Foundation

Global Safety Evidence Centre

The role of leadership and governance in occupational safety and health: a rapid evidence assessment for international standard development

Safe Work

Evidence Review

Technical Report

Preface

This report presents the findings of a Rapid Evidence Assessment examining how leadership and governance influence occupational safety and health outcomes. It identifies key roles, competencies and contextual factors that shape these outcomes. The review has been produced as part of a pilot initiative exploring how evidence can help inform the development of international standards.

This initiative is a collaborative effort between the International Organisation for Standardisation Technical Committee 283 (ISO/TC 283), Lloyd's Register Foundation and RAND Europe. The research was funded by Lloyd's Register Foundation as part of the Global Safety Evidence Centre. For more information about the Centre, please visit: *https://www.lrfoundation.org.uk/gsec*

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Executive summary

Context and aims

The objective of this pilot study was to explore how research evidence could inform the development of a proposed International Organization for Standardization (ISO) occupational health and safety (OH&S) standard focused on leadership and governance. At the time of inception, the standard had recently received development approval, and the International Organization for Standardization Technical Committee 283 (ISO/TC 283) Working Group 9 (WG9) was established to begin this work. The project aimed to address knowledge gaps identified by the Committee, particularly regarding the roles, responsibilities and impact of leadership and governance on OH&S outcomes. In this report, we use the following terms interchangeably: top management, senior management and senior leader.

Methods

We conducted a Rapid Evidence Assessment (REA) to identify and synthesise existing literature on the influence of leadership and governance on OH&S outcomes. We refined the REA's scope through an initial workshop with WG9, which helped to clarify the focus of the study on senior managers and their impact on OH&S. The review addressed five key research questions related to senior management's contribution to safety, their influence on OH&S outcomes, the skills and competencies required for effective safety leadership, the organisational and contextual factors that shape these influences and how senior management is defined in the literature.

The literature sources included five major academic databases (Web of Science Core Collection, Scopus, Business Source Complete, EconLit, and PubMed) and targeted English-language articles published between 2015 and 2025. The search also targeted articles published in Arabic, Chinese, French, Russian, and Spanish. Literature screening and the data extraction followed predefined, systematic criteria to ensure consistency across studies. The strength of evidence, based on study design, was assessed using a six-level hierarchy. We synthesised findings using thematic analysis and incorporated stakeholder feedback through a follow-up workshop with WG9.

Findings

1. Included articles:
   - We screened 1,061 study abstracts and titles and reviewed 144 full-text articles, resulting in the inclusion of 80 for analysis.
   - We identified no further eligible studies through searches in additional languages.
2. The evidence indicates that senior managers can positively impact OH&S outcomes in organisations by providing strategic direction and management, visible leadership and engagement, systematic oversight and cultural leadership:
   - Strategic direction includes setting clear safety policies, establishing measurable objectives and integrating safety into broader business strategies.
   - Visible leadership and engagement are demonstrated through site visits, participation in safety meetings, and direct communication with employees, thereby reinforcing the importance of safety and building trust.
   - Systematic oversight involves implementing training programmes, monitoring safety indicators, conducting internal reviews and investigations and establishing reward and recognition frameworks to incentivise safe behaviours.
   - Cultural leadership is reflected in the creation of a 'just culture' where employees feel safe reporting incidents, and in the ability to adapt to new risks and support innovation.
   - Through these combined actions, senior managers influence safety both directly – by allocating resources and enforcing compliance – and indirectly – by shaping employee motivation, trust, and organisational learning, all of which contribute to a stronger safety culture and reduced incident rates.
3. Definitions of senior management vary between ISO standards and research literature, leading to inconsistencies in terminology and scope:
   - ISO standards define senior management by organisational hierarchy and authority, encompassing roles such as Chief Executive Officer (CEO), Chief Operating Officer (COO) and other C-suite positions.
   - Definitions within research literature are varied. Senior management is usually defined by the functions and responsibilities it exercises, such as setting OH&S policies, allocating resources, and overseeing safety performance.
   - This lack of alignment can create challenges for integrating research evidence into standards development.

4. While senior management activities – such as setting safety strategy and objectives, conducting site visits and safety meetings, monitoring performance indicators and promoting an open reporting culture – are consistently associated with improved OH&S outcomes, most research is correlational and does not establish causal links:

- The evidence base shows positive associations between senior leadership activities and improved OH&S outcomes, such as lower injury rates and stronger safety culture.
- However, most studies are correlational, with few attempting to establish causality or clarify the mechanisms through which senior leadership influences OH&S outcomes.
- Individual characteristics and senior management's leadership style may be linked to OH&S outcomes, but evidence of causal effects is limited.
- Demographic factors such as age, gender and tenure are frequently reported, but few studies establish direct links to OH&S outcomes.
- Board composition – including female and racial/ethnic minority representation – and structurally powerful CEOs are associated with improved OH&S outcomes, especially when these directors have sufficient authority and accountability.
- Leadership styles described in the literature as ethical, attentive, or prevention-oriented – typically characterised by transparent decision-making, active monitoring and prioritisation of safety – are consistently linked to safer workplaces. In contrast, leaders described as overconfident, disengaged or heavily production-focused are associated with higher incident rates and poorer OH&S outcomes.
- CEOs with generalist experience across multiple industries are also linked to lower injury and illness rates.

5. A wide range of factors motivates senior leaders to improve OH&S outcomes:

- Individual characteristics such as risk aversion, ethical commitment and prevention-focused attitudes are associated with stronger OH&S outcomes.
- External incentives, including financial rewards and reputational concerns, can influence senior management engagement with safety. However, evidence on financial incentives is mixed: while some compensation structures encourage alignment with safety priorities, others may create perverse incentives, such as underreporting incidents or short-term performance.
- Contextual pressures, such as government contracting requirements and formal safety benchmarks, can further increase executive focus on safety.

6. Most of the evidence base focuses on large organisations and developed economies, with limited coverage of small and medium-sized enterprises (SMEs) and developing economies:

- Most of the included studies collected data from large firms, particularly in the construction and manufacturing sectors, whereas only a small proportion focused on SMEs.
- The geographical distribution of research is skewed towards North America, Europe and Australia, with fewer studies from Asia, Africa and Latin America.
- Over half of the included studies are considered robust, involving randomised controlled trials, systematic reviews or large-sample quantitative designs.

Conclusion

This review finds that senior management plays a significant role in shaping occupational health and safety outcomes, primarily through strategic direction, visible leadership, systematic oversight and cultural influence. However, most available evidence is correlational, with few studies establishing direct causal links or clarifying mechanisms of influence. Furthermore, the research base is heavily weighted toward large organisations in developed economies, with limited coverage of SMEs and developing economies. Definitions of senior management vary across ISO standards and the research literature, making it difficult to compare findings and apply lessons consistently across studies.

This review was conducted as part of a pilot to explore how evidence can inform the development of an international standard. The findings show that collaboration between researchers and members of ISO technical committees to include an evidence review stage in the standards development process is both feasible and valuable for identifying areas of uncertainty that merit further investigation. The development of the standard would benefit from precise terminology and definitions. To build on this work, a follow-up discussion with the technical committee involved in this study would help assess whether, and how, the review findings have influenced the development of the OH&S leadership and governance standard. Future steps may also involve applying the methods used in this study to other standards and committees, as well as adapting these methods to include living evidence reviews to help ensure that standards remain current and evidence-based.

Contents

Figures, tables, and boxes

Abbreviations

CEO	Chief Executive Officer
CFO	Chief Financial Officer
COO	Chief Operating Officer
CTO	Chief Technology Officer
GSEC	Global Safety Evidence Centre
ISO	International Organization for Standardization
ISO/TC 283	International Organization for Standardization Technical Committee 283
OH&S	Occupational Health and Safety
PPE	Personal Protective Equipment
RCT	Randomised Controlled Trial
REA	Rapid Evidence Assessment
SME	Small and Medium-sized Enterprise
TC	Technical Committee
UN	United Nations
WG	Working Group

1. Introduction

The International Organization for Standardization (ISO) is an independent, non-governmental international body that develops and publishes standards to ensure quality, safety and efficiency across a wide range of products, processes and practices. Well-known ISO management system standards include ISO 9001 for quality management, ISO 27001 for information security and ISO 45001 for occupational health and safety (OH&S) management systems (ISO 2018). ISO standards are not laws; instead, they serve as respected sets of requirements that organisations may voluntarily comply with, signalling their commitment to quality, reliability and trustworthiness. Independent conformity assessment and certification are often used to provide evidence of responsible and effective practices within organisations.

These standards are developed using a consensus-based approach. There are more than 250 Technical Committees (TC) within ISO, each focusing on a specific field. For each standard under development, an ad hoc Working Group (WG) is established to bring together experts from a broad spectrum of TC members representing diverse nationalities, roles and sectors. These experts typically have substantial real-world experience in the relevant field. WG members meet regularly over several months, engaging in discussions until they reach consensus on the standard's content and scope. ISO WGs also consult with national 'mirror committees' as well as with the public before the content of the standard is finalised and approved for publication. While WG discussions are informed by considerable expertise, groups do not have systematic processes for incorporating research evidence – that is, information generated through recognised scholarly methods (Cairney 2016) – into standards development.

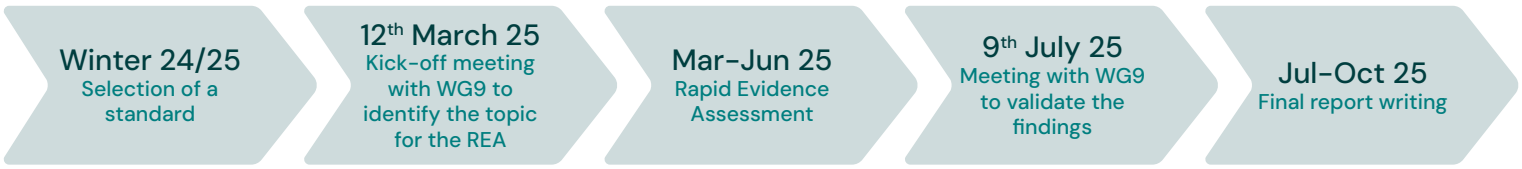
Lloyd's Register Foundation (hereafter referred to as the Foundation), an international charity focused on advancing the use of evidence to improve safety worldwide, is collaborating with ISO/TC 283, the technical committee for OH&S management. Together, they are examining how research evidence can be better integrated into the OH&S standard-setting process, building on an earlier rapid evidence assessment of the role of evidence in OH&S (Stockwell 2022). To support this work, the Foundation commissioned RAND Europe, an independent research organisation, to conduct a pilot project exploring how research evidence could inform the development of an OH&S standard. This report describes the process and outcome of this pilot.

2. Overview of the research pilot

This research pilot tested the feasibility of integrating research evidence into the development of a new OH&S standard. It involved conducting a Rapid Evidence Assessment (REA) to gather relevant literature and sharing the findings with the WG developing the proposed standard. REAs use a more structured and rigorous approach to searching and appraising evidence than standard literature reviews, though they are less comprehensive than systematic reviews. They are commonly employed to summarise the scope and quality of evidence on a given topic, inform decision-making and identify areas where further research is needed (Breckon et al. 2023).

