice. For example, organizations widely recognize ergonomics as a contributor to serious incidents. Ninety-two percent of respondents agreed that human factors and ergonomic issues contribute to SIFs or pSIFs, most commonly citing fatigue and poor equipment/workstation design as mechanisms. This belief is also not abstract: A majority of organizations (79%) have already classified an MSD as a SIF, pSIF or both, and the estimated ergonomic contribution to SIFs/pSIFs was positively correlated with organizations' overall MSD and SIF burden.

At the same time, the data reveals meaningful gaps. Definitions of MSDs, SIFs and especially pSIFs remain inconsistent across organizations, with over a third lacking formal definitions for one or both — a gap associated with less proactive (i.e., later) pSIF identification. Reporting barriers, particularly the expectation that symptoms will resolve on their own and fear of blame or productivity consequences, also remain common and are more pronounced in large, geographically distributed organizations, suggesting both structural and cultural drivers.

Encouragingly, risk assessment and intervention practices show substantial methodological overlap between MSD and SIF programs — in job hazard analysis, incident review, worker participation and training — indicating that the infrastructure for a more unified approach largely already exists. The clearest lagging area is technology adoption: Ergonomic-specific tools trail SIF-focused safety technologies, despite their growing relevance to musculoskeletal risk detection.

Taken together, these findings suggest that a potential barrier to fuller MSD-SIF integration is a lack of formalization — in definitions, in evaluation processes and in the deliberate consolidation of parallel risk assessment methods that organizations are, in many cases, already running side by side. SIF classification systems that recognize cumulative injury exposure pathways can help organizations build evaluation systems that highlight potential overlaps between MSDs and SIFs.