See Figure 1 below for activities and timelines of the research pilot process.

Figure 1. Research pilot activities and timelines



2.1. Selection of a standard

Following discussions with the ISO/TC 283 Chair and colleagues, it was agreed to test this pilot approach using the proposed standard on OH&S leadership and governance. We selected this standard because it had been recently approved for development, and WG9 was established a few months later to initiate this work. This timing provided us with an opportunity to conduct the REA and contribute evidence in a timely way as part of the development of the proposed standard.

2.2. Initial workshop with WG9

The research team conducted an online workshop with nine members of WG9 on 12 March 2025. The workshop aimed to identify potential knowledge gaps where the group felt additional evidence could be valuable.

During the workshop, participants discussed the importance of clarifying the role and responsibilities of 'top managers' in comparison to middle managers and supervisors. The discussion also explored how responsibilities and competencies should be divided between executive and non-executive management in the context of the OH&S standard.

2.3. REA scope and research questions

Following the workshop with WG9, we refined the scope of the REA to address the identified gaps and focus specifically on the roles, responsibilities and impact of top managers on OH&S outcomes. The aim was to understand how senior management influences safety and to identify the relevant competencies and contextual factors that underpin this influence.

We developed the following research questions to guide the REA:

1. How is 'senior management' defined in research literature?
2. How does senior management contribute to or influence OH&S outcomes?
3. Which OH&S outcomes do senior management influence?
4. Which skills or competencies shown by senior management affect OH&S outcomes?
5. How does the influence of senior management on safety change in different contexts (for example, in different countries, organisation types or sectors)?

2.4. REA research methods

We designed the REA to identify and synthesise existing research literature on how senior management influences OH&S outcomes across all sectors and geographical regions. We briefly describe our REA methodology below.

Academic database searches

The review began with the development of a search strategy. In May 2025, we used the final search string (see Annex A, Table A.1) to search five major academic databases: Web of Science Core Collection, Scopus, Business Source Complete, EconLit and PubMed. We included only English-language articles published between 2015 and 2025 at this stage of the research.

Screening of the articles

We conducted screening using the Covidence[1] platform, which streamlines systematic review processes and enables independent screening. Two independent reviewers assessed all titles and abstracts against predefined inclusion and exclusion criteria (see Annex A, Table A.2), and coded articles as 'yes', 'no' or 'maybe'. Disagreements and 'maybes' were resolved by discussion with a third reviewer.

Additional languages

Given ISO's global scope, we decided to conduct an additional search to identify any relevant articles published in Arabic, Chinese, French, Russian or Spanish; we selected these languages to cover the official United Nations (UN) languages. We conducted the searches using a translation of the original English search string.

Extraction

For all included studies, we extracted information using a structured template in Covidence to ensure consistency and comparability (see Annex A, Table A.3). Data extraction covered publication details, study characteristics and key variables relating to leadership and OH&S outcomes. We designed the extraction process to closely align with the review questions, ensuring that the evidence base could be synthesised to directly address the objectives of WG9.

Analysis

We analysed the extracted data thematically, using our extraction template. In doing so, we paid close attention to whether studies showed causal links between senior management actions and OH&S outcomes, or merely highlighted correlations. We also examined how these relationships varied across contexts, including organisational size, sector and geography.

1. Covidence is a non-profit SaaS platform, established in 2014 to streamline the synthesis of global research into reliable summaries of scientific evidence - *https://www.covidence.org/*.

In addition, we assessed the evidence level based on each study's methods and design. To evaluate the level of the underlying evidence, we adopted a classification framework based on the six-level hierarchy proposed by Reay, Berta and Kohn (2009) in What's the Evidence on Evidence-Based Management? Their paper applied a structured rubric, adapted from evidence-based medicine, to assess the level of management literature. The research team used this approach to classify the studies cited in our review.

We classified each study into one of the following evidence levels:

- Level 1: Randomised controlled trials (RCTs) or meta-analyses
- Level 2: Systematic or high-quality literature reviews that are comprehensive and replicable
- Level 3: Large-sample, multi-site quantitative studies or comparative case studies
- Level 4: Small-sample, single-site studies conducted objectively by trained researchers
- Level 5: Descriptive or self-report studies with limited methodological rigour
- Level 6: Expert opinion or anecdotal commentary without original data.

This classification helped us separate findings generalisable across settings from those based on more localised or exploratory work.

Stakeholder feedback

On 9 July 2025, we held another online workshop with WG9 and two representatives from the Foundation, during which we presented interim findings from the REA. We requested input from WG9 members, particularly regarding any additional literature that might be relevant, and any arising issues to consider during analysis. We used this feedback to refine the analysis before finalising the report.

Strengths and limitations

This REA adopted a structured and transparent approach to synthesise evidence within a limited timeframe, using predefined inclusion criteria, independent screening by multiple reviewers and thematic analysis. The approach helped us provide timely insights to inform the ongoing development of the OH&S leadership and governance standard.

Nonetheless, certain limitations must be considered when interpreting the findings. While the search strategy was comprehensive, small and medium-sized enterprises' (SMEs') perspectives may have been under-represented because it is less clear how well senior management descriptors align to SMEs (e.g. terms such as 'founder' were not included in the search strings). Restricting the publication window to 2015–2025 may also have excluded older but still relevant publications. The included articles were categorised by study design, indicating the relative strength of their methodologies. However, we did not undertake a full quality appraisal of the evidence base, which limits the extent to which we can draw conclusions about methodological rigour and, by extension, the certainty of the evidence. Finally, by including exclusively academic articles, we may not have captured relevant information from other evidence sources and grey literature.

3. Findings

This chapter presents the findings from the REA. While we conducted the REA to address the research questions described above, the results are organised by key themes that emerged from the evidence, rather than by individual research questions.

3.1. Study selection

In total, we retrieved 1,065 studies through database searches. After removing duplicate records, we selected 1,061 unique studies for screening, excluding 917 and retaining 144 for full-text review.

We read all 144 articles in full to assess eligibility, thereby excluding an additional 64 studies. We excluded studies based on the following criteria: a) if they were outside the scope of the research focus, including those that examined safety management systems rather than the impact of leadership on safety (n=33), b) those focusing on ineligible leader types, e.g. studies centred on supervisors or middle managers rather than directors or top management (n = 20), c) studies based on unsuitable data types, such as opinion pieces or commentaries (n=7), d) papers addressing irrelevant concept, e.g. papers addressing leadership in a non-OH&S context (n=3), and e) those assessing irrelevant outcome, such as studies measuring patient rather than worker safety (n=1). A total of 80 studies met the inclusion criteria and were selected for extraction and analysis. The overall flow of studies through this process is shown in Annex A, Figure A.1.

The searches in additional languages identified a small number of potentially relevant articles (n=34) for screening, but none met the criteria for full-text review.

3.2. Overview of the included articles

The evidence base for the REA reflects notable variation in study design, geographical focus, sectoral coverage, and organisational size. Annex B summarises the distribution of included studies, while Annex C provides a summary table of all included articles. Of the 80 studies included, almost half employed quantitative approaches (43.8%), about one-fourth used qualitative approaches (26.3%) and the remainder used mixed-methods (18.8%) or were literature/review-based (11.3%) (Table B.1). Geographically, the evidence base was primarily concentrated in developed economies, particularly the United States (21.3%) and Australia (7.5%), with additional contributions from the United Kingdom, Canada and Finland. Studies from developing contexts, including India (7.5%), Türkiye (5%), Malaysia (5%), China (3.8%) and South Africa (2.5%), represent a substantial share of the literature. Around 12.5% of studies draw on multi-country or cross-regional analyses. In comparison, a further 16.3% comprise smaller single-country studies across Asia, Africa and Europe (Table B.2).

Sectorally, the evidence base was dominated by multiple or cross-sectoral studies (43.8%). Among identifiable sectors, energy, utilities and chemicals (17.5%), construction (15%), manufacturing (11.3%), and transportation and logistics (8.8%) featured most prominently. Coverage of mining (3.8%) was limited (Table B.3). In terms of organisational size, most studies focused on large enterprises (40%), with fewer addressing medium (15%) or small firms (13.8%). Around 20% of studies included organisations of mixed sizes, while 11.3% did not specify organisational scale (Table B.4).

3.3. Summary of the included articles' methodologies

Table 1 summarises studies by study design and evidence level.

Table 1. Number of studies by evidence level

Evidence Level	Study Design	Number of Studies
Level 1	RCTs or meta-analyses	1
Level 2	Systematic/high-quality literature reviews	6
Level 3	Multi-site, large-sample quantitative or comparative studies	36
Level 4	Small-sample, single-site, theoretically motivated objective studies	27
Level 5	Descriptive studies/self-report, non-systematic, limited analysis	10
Level 6	Expert opinion, anecdotal, no data	0

Of the 80 studies, 43 (54%) fell within Levels 1 to 3, the tiers in evidence hierarchies generally regarded as stronger forms of evidence and more appropriate for informing policy and decision-making (Reay et al. 2009). Only one study (Schwatka 2022) qualified as Level 1, involving a randomised controlled trial (RCT) comparing leadership training approaches across companies. Six studies were Level 2 (e.g. Luo 2020; Adra 2024), offering structured, replicable analyses of the literature. A total of 36 studies qualified as Level 3, consisting of large-sample or multisite quantitative designs. Examples include Dahl (2022), which used data from over 29,000 companies, and Grocutt (2023), which conducted comparative analyses across railway maintenance and steel workers. This distribution suggests that while the evidence base is relatively robust in terms of quantitative breadth (Levels 2–3), it remains limited in experimental and causal research (Level 1). The predominance of Level 3 studies reflects a field that is empirically rich but still developing in methodological depth and causal inference.

Twenty-seven studies (34%) fell within Level 4. These tended to be single-site case studies or small-sample qualitative analyses, often conducted by academically trained researchers. Although these studies lacked large samples or broader generalisability, they provided valuable depth and organisational insight. For example, Haroun (2023) conducted expert interviews in Algeria's energy sector, while Monteiro (2022) conducted a multi-phase internal review of safety practices within a single firm, including site observations, accident data analysis and interviews with senior management. These works show how safety policies are interpreted and studied in real organisational settings.

Ten studies (13%) were classified as Level 5. These were primarily descriptive, relying on self-reported data, thematic analysis of field visits or practitioner reflections. For instance, Kaila (2024a) drew on fieldwork across ten sites in India and interviews with 480 managers to explore experiences of implementing a zero-harm safety culture. However, the study reports themes rather than systematically testing relationships or outcomes. In contrast, Atay (2020) developed a single-case study based entirely on secondary sources (media reports, archives, etc.), offering a narrative reconstruction of an incident. While these studies offer conceptual or early-stage insights, they often rely on exploratory methods that may be less easily replicable. They are most helpful in identifying emerging themes or raising hypotheses for future research.

No studies in this review fell into Level 6, which is considered the weakest tier of evidence, as papers based solely on expert opinion or anecdote were excluded.

3.4. Definitions of senior management

ISO standards[1] provide definitions of senior leadership roles. Across multiple standards (ISO 9000:2015; ISO 45001:2018; ISO 41011:2024), 'top management' or 'executive management' is defined as the person or group at the highest level of an organisation, with authority to direct, control, delegate and allocate resources. ISO 81001-1:2021 places additional emphasis on overall accountability, while ISO/TS 5441:2024 notes that 'senior management' is often used interchangeably with executive, top or upper management. These definitions typically encompass C-suite positions such as Chief Executive Officer (CEO), Chief Operating Officer (COO), Chief Financial Officer (CFO) and Chief Technology Officer (CTO), underscoring their responsibility for strategic and governance functions.

We designed our search strategy to capture this breadth. In addition to direct terms like 'senior, 'executive' and 'top management,' we included variations such as 'leadership team,' 'C-suite,' and specific titles (e.g. CEO, director and executive officer). We also incorporated governance-related terms ('corporate governance', 'company governance' and 'corporate head') to reflect the roles and responsibilities described in ISO standards.

However, the research literature does not use the same, or even consistent, definitions. References to 'CEO,' 'top leader,' and 'C-suite' were common, but definitions tend to be functional rather than tied to job titles. In this body of work, we primarily characterise senior management by the responsibilities they exercise, many of which are directly linked to OH&S outcomes. These include setting OH&S policies and objectives, reviewing safety performance, designing

1. ISO definitions of top/executive/senior management were searched from ISO's Online Browsing Platform (OBP). *https://www.iso.org/obp/ui#home*

reward-and-recognition systems, allocating resources (e.g. OH&S staff, Personal Protective Equipment [PPE] and training), ensuring a visible presence on worksites, engaging in two-way communication with employees and supporting middle management and supervisors.

Taken together, ISO standards and academic literature converge on the idea that 'senior management' is best understood not solely by title, but by the authority and functions they exercise.

3.5. The influence of context: geographic region, policy, and economic development

A range of contextual factors, including geographic region, policy environment and level of economic development, shapes the relationship between senior management and OH&S outcomes. Many studies in this review were situated within specific national or sectoral contexts, and some explicitly discussed how these factors may influence safety leadership and management practices. However, only a small subset of studies systematically compared or analysed the impact of these contextual factors on the relationship between senior management and OH&S outcomes.

For example, Haidar (2024) used data from 48 countries to examine the effect of board gender quotas on workplace safety, reporting that this effect varies across national institutional factors, such as legal systems and union presence. Ebbevi et al. (2021) conducted a scoping review of OH&S governance across multiple countries and noted that regulatory frameworks and board practices differ internationally, with implications for the role of senior management. Zwetsloot et al. (2017) describe the implementation of the Zero Accident Vision across seven European countries, highlighting differences in national contexts, cultures and policy environments. However, their analysis is primarily descriptive rather than comparative.

Other studies provided context-specific insights from developing economies or particular policy environments. For instance, Mandowa (2025) in Zimbabwe, Haroun (2023) in Algeria, and Sileyew (2020) in Ethiopia describe challenges such as resource constraints, data management, and policy implementation, and discuss how these factors may affect the effectiveness of senior management actions. Studies from Türkiye (Karakavuz, 2017), Saudi Arabia (Mosly, 2020), and Nepal (Bhattarai, 2022) examine the influence of national culture, workforce composition or sector-specific regulations, but do not systematically compare these factors across settings.

As outlined in Section 3.2, more studies were conducted in developed economies, with less representation from developing contexts and smaller organisations. The current evidence largely reflects experiences of larger firms, limiting generalisability across settings. Only a few studies systematically examined the impact of context on the relationship between senior management and OH&S outcomes, limiting the generalisability of findings and suggesting that caution is needed when applying research evidence to standards development in diverse contexts.

3.6. What senior leaders do to shape OH&S outcomes

The literature highlights a range of roles and actions through which senior leaders can influence OH&S practice, culture and outcomes. Üzülmez & Gerede (2023) identify effective safety leadership, planning and resource provision as key components of senior management support, while Lal (2023) argues that 'without leadership's active involvement, [safety culture] is not possible to achieve.' Schwatka et al. (2022) further reinforce that 'leadership commitment to worker safety and health is one of the most important factors' in organisational change, though they caution that demonstrating measurable improvements remains challenging in practice. Specific action areas which can support OH&S can be clustered into four higher-level domains: strategic direction, visible leadership, systematic oversight, and culture and adaptability. This synthesis highlights recurring patterns across the literature, but also demonstrates that these domains often overlap in practice, and that their effectiveness depends on organisational context, the quality of leadership engagement, and sustained follow-through.

3.6.1. Strategic direction

Senior management can set the overall direction of OH&S performance by establishing safety policies, defining measurable objectives and embedding safety into wider business strategies (Üzülmez 2023; Zhu 2016; Lal 2023). Actions such as allocating budgets and staff, providing training and ensuring the availability of PPE (Karakavuz 2017; Mosly 2020; Bhattarai 2022; Schwatka 2022; Ahamed 2023) signal that safety is integrated into organisational performance. However, studies also indicate that such commitments achieve impact only when reinforced at the middle-management level and aligned with operational realities, underlining the importance of sustaining strategic intent across organisational layers (Bhattarai 2022; Lal 2023). In several cases (e.g. Üzülmez 2023; Haidar 2024), strategic commitment is operationalised through formal board directives and clearly communicated safety objectives embedded in corporate governance frameworks, linking leadership priorities directly to organisational performance indicators.

3.6.2. Visible leadership and engagement

Senior leaders' visibility is frequently cited as an important influence on safety culture. Common practices include worksite visits, participation in safety meetings and direct communication with employees (Lal 2023; Rosso, 2019; Schwatka 2022; Galis 2018; Xue 2020). Support for middle managers and supervisors via resources, recognition and reinforcement of organisational safety values is also highlighted (Peker 2022; Grocutt 2023). Evidence also suggests that visibility can be symbolic rather than substantive. Leaders who appear at sites but do not follow through on employee concerns may undermine trust, reducing rather than strengthening safety culture (Kaila 2023; Fruhen & Flin 2019). In the Schwatka et al. (2022) trial, leaders reported greater awareness and confidence in communicating about safety. However, employees did not yet

perceive stronger leadership, suggesting that behavioural and perceptual change may occur on different timelines. Therefore, the impact of visible leadership depends on consistency and meaningful action, not presence alone.

3.6.3. Systematic oversight

Senior management can also support the integrity of OH&S systems through oversight and accountability mechanisms. These mechanisms include mandating induction and refresher training, overseeing the monitoring of safety indicators, participating in internal reviews and investigations and implementing reward and recognition frameworks to incentivise safe behaviours (Dahl 2022; Mandowa 2025; Üzülmez 2023; Lal 2023). By anchoring accountability at the top, these practices drive continuous improvement and signal the value placed on safety performance at all organisational levels. Schwatka et al. (2022), one of the few randomised controlled trials in this field, tested a Total Worker Health® leadership development intervention for small business owners and senior leaders. The study found that while the intervention improved formal safety and health policies ('transactional changes'), it did not produce measurable improvements in employee-reported safety leadership or safety climate after one year. This finding suggests that formal oversight mechanisms may be necessary but insufficient without sustained behavioural and cultural reinforcement.

Dahl (2022) also notes that systematic oversight can extend to mandatory OH&S training for senior executives and structured follow-up mechanisms to verify compliance. As Schwatka et al. (2022, p. 10) observed, 'we may not have observed transactional or transformational changes… because the follow-up timeframe may have been too short,' highlighting that leadership interventions require longer time horizons and stronger engagement mechanisms to influence workforce outcomes. Tappura et al. (2022) further emphasise that safety culture dimensions are interdependent and should be developed in an integrated way.

3.6.4. Culture and adaptability

Finally, senior leaders shape the broader safety climate through their behaviours, communication styles and responsiveness to change. Their attitudes influence whether organisations develop a 'just culture' in which employees feel safe reporting near misses without fear of reprisal (Huang 2017; Tappura 2022; Newaz 2019). In addition, senior management plays a pivotal role in adapting to new risks and supporting innovation, whether by implementing health protocols during COVID-19 or piloting new safety interventions (Rahul 2020; Lestari 2022; Jilcha 2016). Chen (2024) and Huang (2017) highlight that senior leadership can strengthen this culture through health-oriented communication and by cultivating a collective sense of safety responsibility among employees, reinforcing shared accountability for well-being. Findings from Schwatka et al. (2022) also highlight that cultural change typically manifests more slowly than policy or procedural change, suggesting that adaptive safety cultures may require multi-year leadership engagement to mature.

Taken together, the evidence indicates that senior management influences OH&S outcomes through a combination of strategic decisions, visible behaviours, systematic oversight and cultural leadership. While individual actions vary across sectors and contexts, the consistent finding is that leadership commitment at the highest level, demonstrated through resourcing, engagement and adaptability, is important in shaping organisational safety performance.

3.7. What motivates senior leaders to support safety

The question of what motivates senior leaders to implement and uphold safety policies and practices is central to understanding how their decisions influence safety in organisations. While our REA did not specifically target motivational drivers, several studies provide relevant evidence, often supported by large datasets. These studies point to both positive and negative drivers of OH&S outcomes, spanning financial incentives and contextual pressures.

While there is evidence that financial incentives can play a positive role, the evidence on their effectiveness is mixed. Several studies suggest that compensation structures can act as governance tools to align CEO behaviour with safety priorities. Haga (2022), analysing more than 31,000 firm-year observations (one observation per firm per year), found that tying CEO pay to workplace-injury metrics was associated with fewer recorded injuries and illnesses, particularly when CEOs held structural power within the organisation. Similarly, Wu et al. (2023) found that 'inside debt' – that is, retirement and deferred compensation benefits that are paid out gradually – encourage CEOs to prioritise long-term organisational stability, including workplace safety. Linking bonuses to lagging safety indicators can encourage underreporting (Bitar et al. 2022), while performance-focused incentive systems have been associated with higher injury rates (Haidar et al. 2024; McDermott et al. 2017).

Reputation and external pressures are further motivational drivers. Some research suggests that a strong safety record can enhance a CEO's legitimacy, help safeguard against takeovers, and strengthen corporate reputation (Barnea & Rubin, 2010; Pagano & Volpin, 2005; Wu et al., 2023). Government contracting requirements also appear to heighten executives' focus on safety, as Wu et al. (2023) found that the positive association between CEOs' inside debt holdings and workplace safety is stronger in firms with government contracting requirements, where safety lapses carry higher regulatory and reputational risks. Other work highlights the pursuit of formal benchmarks. Chinda et al. (2021) model this dynamic through an ergonomics culture maturity framework comprising five levels – pathological, reactive, calculative, proactive and generative – that represent progressive stages of organisational commitment to ergonomics and safety. The study finds that executives were motivated to reach higher maturity levels but tended to withdraw attention once these thresholds were reached, leading to cyclical improvements and declines in performance over time.

Overall, the literature suggests that senior management may be motivated to improve safety through a mix of individual characteristics (such as risk aversion or chronic unease), financial incentives (including long-term compensation structures), and external pressures (such as contracting requirements or reputational concerns). Risk-averse and prevention-focused behaviours are consistently linked to positive OH&S outcomes, whereas overconfidence and short-term performance orientation are associated with higher workplace injury rates. However, evidence on intrinsic motivations, such as reputation-building or moral commitment to 'doing the right thing', remains limited and methodologically less robust. Most studies addressing these factors rely on qualitative case designs, self-reported perceptions or secondary proxies (e.g. reputation indices), rather than higher-level evidence designs such as longitudinal or experimental studies.