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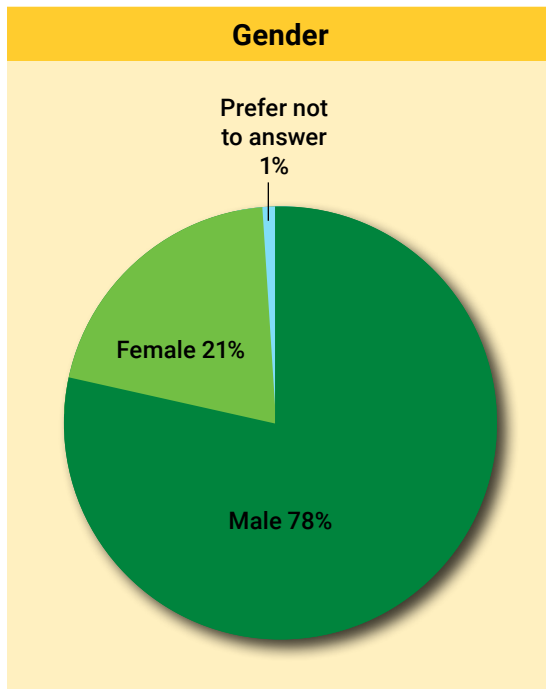
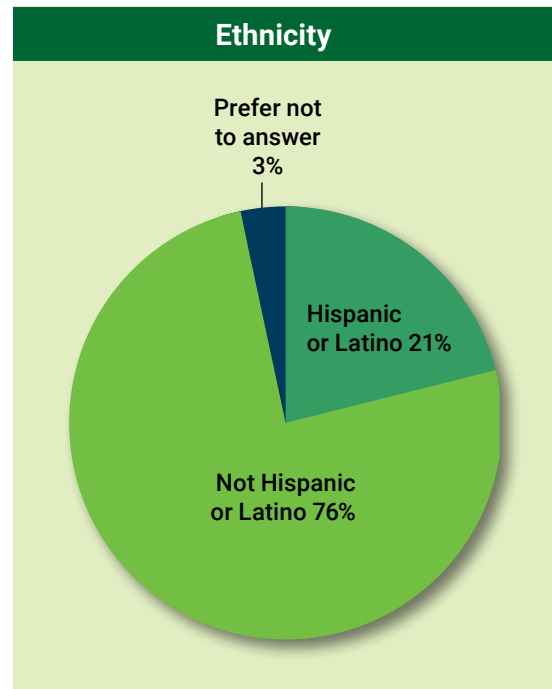
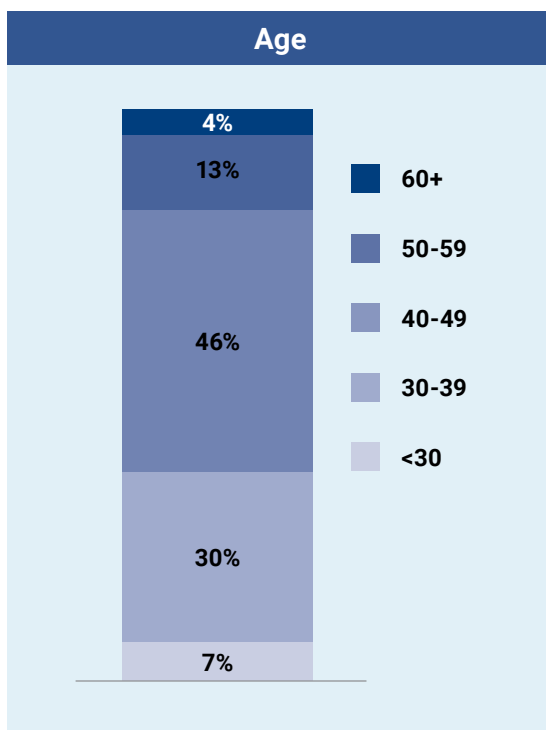
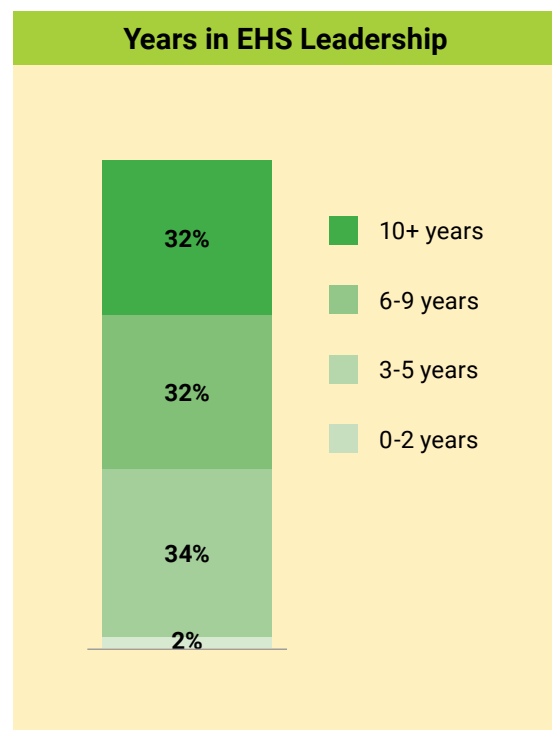