3.7.1. Demographic characteristics

Studies frequently report descriptive characteristics of senior leaders, such as age, gender, and tenure, though causal links between these characteristics and OH&S outcomes are inconsistently demonstrated. Most research participants are male executives aged 31–78, with a median age of around 50 (Fruhen 2016; Ghahramani 2016; Galis 2018; Walkosz 2019; Haga 2022; Rahul 2020; Ahamed 2023; Qian 2023). Few studies establish a direct connection between these demographic factors and OH&S outcomes. One exception is Khadivar (2024), who found that 'shareholders and activist investors of airlines should choose more qualified, younger and less busy directors,' as airlines with younger directors experienced fewer accidents (p. 583).

Another study by Son (2025) found that female and racial/ethnic minority[1] board representation improved workplace safety when these directors held influential positions and when boards faced stronger accountability pressures. Notably, the study identified a synergistic, intersectional effect – boards that were diverse across both gender and ethnicity achieved the strongest occupational health and safety outcomes.

3.7.2. Organisational characteristics

Organisational characteristics such as tenure and positional power have also been examined. Drawing on interviews with 16 managers across three OHSAS 18001-certified manufacturing firms in Iran, Ghahramani (2016) emphasised the importance of senior management commitment, communication and employee involvement in enabling safety systems to function effectively. While insightful, this grounded-theory study is small-scale and context-specific, focusing on internal perceptions rather than measurable outcomes. Using a large US establishment-level dataset of 31,924 observations (2002–2011), Haga (2022) found that firms governed by founders or owner-CEOs (i.e. exercising ownership power) experienced higher rates of workplace injuries and illnesses, whereas structurally powerful CEOs – those whose authority derives from formal board appointment and organisational hierarchy, rather than ownership, were associated with lower rates of injury, illness, and days away from work. Structural CEOs also appeared to reduce differences in injury and illness rates between headquarters-based and out-of-state establishments. Although this large-scale study offers strong correlational evidence, it cannot establish causal direction or account for all unobserved firm characteristics. Khadivar (2024) similarly noted that longer CEO tenure may foster organisational stability and accumulated experience, thereby contributing to improved OH&S outcomes. However, despite its global coverage, the study remains correlational and cannot isolate leadership effects from broader financial or regulatory influences. Taken together, these studies highlight potential mechanisms – such as clear accountability, consistent policy implementation, and sustained managerial commitment – that may shape organisational structures and leadership continuity in shaping OH&S outcomes. Further research using longitudinal or experimental designs could help clarify causal pathways and test generalisability across sectors.

3.7.3. Leadership profiles

Recent research suggests that the leadership profile – i.e. the combination of a leader's career background, personality attributes and leadership style – plays a critical role in shaping safety culture and outcomes. Rather than being defined solely by formal position or title, leadership profiles are increasingly understood to include a range of individual characteristics that influence how senior leaders approach safety.

Several studies identify personality attributes as influential in shaping safety culture. Positive leadership styles, such as care for employee well-being and ethical commitment, are consistently associated with reduced incidents and improved OH&S outcomes. In a qualitative study of Indian industrial firms pursuing 'zero-harm' initiatives, Kaila (2024a, p. 4) notes, 'A deeper sense of commitment to ethical values and principles is utmost essential for meeting a standard of safety ethics as a corporate drive'. Rahul (2020) similarly highlights the benefits of leadership actions during COVID-19, when senior managers visibly prioritised workforce safety and well-being.

Practical awareness is also an important factor. Using data from the Sun Safe Workplaces programme involving 98 US local government organisations, Walkosz et al. (2019) analysed how leadership awareness predicted sun-safety implementation over two years. They found that when senior managers were familiar with the written policy, this translated into tangible organisational action, such as having 'more sun safety messages and items at the workplace, more communication about sun safety, and greater awareness of policy among frontline supervisors and employees' (p. 4). These associations remained significant at follow-up, indicating that senior-level awareness can drive sustained policy adoption and visible behavioural change.

Some leadership profiles appear particularly effective. Zhang et al. (2025) analysed a panel of US public firms (2002–2019). They found that organisations led by 'generalist' CEOs, i.e. those with experience across multiple industries, had 12.7% lower rates of workplace injuries and illnesses than those led by specialists. This effect was both

1. We define minority board representation (MBR) as the proportion of directors identified as racial/ethnic minorities, i.e. those not classified as White in the dataset analysed in this paper.

statistically and economically significant and remained robust across alternative model specifications. The authors suggest that generalist CEOs' broader managerial experience and awareness of reputational and financial risks make them more attentive to workplace safety. Roughly half of the CEOs in Zhang et al.'s (2025) US sample were classified as generalists (those above the median on the General Ability Index), indicating that this profile is relatively common within the population of publicly listed firms studied.

A substantial body of research examines how leadership styles and individual characteristics, particularly risk tolerance, shape organisational OH&S outcomes. While risk tolerance is not typically classified as a personality trait, it is a relatively stable individual characteristic that can vary over time and across contexts. For example, Wu et al. (2023), analysing more than 30,000 US firm-year observations, found that CEOs with larger inside-debt holdings were associated with statistically significant reductions in workplace injuries and illnesses. As noted earlier, inside debt refers to deferred forms of pay such as pensions and long-term compensation that tie a CEO's wealth to the firm's long-term solvency. Because these assets lose value if the company incurs costly accidents or liabilities, they act as a financial incentive for more risk-averse, safety-conscious behaviour. This suggests that CEOs with greater personal financial stakes in their companies' long-term health may adopt more cautious strategies to safeguard reputation and firm value.

Conversely, 'overconfident' or 'promotion-focused' CEOs have been linked to higher employee injury rates (Chen et al. 2023; Qian et al. 2023). Qian et al. (2023), analysing almost 15,000 firm-year observations across US public companies, found that CEO regulatory focus shapes safety outcomes. Promotion-focused CEOs, those prioritising growth and advancement, were associated with roughly 9% higher workplace injury rates. In contrast, prevention-focused CEOs, motivated by error avoidance and caution, were linked to 16–18% fewer injuries, depending on market conditions. At the more vigilant end of the spectrum, Fruhen et al. (2016) found that leaders experiencing 'chronic unease' consistently exhibited strong safety commitment, refusing to compromise on safety and dedicating significant time to safety issues. In interviews with 27 senior energy-sector managers, these leaders described behaviours such as questioning assumptions, seeking additional information and refusing to compromise on safety, which were associated with improved safety performance and more mature organisational safety discussions.

O'Sullivan et al. (2024) found that higher levels of perceived CEO greed, which is an observable measure based on public and financial indicators rather than personality traits, were statistically associated with fewer recorded workplace safety failures. In their large-scale regression analysis, a one-interquartile increase in perceived greed was associated with a 9.5% reduction in safety failure rates. The authors interpret this as evidence that self-interested leaders, conscious of their reputational exposure, may exercise greater caution to avoid incidents that could damage firm value or their public image.

This finding contrasts with Atay's (2020) qualitative analysis of the Soma mining disaster, which linked self-centred managerial decision-making to the prioritisation of production over safety, contributing directly to poor OH&S outcomes. Atay characterises the incident as a moral and managerial failure, showing how ethical lapses at the top can erode safety culture and normalise unsafe practices.

Other studies point more consistently to the risks associated with cognitive and behavioural biases at senior levels. For example, CEO overconfidence, commonly defined as an overestimation of one's control or an underestimation of risks (Chen et al. 2023), has been linked to higher incident rates and broader business risks.

Xue (2020) conceptualised personal character as a moral and exemplary dimension of senior managers' safety leadership, reflecting integrity, virtue and leading by example. The study found that while personal character did not directly influence safety behaviour, it had a significant indirect effect through the safety climate: managers with strong moral character fostered a positive safety climate, which in turn increased employees' safety participation.

Overall, while demographic characteristics such as age and gender have not been a significant focus in the literature to date, factors such as board composition, tenure and structural authority have received more attention and appear more consequential for organisational safety. Leadership characteristics measured through behavioural dimensions such as integrity, attentiveness and a prevention-oriented focus are most consistently associated with safer workplaces. By contrast, traits such as overconfidence, disengagement, and production-first priorities are associated with higher incident rates and greater business risks. Several studies also indicate that these leadership attributes influence OH&S outcomes indirectly, by shaping the safety climate within which employees operate.

4. Discussion

This REA identified a broad range of studies suggesting that senior management has a significant influence on workplace safety through their decisions and actions. Key themes of effective safety leadership by senior management are setting clear policies, allocating resources, being visibly involved, and building a positive safety culture. Board diversity and experienced, prevention-focused leaders are associated with safer workplaces. This evidence base covers a broad range of countries and sectors. However, most of the research focuses on large companies and developed countries, with less evidence from small businesses or developing economies.

A key limitation in the evidence base, however, is the difficulty in proving a direct causal link between senior management actions and OH&S outcomes. Most of the studies identified report correlations, showing that certain senior management behaviours are associated with better or worse safety outcomes, but do not demonstrate causation or articulate a clear theory of change. Only a small number of studies attempt to test for causality, and even these face methodological challenges, such as controlling for confounding factors and isolating the impact of senior management from other influences within the organisation.

As a result, while there is enough evidence that senior management is linked to OH&S outcomes, it is not possible to draw firm conclusions about direct cause and effect. The complexity of organisational settings, the influence of middle management and the interplay of multiple factors make it challenging to isolate the unique contribution of senior leaders.

Moreover, there is a noticeable disconnect between the existing ISO standards related to this topic and the research literature we identified. This was particularly clear around the definitions of senior management. The research literature does not reflect the ISO definitions described above, nor does it treat them as a reference point. This finding suggests that it may be worth greater consideration of how ISO standards in this area are implemented in practice, and links to research funding in this area. Strengthening links between research and practice, as well as developing evidence-based Theories of Change, may also help address the lack of studies that provide robust evidence of causal links between management practices and OH&S outcomes.

This issue may be particularly useful for exploring questions of motivation and incentives – an area where studies have found mixed results, with different incentives appearing to be associated with quite different impacts on OH&S outcomes, and a risk of linking incentives to safety that could create perverse outcomes. The mixed and nuanced evidence in this area suggests a cautious approach to making recommendations on incentives, and this could be a particular area of future research interest.

Regarding the overall aim of this pilot, this review demonstrates that it is feasible to work together with an ISO technical committee to identify areas of potential uncertainty where additional evidence may be useful, and to carry out a review that can contribute to the work of the committee in a timely manner within that overall schedule of work. This depends on early identification of the potential topic, close collaboration between the committee and the research team, and funding support for the work. The approach taken in this pilot could now be tested on other standards to refine this process and develop a model for integrating evidence directly into the standards development process.

5. Conclusions

About the study

This research examines how senior management's roles, behaviours, and motivations influence OH&S outcomes. By conducting a rapid evidence assessment, the research team gathered evidence to inform the development of an international standard for safety leadership and governance.

Findings

Our research suggests three overarching conclusions. First, the evidence indicates that senior management actions are associated with workplace OH&S outcomes, including lower injury and illness rates, stronger safety climate scores and greater employee participation in safety activities. These actions include strategic direction, visible leadership, oversight and cultural influence. However, this relationship is complex and shaped by organisational context, sector, policy environment, and geographic region. Many studies in this review are situated within specific national, policy or economic contexts, and several explicitly discuss how these factors may influence safety leadership, management practices and outcomes. However, only a subset systematically compares or analyses the impact of these contextual factors on the relationship between senior management and OH&S outcomes. Most studies are single-country or single-sector, and only a few attempt cross-country or policy-context comparisons. This finding highlights the importance of considering local context and organisational characteristics when interpreting and applying research findings to standards development, and that standards may need to be adaptable to different settings.

Second, the review highlights variability in how senior management is defined and understood across both research literature and ISO standards. While ISO standards offer formal definitions based on organisational hierarchy and authority, research studies tend to focus on the functions and responsibilities that senior leaders exercise in practice. This difference shows the importance of clarifying terminology and ensuring alignment between standards and the evidence base when developing or revising standards.

Finally, the findings point to gaps and limitations in the strength of the evidence and its generalisability. There is limited research on SMEs and on organisations in developing economies. In addition, most studies in this area report associations between senior management actions and workplace OH&S outcomes rather than demonstrating direct causal effects. This issue is not simply a methodological shortcoming; it reflects the complexity of organisational systems, where multiple factors interact, making it often difficult to isolate the impact of any single variable. Correlational studies can still provide valuable insights, especially when supported by mechanisms and consistent patterns across contexts. However, without robust causal evidence, there is a risk that standards may be based on practices that are effective only under certain conditions, or that their impact may be overstated.

Implications for standards development

For standards development, this means that recommended practices should be grounded in the best available evidence but also allow for flexibility and adaptation to local context. It is important to acknowledge the limitations of the evidence and avoid prescribing overly rigid requirements when causal pathways are not well established. Future research should aim to strengthen the evidence base by employing designs that can better test causality, such as robust longitudinal studies, natural experiments, or randomised controlled trials, and by clear theories of change that specify how and why senior management actions are expected to influence OH&S outcomes. In the meantime, standards could be designed to encourage ongoing evaluation and learning, enabling organisations to adapt and refine their approaches as new evidence emerges.

Summary and next steps

Overall, this research pilot offers a structured overview of the available evidence on the impact of senior management on OH&S outcomes, while acknowledging important limitations in scope and context. Designed explicitly to inform the development of the OH&S leadership and governance standard, the pilot shows that collaboration between researchers and ISO members is both possible and productive. This collaboration enabled the identification of key areas of uncertainty within the standard's subject matter, guided the research, and informed revisions to ensure the review remained relevant to OH&S standard development.

We will share the findings from this review with WG9 to further support the development of the new standard. To build on these insights, we recommend a follow-up engagement with WG9. Such a discussion would verify whether, and in what ways, the findings from this review have contributed to shaping the OH&S leadership and governance standard. Documenting this influence would provide evidence of impact and further clarify how formal evidence can best support committees in their standardisation work.

Furthermore, we recommend that the methodology used in this pilot be applied to other standards and technical committees to further test and demonstrate the benefits of drawing on formal research evidence in standard development. The potential use of 'living evidence reviews' – continuously updated evidence reviews – could also be explored as a means of ensuring that standards remain current, relevant and informed by the latest research.

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Annex A. Search strings and other REA details

We used the search string in the table for the Web of Science database and then adapted it for other databases.

Table A.1. Search strings

Set	Search	Results
1. Executive leadership	TI=(((senior OR executive OR elite OR top) NEAR/1 (management OR manager OR managers OR "managerial team*" OR leader* OR executive* OR director*)) OR ((corporate OR company OR business) NEAR/1 (executive* OR officer* OR leader* OR board* OR director* OR governing)) OR "corporate head" OR "leadership team*" OR "C Suite*" OR CEO OR CEOs OR "chief executive*" OR "executive officer*" OR "upper echelon*" OR "high status" OR (chief NEAR/1 officer*) OR "corporate governance" OR "company governance" OR "leadership council*" OR "advisory council*" OR "oversight committee*" OR "oversight council*" OR "corporate oversight" OR "management pressure" OR "transformational leader*" OR (board* NEAR/1 (director* OR executive* OR supervisory OR trustee* OR advisor* OR oversight OR strategic OR governing))) OR AB=(((senior OR executive OR elite OR top) NEAR/1 (management OR manager OR managers OR "managerial team*" OR leader* OR executive* OR director*)) OR ((corporate OR company OR business) NEAR/1 (executive* OR officer* OR leader* OR board* OR director* OR governing)) OR "corporate head" OR "leadership team*" OR "C Suite*" OR CEO OR CEOs OR "chief executive*" OR "executive officer*" OR "upper echelon*" OR "high status" OR (chief NEAR/1 officer*) OR "corporate governance" OR "company governance" OR "leadership council*" OR "advisory council*" OR "oversight committee*" OR "oversight council*" OR "corporate oversight" OR "management pressure" OR "transformational leader*" OR (board* NEAR/1 (director* OR executive* OR supervisory OR trustee* OR advisor* OR oversight OR strategic OR governing)))	179,385
2. Health & safety / safety outcomes	TI=(((impact* OR prevention OR mitigation OR reduc* OR improve* OR maintain* OR enhanc* OR influence* OR affect* OR contribution* OR contribute* OR contributing OR "relation to" OR related OR "in association" OR associated) NEAR/1 ("safety outcome*" OR hazard* OR accident* OR (health NEAR/1 safety) OR incident* OR injury OR injuries OR fatalit* OR death* OR "ill health" OR illness* OR sickness* OR "physical safety" OR "psychological safety" OR "occupational safety" OR "occupational health" OR "organizational safety" OR "safety behavior*" OR "safety behaviour*" OR "employee safety" OR "safety culture" OR "safety motivation*" OR "safety climate*")) OR ((safe OR safety) NEAR/1 (work* OR environment OR environments OR office OR offices OR job* OR participation* OR commitment* OR voice* OR knowledge OR aware* OR behavior* OR behaviour* OR measure* OR control* OR procedur* OR strateg* OR practice*))) OR AB=(((impact* OR prevention OR mitigation OR reduc* OR improve* OR maintain* OR enhanc* OR influence* OR affect* OR contribution* OR contribute* OR contributing OR "relation to" OR related OR "in association" OR associated) NEAR/1 ("safety outcome*" OR hazard* OR accident* OR (health NEAR/1 safety) OR incident* OR injury OR injuries OR fatalit* OR death* OR "ill health" OR illness* OR sickness* OR "physical safety" OR "psychological safety" OR "occupational safety" OR "occupational health" OR "organizational safety" OR "safety behavior*" OR "safety behaviour*" OR "employee safety" OR "safety culture" OR "safety motivation*" OR "safety climate*")) OR ((safe OR safety) NEAR/1 (work* OR environment OR environments OR office OR offices OR job* OR participation* OR commitment* OR voice* OR knowledge OR aware* OR behavior* OR behaviour* OR measure* OR control* OR procedur* OR strateg* OR practice*)))	349,545
3. Terms to be excluded	TI=("high school" OR "middle school" OR athlete* OR sport* OR football OR baseball OR "school board" OR pedagogy OR "patient safety" OR pediatric* OR child* OR "executive function*" OR "executive dysfunction*" OR "executive impairment*" OR "executive control" OR "executive summary" OR SIRVA) OR AB=("high school" OR "middle school" OR athlete* OR sport* OR football OR baseball OR "school board" OR pedagogy OR "patient safety" OR pediatric* OR child* OR "executive function*" OR "executive dysfunction*" OR "executive impairment*" OR "executive control" OR "executive summary" OR SIRVA)	2,401,095
4. Final results	((#1 AND #2) NOT #3) AND DT==("ARTICLE" OR "REVIEW" OR "EARLY ACCESS") AND LA==("ENGLISH" OR "SPANISH") AND PY==("2024" OR "2022" OR "2023" OR "2025" OR "2021" OR "2020")	459

Table A.2. Inclusion and exclusion Criteria

	Include	Exclude
Literature type	Academic and peer-reviewed articles (including any study design), book chapters	Research protocols, conference papers, opinion pieces, news articles, commentaries, grey literature and interviews
Topic focus	• Role of company directors and/or top-level managers in promoting OH&S • Impact of leadership on OH&S outcomes • Physical or mental health and safety of workers	• Descriptions of OH&S interventions without leadership analysis • Non-OH&S workplace focus • Governance/leadership beyond OH&S interventions • Focus on supervisors/middle management • Data-protection or information-security issues • Safety of recipients of goods/services (e.g. patients) rather than workers • General safety/management systems without OH&S leadership • Focus on different leadership styles
Date	Published since 2015	Published before 2015
Region	All	None
Language	Written in English, Arabic, Chinese, French, Russian or Spanish	Written in languages other than English, Arabic, Chinese, French, Russian or Spanish