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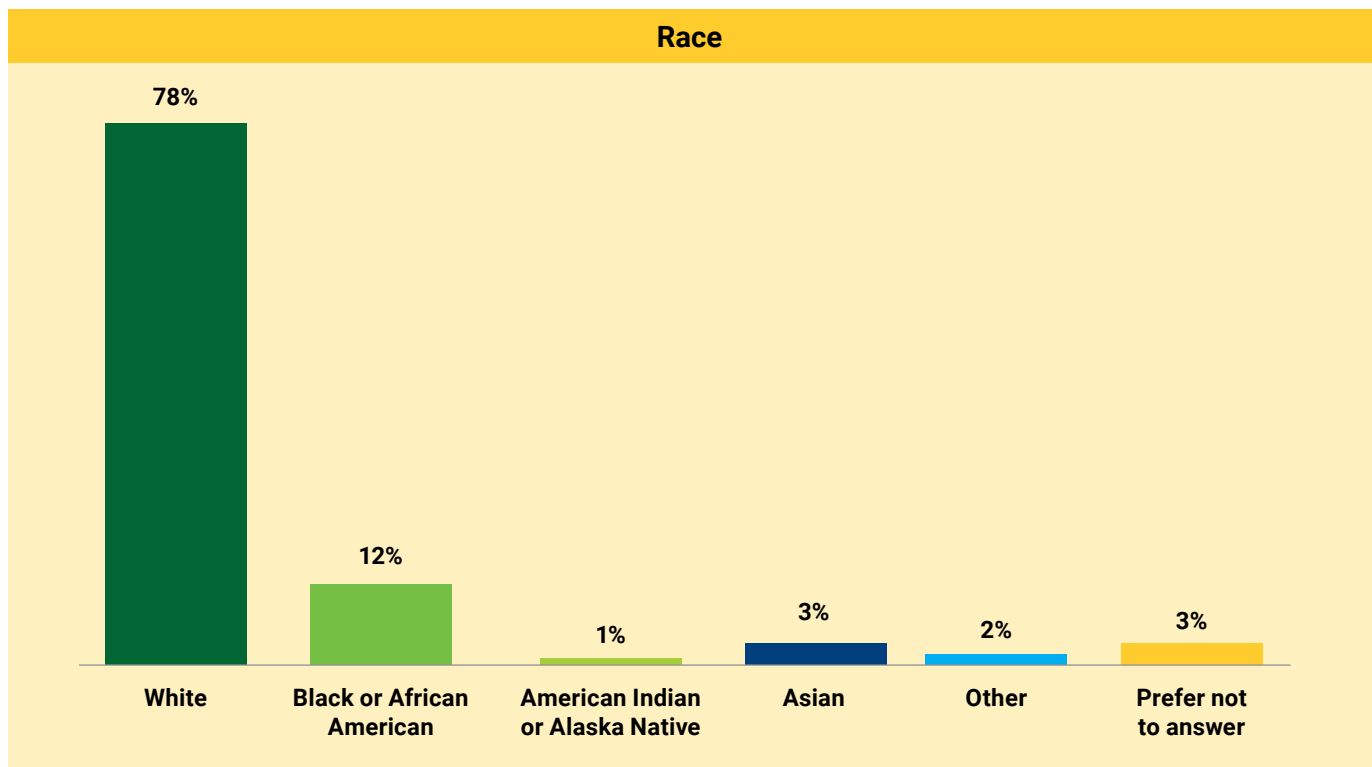
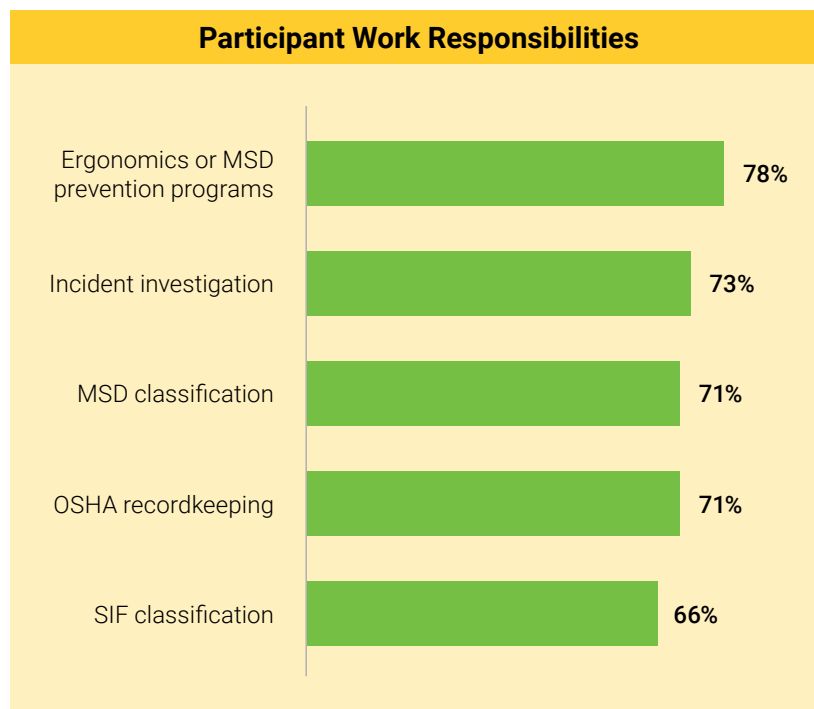
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Appendix

Respondent Demographics and Characteristics





Organization Characteristics