Figure A.1. PRISMA Diagram

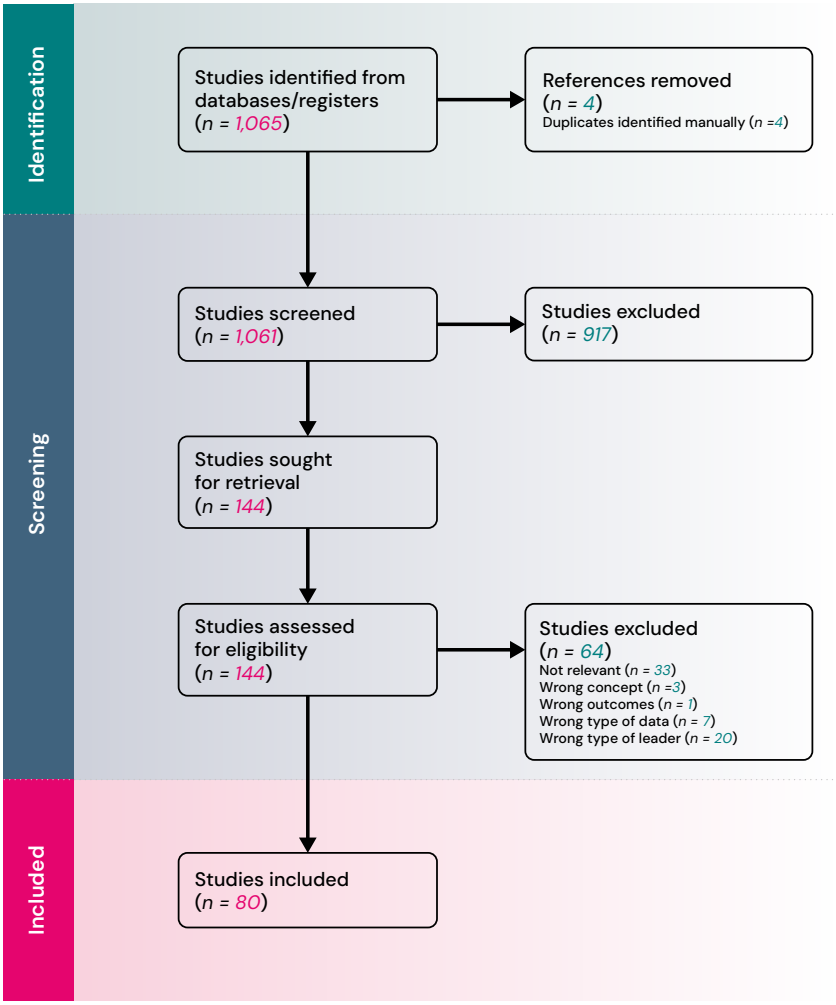

Table A.3. Extraction template

Code	Guidance
Reviewer information	
Name	
Date	
Affiliation	
Article information	
Paper title	
Authors	
Year of publication	
DOI/Link	
Journal name	
Type of article (e.g. systematic review, meta-analysis, scoping review, primary study, qualitative/quantitative, etc.)	
Objective of the article	
Definitions	
Definition of health and safety and health and safety outcomes (if available)	
Who are the senior/top managers mentioned, and how (if) are they defined?	E.g. C-Suite, executive, boss, top management
Information about context	
Geographical location	
Workplace/industry/sector	
Size of organisation (small vs large?)	We used the article's description for data extraction. For analysis, and if relevant here, we can use the Eurostat definition: small means ≤50 employees; medium means ≤250 employees.
Other relevant contextual information	
Senior management impact on OSH	
Actions: Management actions and competencies that impact OSH outcomes (the 'what')	
Characteristics: Management traits or characteristics (e.g. gender) that impact OSH outcomes (the 'who')	
Mechanism: How does the impact happen? (the 'how')	
Mediating factors: factors such as the role of middle management that mediate the effects of senior management on OSH outcomes (enablers or barriers)	
Safety outcomes influenced by senior management	
Improvement	Specific measured outcomes (e.g. injury rates, safety culture improvements, changes in worker behaviour and well-being).
Deterioration	Specific measured outcomes (e.g. injury rates, safety culture improvements, changes in worker behaviour and well-being).
Indicators and measurements	Tools or metrics used to assess outcomes (e.g. incident reports, surveys and safety climate scales).
Evidence level	
Level 1	RCTs or meta-analyses
Level 2	Systematic/high-quality literature reviews
Level 3	Multi-site, large-sample quantitative or comparative studies
Level 4	Small-sample, single-site, theoretically motivated objective studies
Level 5	Descriptive studies/self-report, non-systematic, limited analysis
Level 6	Expert opinion, anecdotal, no data

Annex B. Breakdown of included articles

Table B.1. Method type

Method Type	Count	Proportion (%)
Quantitative (including survey-based, statistical, regression, etc.)	35	43.8%
Qualitative (including interviews, case studies, thematic analysis, etc.)	21	26.3%
Mixed methods (either explicitly stated or a clear combination of qualitative and quantitative)	15	18.8%
Literature/review/other (e.g. literature reviews, scoping/systematic reviews, etc.)	9	11.3%
Total	**80**	**100%**

Table B.2. Split by country[1]

Country/Region	Total	Proportion (%)	Category
United States	17	21.3%	Developed
Australia	6	7.5%	Developed
India	6	7.5%	Developing
Malaysia	4	5.0%	Developing
Türkiye	4	5.0%	Developing
China	3	3.8%	Developing
Iran	3	3.8%	Developing
Canada	2	2.5%	Developed
Ethiopia	2	2.5%	Developing
Indonesia	2	2.5%	Developing
Saudi Arabia	2	2.5%	Developing
South Africa	2	2.5%	Developing
United Kingdom	2	2.5%	Developed
Finland	2	2.5%	Developed
Other single-country studies (Algeria, Hong Kong, Nepal, New Zealand, Norway, Pakistan, Portugal, Serbia, Sweden, Thailand, UAE, Vietnam, Zimbabwe)	13	16.3%	-
Multiple countries (global or cross-country)	10	12.5%	-
Total	**80**	**100.0%**	

1. Classified based on the International Monetary Fund rankings: *https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates*

Table B.3. Split by sector

Sector/Industry	Total	Proportion (%)
Construction	12	15.0%
Manufacturing & Industry	9	11.3%
Energy, Utilities & Chemicals	14	17.5%
Transportation & Logistics	7	8.8%
Mining	3	3.8%
Multiple / Cross-sectoral / Not specified[1]	35	43.8%
Total	**80**	**100%**

Table B.4. Split by organisation size

Organisation-size category	Total	Proportion (%)
Micro (0–9 employees)	0	0.0%
Small (10–49 employees)	11	13.8%
Medium (50–249 employees)	12	15.0%
Large (≥250 employees)	32	40.0%
Multiple sizes represented (mix of micro, small, medium and large)	16	20.0%
Not specified or unclear	9	11.3%
Total	**80**	**100.0%**

1. The multiple/cross-sector category includes studies that draw on evidence from two or more distinct industries (e.g. construction and manufacturing, or energy and transport), or that analyse workplace or organisational issues such as occupational safety, training systems, or management practices across multiple sectors simultaneously. It also covers studies using national datasets or surveys aggregated across industries, where sector-specific findings are not disaggregated, as well as those that do not specify an industry or sectoral focus.

Annex C. Summary of included articles

No.	Study title	Author(s), Pub. Year	Country	Sector	Organisational size	Level	Study Design	Population/ Participants characteristics (e.g. gender, age and ethnicity)	Sample Size	Summary of Key Findings related to the review questions
1	'What Is Safety Leadership? A Systematic Review of Definitions'	Adra et al. (2024)	Multiple	Multiple	Not specified	2	Systematic literature review	N/A	37 studies	Identified a lack of consensus on the definition of safety leadership, proposed three thematic dimensions ('why', 'how' and 'who') and highlighted the dominance of transformational leadership frameworks.
2	'A Study to Determine Human-Related Errors at the Level of Top Management, Safety Supervisors & Workers during the Implementation of Safety Practices in the Construction Industry'	Ahamed & Mariappan (2023)	India	Construction	Medium (presumed but not explicitly stated)	3	Mixed: qualitative (interviews and data survey)	The study respondents included top management officials, safety supervisors and construction workers from seven projects in Chennai, South India. The majority were male (90.54%), aged 31–50 (68.91%) and had a range of educational backgrounds and work experience.	148 interviewees from 7 construction companies	Identified 140 human-related contributing errors linked to three key safety issues: inadequate supply and use of PPE, insufficient safety training and poor safety supervision. Top management was responsible for the largest share of errors across all three issues, underscoring the critical role of leadership in shaping safety outcomes.
3	'Modeling the Impact of Safety Climate on Process Safety in a Modern Process Industry: The Case of the UAE's Oil-Refining Industry'	Al Mazrouei et al. (2019)	United Arab Emirates	Oil refining	Large (presumed but not explicitly stated)	3	Quantitative	Oil refinery employees in the UAE; workforce composition not specified	180 employees	Confirmed that top-management commitment, management practices, and supervisory safety behaviour are positively related to process safety outcomes.
4	'The Determinants of Corporate Social Irresponsibility: A Case Study of the Soma Mine Accident in Turkey'	Atay & Terpstra-Tong (2020)	Türkiye	Mining	Large	4	Qualitative case study	Secondary data from reports, media, and official investigations	N/A	Found top management's negligence and weak institutional regulation as the primary causes of corporate social irresponsibility in the Soma mine disaster.
5	'Perception of Safety Culture in the Nepalese Aviation Industry: A Factor Analysis Approach'	Bhattarai et al. (2022)	Nepal	Aviation	Small (350 active personnel across 9 airlines)	3	Quantitative (survey)	Most respondents were male (64%), aged 30–40 (74%), held a Master's degree (60%) and had over 9 years' experience (37%). They were primarily mid-level managers who worked in maintenance, quality assurance, and safety education roles across nine Nepalese airlines operating fixed-wing aircraft.	120 respondents	Identified four factors shaping safety culture: positive safety practices, management decision-making, safety management systems, and policy implementation.

No.	Study title	Author(s), Pub. Year	Country	Sector	Organisational size	Level	Study Design	Population/ Participants characteristics (e.g. gender, age and ethnicity)	Sample Size	Summary of Key Findings related to the review questions
6	'Health and Safety Leadership: A Study of Employee Perceptions and Company Leader Responses in New Zealand's Electricity Supply Industry'	Börner& Lassowski (2019)	New Zealand	Electricity supply	Large (presumed but not explicitly stated)	3	Mixed: qualitative (interviews) and quantitative (survey)	Analysis of the Great Safety Performance (GSP) Survey completed by field staff, supervisors and network staff, plus additional interviews with CEOs and health and safety managers.	Included 61 survey responses from the four companies – 472 (84%) field staff, 58 (10%) supervisors and 31 (6%) network staff, including engineers, project managers and control operators.	Found that safety culture improves when top management actively implements action plans. In two case studies, GSP scores improved, and health and safety risks decreased as a result of leader engagement. In the remaining two case studies, there was negative or no engagement, resulting in stagnating or falling GSP scores.
7	'Leading by example: Culture, leadership, and accountability'	Broadribb (2024)	Multiple	Multiple	Not specified	5	Document and literature review (non-systematic)	N/A	N/A	Suggests that the quality and commitment of leadership directly influence the safety culture, which is essential for preventing and mitigating major incidents in facilities handling high-hazard chemicals.
8	'Considerations for Laboratory Biosafety and Biosecurity During the Coronavirus Disease 2019 Pandemic: Applying the ISO 35001:2019 Standard and High-Reliability Organizations Principles'	Callihan, D. R., M. Downing, E. Meyer et al. (2021)	Australia	Multiple	Multiple	5	Qualitative (secondary sources)	The article explored international standards, expert guidance, and institutional practices.	N/A	Found that workplace safety is improved by the involvement of all stakeholders, from top leadership to front-line workers. High-quality outcomes – measured by the absence of incidents, accidents, injuries, or near misses – result from strictly following standard operating procedures and timely communication of risks and pitfalls. Adopting a systematic framework to identify and manage risks posed by emerging pathogens results in increased workplace safety and higher quality processes and products.
9	'Health-Oriented Leadership Communication Matters: A Trickle-down Model to Enhance Employees' Health and Well-Being during Turbulent Times'	Chen & Wu (2024)	United States	Multiple	Multiple	3	Quantitative (survey)	The majority of remote workers surveyed were White (82.37%), male (60.66%), aged 35–44 (22.04%) and occupied non-management (38.29%) or middle-management (42.7%) roles.	363 full-time remote employees.	Found that health-oriented communication at the executive and supervisory levels directly influenced employees' self-care, thereby reducing their stress levels. Executive leaders' health-oriented leadership communication indirectly influenced remote workers' self-care by positively associating with supervisors' health-oriented leadership communication.
10	'A Resilience Safety Climate Model Predicting Construction Safety Performance'	Chen et al. (2018)	Canada	Construction	Multiple (Micro (1–4) 5.6% – Small (5–99) 51.0% – Medium (100–499) 28.6% – Large (500+) 14.8%)	3	Quantitative (survey)	The mean age of the respondents was 37; 98% were male; 68% of workers were journeymen or apprentices.	431 self-administered surveys from 68 construction sites in Ontario, Canada	Found that top management engagement was the most important factor, given that site-level management and frontline workers were significantly affected by top management's attitudes toward and investment in safety, e.g. developing new safety programmes and introducing new safety-related techniques.

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11	'Does CEO Overconfidence Affect Workplace Safety'	Chen et al. (2023)	United States	Multiple	Multiple	3	Quantitative (OSH dataset)	Measured CEOs' confidence levels through stock options. Demographic characteristics not provided.	A sample of 50,012 establishment-year observations.	Found that CEO overconfidence can lead to poor workplace safety policies and increased employee workload.
12	'Effect of Management Attention on Ergonomics Culture Maturity: System Dynamics Modeling Approach'	Chinda (2021)	Thailand	Manufacturing	Large (1,500 employees)	4	Mixed: literature review and one case study	N/A	N/A	Identified enablers in the proposed model through which the impact on OSH occurs: leadership, people, policy and strategy, resources and processes. Management's attention to ergonomics culture fluctuates over time, sometimes withdrawn from its implementation.
13	'Using "CEO Speak" to Prioritize a Safety Culture'	Craig et al. (2023)	US and Canada	Transport (rail)	Large (presumed but not explicitly stated)	4	Case study	N/A	N/A	Found that 'CEO speak' is about transparent, factual and values-driven communication and recommends five specific actions for CEOs: 1) using clear, sincere safety language, 2) avoiding empty platitudes, 3) demonstrating genuine commitment through words and actions, 4) citing meaningful, long-term safety metrics, and 5) openly addressing operational risks.
14	'The Impact of Business Leaders' Formal Health and Safety Training on the Establishment of Robust Occupational Safety and Health Management Systems: Three Studies Based on Data from Labour Inspections'	Dahl & Olsen (2022)	Norway	Multiple: wholesale and retail trade, construction, accommodation and food service, manufacturing, health and social work, administrative/ support services, transportation, and others	Multiple	3	Quantitative (cross-sectional and longitudinal data from labour inspections)	No demographic or psychometric data on managers reported.	Study 1 included data gathered from health and safety inspections of 29,224 companies. Studies 2 and 3 included 1,119 and 189 companies, respectively.	Found that mandatory OSH training for business leaders is associated with significant improvement in OSH compliance at the organisational level. Companies where managers completed OSH training had higher compliance scores. When previously untrained managers completed training, compliance improved substantially.
15	'Boards of Directors' Influences on Occupational Health and Safety: A Scoping Review of Evidence and Best Practices'	Ebbevi et al. (2021)	Sweden	Multiple	Large organisations (>250 employees)	2	Scoping review	N/A	Included 49 studies	Found that the majority of studies contained empirical data (57%), some were entirely normative (33%), and a few contained normative claims far beyond empirical data (10%). Empirical studies gave no insight into the scope of impact of board activities on OSH, and no studies assessed the causal mechanisms by which board activities influence OSH outcomes.
16	'"Chronic Unease" for Safety in Senior Managers: An Interview Study of Its Components, Behaviours and Consequences'	Fruhen & Flin (2016)	United Kingdom	Energy	Large	4	Qualitative (interviews)	Participants were senior managers, most of whom were from one company. Five of the 27 participants in the interviews were women.	27 interviewees	Argues that senior managers would spend more time on safety issues by experiencing chronic unease; 120 of 188 consequences of chronic unease were positive, while 65 were negative, and 3 were neither positive nor negative.

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17	'The Factors Affecting Behaviour Based Safety (BBS) Implementation in Oil and Gas Industry'	Galis et al. (2018)	Malaysia	Oil and gas	Large (presumed but not explicitly stated)	4	Qualitative (interviews)	Interviewed Safety and Health Officers, of whom five were male and two were female.	Seven interviews with seven companies.	Found that factors affecting the implementation of Behaviour Based Safety (BBS) include workers' level of commitment, superiors' level of involvement, training provided, lack of action and workers' level of understanding of the BBS principles.
18	'Factors That Influence the Maintenance and Improvement of OHSAS 18001 in Adopting Companies: A Qualitative Study'	Ghahramani (2016).	Iran	Manufacturing	Medium-large organisations (200–400 employees)	4	Qualitative (interviews)	Most participants were male (n=15), with one female. Participants' roles in the companies were as follows: representatives of the companies' senior managers in OHSAS 18001 (n=3); OHS managers (n=5); production managers (n=4); maintenance managers (n=3) and an administrative manager (n=1).	16 managers interviewed from multiple organisations.	Found that inadequate senior management commitment is reflected in poor prioritisation of safety, limited authority delegation, insufficient knowledge, weak communication and a focus on compliance before audits. These undermined the effective implementation of OHSAS 18001 and overall workplace safety.
19	'Relative Influence of Senior Managers, Direct Supervisors, and Coworkers on Employee Injuries and Safety Behaviors'	Grocutt et al. (2023)	United Kingdom	Multiple: Railway maintenance and steelwork	Large	3	Quantitative (survey)	Frontline industrial workers, majority male (above 90% in all studies), with average ages of 41, 39 and 44 years in the three studies.	Studies 1 and 2: n=307 and n=123 railway maintenance workers, respectively; Study 3: n=205 steelworkers	Examined which source of safety support – senior managers, direct supervisors, or coworkers – most strongly predicts the following: employee injuries, safety compliance, and safety participation. Overall, no single source of safety support consistently emerged as the strongest predictor across all contexts.
20	'Ruthless Exploiters or Ethical Guardians of the Workforce? Powerful CEOs and Their Impact on Workplace Safety and Health'	Haga et al. (2022)	United States	Multiple	Multiple	3	Quantitative (OLS regression).	2% of the firms in the sample had a female CEO. The mean age of the CEO was 56.15 years.	The final sample contains 31,924 establishment-year observations from 319 firms.	Showed that workplace injuries, illnesses and days away from work decrease when a structurally powerful CEO is in charge. Structural and expertise power also have a positive effect on workforce injuries. Structurally more powerful CEOs also mitigate differences in workplace injury and illness rates between headquarters state establishments and those outside the state in which the headquarters are located.
21	'Board Gender Diversity and Workplace Safety: Evidence From Quasi-Natural Experiments'	Haidar & Hossain (2024)	Multiple (48 countries)	Multiple	Large (average of 10,420 employees)	3	Quantitative (quasi-natural experiment, difference-in-difference, multiple data sources).	N/A	13,124 firm-year observations from 2,662 unique firms in 48 countries between 2002 and 2019.	Found that board gender quotas are associated with an increase in workplace injury rates, especially in financially constrained firms and those with high workloads or low safety investment. However, this negative effect is less pronounced in countries with strong institutions and high union representation.

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22	'Prioritizing Work Health, Safety, and Wellbeing in Corporate Strategies: An Indicative Framework'	Halliday et al. (2024)	Australia	Multiple: public sector, manufacturing, resources, construction, transport.	Not specified	4	Mixed: qualitative (interviews) and quantitative (survey)	Most participants were male (69.5%), senior managers (48.5%), and had ten or more years of on-the-job experience (82.1%).	8 semi-structured interviews, 95 survey responses.	Recommends aligning health, safety and well-being practices with the overall business strategy. The study produced an industry-confirmed, indicative framework with a business-centric roadmap.
23	'A Spatial Data Integration and Visualization Approach for Occupational Health and Safety Risks Management: Application to Algerian Electricity and Gas Company'	Haroun & Ghomari (2023)	Algeria	Electricity and gas	Large	4	Qualitative (literature review, case study and interviews)	Ten physicians, five hygienists and three ergonomists were interviewed, all from the Service Universitaire de Médecine de Travail (SUMT) in Rouiba, Algiers.	18 OHS experts	Demonstrates that integrating spatial and semantic dimensions into OHS data systems improves the accuracy, visualisation and effectiveness of safety decision making, provided that top management supports it and spatial data are made available.
24	'Individual Employee's Perceptions of "Group-Level Safety Climate" (Supervisor Referenced) versus "Organization-Level Safety Climate" (Top Management Referenced): Associations with Safety Outcomes for Lone Workers'	Huang et al. (2017)	United States	Trucking	Large (assumed)	3	Quantitative (survey)	The participants were lone working professional truck drivers from eight US trucking companies. Limited demographic data (age and tenure) were captured but not detailed, and no variables such as gender, education, or ethnicity were reported.	7,466 participants from eight companies	Found that the organisational safety climate (OSC; top management) and group safety climate (GSC; supervisors) scores were closely related, but notable gaps between the two were observed for some truck drivers. When top management-induced climate safety is lacking, supervisor-induced climate safety compensates. OSC and GSC interacted in a compensatory way. The highest levels of safe driving behaviour occurred when both organisational and supervisor safety climates were strong.
25	'Safety Climate in the Utility Industry Perceptual Discrepancies Across Organizational Hierarchy'	Huang et al. (2024)	United States	Utility	Large	4	Quantitative (survey)	Included 861 utility workers, 153 field leaders/supervisors, and 45 senior leaders/ executives.	1,059 participants	Found that perceptions of safety climate in the utility industry differ significantly across organisational levels. Senior leaders view the safety climate more positively than front-line workers, revealing a disconnect between leadership's intentions and employees' experiences, and highlighting the need for better alignment and communication across the hierarchy.
26	'An Analysis of the Effect of the Implementation of an Integrated Management System (IMS) on Work Ergonomics in an O&M Power Plant Company'	Ifadiana, & Soemirat (2016)	Indonesia	Energy (power plant company)	Large (presumed but not explicitly stated)	4	Quantitative (survey)	Nine respondents at the top management level, 30 at the middle-management level, and 120 at the worker level.	159 respondents	Logistic regression analysis showed no variables significantly affecting ergonomics or ergonomic accidents. Of the Integrated Management System principles: 1) Policy, 2) Plan, 3) Do, 4) Check, and 5) Action, it seemed that the most influential IMS on work ergonomics was the Do (D) of Deming's PDCA cycle at the worker level, whereas the most influential parameter for ergonomics accident prevention was Policy (P) and Do (D) at the top management level.

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27	Translating Safety Policy into Practice: The Role of Management in Oil and Gas Industry in Malaysia'	Isha (2017)	Malaysia	Oil and gas	Large (presumed but not explicitly stated)	4	Qualitative (interviews)	Respondents represented different levels of organisational personnel, i.e., top and middle management, managers, engineers, technicians, and OHS doctors/nurses.	19	Found that management plays an important role in promoting OHS culture within the organisation.
28	'Workplace Innovation Influence on Occupational Safety and Health'	Jilcha et al. (2016)	Ethiopia	Multiple	Not specified	2	Systematic literature review	N/A	Included 40 academic articles	Listed top management changes as one of the non-technical workplace innovations that can influence OSH. However, the literature lacks clarity on how top management decisions and leadership styles affect workplace safety through innovation.
29	'Corporate Experiences of Zero Harm Culture in India: A Qualitative Survey'	Kaila (2024a)	India	Multiple: steel, construction, chemicals, oil, gas and electricity.	Large (presumed but not explicitly stated)	5	Qualitative (interviews and focus groups)	Not detailed.	Included 480 managers from 10 different project sites, engaged via 60 interviews, 30 training seminars and 20 focus-group discussions.	Limited dialogue and engagement between frontline workers and management undermine safety culture and collaborative risk prevention. Senior leaders often seek clarity on what safety culture entails, how to measure it and its tangible benefits before committing to interventions.
30	'Sustain Leadership Inspiration in Supportive Safety Culture for Grass-Root Change'	Kaila (2024b)	India	Multiple: including chemicals, construction, gas, power and steel.	Large	5	Qualitative (interviews, discussions, field visits)	Researcher participants included the Director, Managers, Head of Departments and EHS/HR Professionals.	Field visits to ten site locations; interactions with 257 managers and 250 contractor workers.	Leadership presence on the ground helps reinforce safe behaviours and fosters trust across teams. Safety culture boards are more effective when they act as solution providers and engage directly with frontline challenges. Attention to employees' socio-familial well-being contributes to a more holistic and caring safety environment. Learning from grassroots leadership encourages inclusive decision-making and responsiveness to real-world risks. Visible commitment to behavioural safety practices helps shift safety from a compliance task to a shared organisational value.
31	'A Qualitative Study to Identify the Success Factors of Occupational Health and Safety Management Systems Implemented in Ground Handling Companies Throughout Turkey'	Karakavuz et al. (2017)	Türkiye	Ground handling	Medium (presumed but not explicitly stated)	4	Qualitative (interviews and a short literature review)	Most participants were male (58%), in their twenties (37%) or thirties (33%), held predominantly undergraduate degrees (75%), had varying experience, and occupied roles such as Occupational Safety Specialists, Occupational Physicians, and OHS Managers.	24 OHS professionals.	A positive safety culture centred on OSH plays a pivotal role in shaping all other success factors. In particular, the shared beliefs and values around OSH, especially those held by top leadership, significantly contribute to the effectiveness of OSH management systems.

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32	'Analysis of the Factors Affecting the Safety Performance in the Iranian Power Distribution Companies - Hybrid Approach of DEMATEL and ISM'	Rezapour et al. (2021)	Iran	Power distribution	Small (presumed but not explicitly stated)	5	Mixed: literature review and a questionnaire	Not detailed.	Not detailed	Top management can contribute significantly by shaping the safety policy in alignment with the organisation's safety management system, occupational health priorities, strategic objectives (both short- and long-term), and clearly defined roles and responsibilities. This also includes guiding the development of practical operational plans to support implementation.
33	'Reducing Airline Accident Risk and Saving Lives: Financial Health, Corporate Governance, and Aviation Safety'	Khadivar et al. (2024)	Multiple (70 countries)	Aviation	Large (presumed but not explicitly stated)	3	Quantitative (multiple datasets)	Based on multiple international databases covering financial, governance and safety records.	Included 372 airlines across 70 countries between 1990 and 2016.	Strong corporate governance – particularly qualified, younger and less busy board members – correlates with lower accident rates.
34	'Safety Climate Assessment: A Survey in an Electric Power Distribution Company'	Kiani et al. (2021)	Iran	Electric power distribution	Medium (presumed but not explicitly stated)	3	Quantitative (survey)	Participants had an average age of 38, an average work experience of 11 years, and worked in various roles (line workers, supervisors, administrative staff, and managers), with educational levels ranging from below diploma to university degrees.	Included 179 respondents	Management commitment was one of the 11 dimensions assessed using the Safety Climate Questionnaire. Among all dimensions, management commitment had the highest correlation with overall safety climate scores (r = 0.754), indicating it plays a critical role in shaping safety perceptions. The authors conclude that management, as an organisational power, can exert significant influence on the promotion of a safety climate.
35	'Perceived Factors Affecting the Implementation of Occupational Health and Safety Management Systems in the South African Construction Industry'	Kunodzia et al. (2024)	South Africa	Construction	Small (presumed but not explicitly stated)	4	Quantitative (survey)	26% of participants were project managers / operations managers; 22% were quantity surveyors / engineering surveyors; 12% were health and safety managers or health and safety officers. Other professions included site manager, architect, site foreman, professional health and safety agent and contracts manager.	50 respondents	The most important internal factors were identified as risk control strategies, senior management commitment and support, communication channels, training, hazard perception, education, risk awareness, risk identification and safety culture.

No.	Study title	Author(s), Pub. Year	Country	Sector	Organisational size	Level	Study Design	Population/ Participants characteristics (e.g. gender, age and ethnicity)	Sample Size	Summary of Key Findings related to the review questions
36	'Leadership Attributes for Corporate Safety Culture'	Lal (2023)	India	Multiple: chemicals, construction, gas, power and steel industries.	Small (presumed but not explicitly stated)	4	Qualitative (interviews)	Not detailed beyond listing participants' roles: 'CEO, Directors, Managers, Heads of Departments, and HR/ Safety Professionals belonging to the public and private industrial sectors.'	200 industry professionals	Suggests that leadership attributes and actions shape employees' risk perception and safety behaviours, which, in turn, influence safety performance. Leadership commitment, presence, and communication are mechanisms for driving safety culture change. Risk perception was identified as a mediator between safety leadership and safety performance. Top management was described as a key enabler of positive safety culture. A lack of engagement or focus from top management was identified as a barrier to sustaining the safety culture.
37	'Outcomes of Safety Climate in Trucking: A Longitudinal Framework'	Lee et al. (2019)	United States	Trucking	Medium (presumed but not explicitly stated)	3	Quantitative (survey and injury records from one company)	Not defined. All professional drivers from one trucking company.	481 (after excluding missing data).	Concluded that senior management influence is reflected in the organisation-level safety climate, which reflects company-wide norms and values about safety. This organisational climate showed a top-down effect on group-level safety climate, shaping drivers' safety behaviour and subsequent lost-time injury outcomes within the trucking company.
38	'COVID-19 in the Workplace in Indonesia'	Lestar et al. (2022)	Indonesia	Multiple: including agriculture and animal husbandry; construction; manufacturing; and logistics and goods transportation.	Multiple (20–170,000 employees).	3	Mixed: Qualitative (interviews) and secondary data analysis	Participants were members of each company's COVID-19 response team or task force. Secondary data included policies and procedures, data from rapid test result mapping, and from worker self-risk assessment dashboards.	Invited participants from 12 companies (the exact number is unspecified).	Implemented health protocols to varying degrees in the surveyed companies; larger companies had more comprehensive and rapid systems. One of the main drivers of compliance with new health protocols was top management's commitment to the COVID-19 response.
39	'Involving Moral and Ethical Principles in Safety Management Systems'	Lindhout & Reniers (2021)	Multiple	Multiple	Not specified	2	Scoping review	N/A - literature review	Included 112 sources in the analysis	Emphasises the ethical responsibilities of leaders in promoting safety and argues that leadership commitment to moral and ethical principles is essential for effective Safety Management Systems.

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40	'Towards Best Practices for Residential Carpentry Safety: Multiple Case Study Analysis'	Lucas et al. (2023)	United States	Construction	Small	3	Case study analysis	Company owners, managing partners, and company presidents.	7 case studies	The results indicated that the direct involvement of owners and upper-level management in safety training and hiring practices affects the company's overall safety performance. Additionally, when a company focuses on and assesses worker competence, there are fewer safety issues and improved quality. Further, the formality of policies and their incorporation into training indicate a stronger safety culture and improved safety performance. One area in the literature that affects worker safety performance is incentive programmes; however, no company in the current study utilised them. Most expressed a negative view of the use of incentives.
41	'Safety Climate: Current Status of the Research and Future Prospects'	Luo (2020)	Multiple	Multiple	Not specified	2	Literature review (bibliometric analysis)	N/A	Not detailed	The results indicate that the safety climate is composed of four dimensions: 1) the attitude of senior executives, 2) safety supervision, 3) safety production environment and 4) the implementation of safety training and education.
42	'Factors Enhancing Implementation of Occupational Safety and Health Management Systems in Manufacturing Industry of Mutare, Zimbabwe'	Mandowa et al. (2025)	Zimbabwe	Manufacturing	Multiple	4	Mixed: qualitative (literature review and interviews) and quantitative (survey)	Employees from manufacturing factories	309 employees	Revealed the primary factors that enhance OSH management systems (OSHMSs) implementation, such as strong senior management commitment, involvement and support, strong employee involvement and participation, good safety culture and provision of adequate resources, among others. Strong senior management commitment, involvement, and support were identified as a catalyst for the other factors that enhanced the implementation of OSHMSs.

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43	'Constructing Safety: Investigating Senior Executive Long-Term Incentive Plans and Safety Objectives in the Construction Sector'	McDermott et al. (2017)	Australia	Construction	Large (presumed but not explicitly stated)	4	Document review	The primary data sources were Annual Reports of publicly listed companies in the Australian non-domestic construction sector.	Not detailed	The research showed that while publicly listed Australian non-domestic construction companies publicly emphasise a strong commitment to safety in their annual reports, their long-term incentive plans (LTIPs) focus solely on financial outcomes, neglecting safety performance measures. This misalignment raises concerns that senior executives are incentivised to prioritise financial results over long-term safety improvements, highlighting the need for more meaningful integration of safety metrics into executive incentive structures.
44	'Security Management Policies and Work Accidents'	Monteiro & Anunciação (2025)	Portugal	A company dedicated to the repair and cargo handling machines.	Medium (presumed but not explicitly stated)	5	Case study (observations, interviews and accident data)	Interviews were conducted with technicians and the General Director	Not detailed	Work accidents in the organisation increased over the years, reflecting frequent non-compliance with safety rules, often due to daily work pressures and insufficient oversight by management. The company's top management did not prioritise safety, leaving responsibility mostly to middle management. The lack of safety policies and enforcement led to significant direct (medical and compensation costs) and indirect (downtime and lost productivity) costs, negatively impacting competitiveness.
45	'Measuring the Causes of Saudi Arabian Construction Accidents: Management and Concerns'	Moosaet al. (2025)	Saudi Arabia	Construction	Small (presumed but not explicitly stated)	4	Quantitative (Survey)	Employees from construction companies in Saudi Arabia	22 respondents	Concludes that all the top ten factors identified as causing poor safety are rooted in management issues, including: a lack of certified skilled labour, poor safety awareness of firms' top leaders, lack of training, poor safety awareness of project managers, reckless operation, a lack of experienced project managers, poor equipment, reluctance to input resources for safety, a lack of organisational commitment and ineffective operation of safety regulation.
46	'Safety Climate Perceptions in the Construction Industry of Saudi Arabia: The Current Situation'	Mosly & Makki (2020)	Saudi Arabia	Construction	Large	3	Quantitative (survey)	Data collected from a random sample of employees (no more details provided).	401 employees across three large construction sites.	Found that strong top management commitment, supervision, training and support are associated with improved safety climate, which, in turn, leads to improved safety behaviour, culture, motivation and performance.

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47	'Using a Psychological Contract of Safety to Predict Safety Climate on Construction Sites'	Newaz et al. (2019)	Australia	Construction	Large	3	Quantitative (survey)	Predominantly male (91.93%), with 38.51% aged 21–30 and 37.58% with 11–15 years of work experience.	352 participants	Suggest that top-level managers must ensure that mutual safety obligations between supervisors and workers are fulfilled to foster a strong, positive safety climate, enabling the introduction of the Psychological Contract of Safety as a new 'predictor' of safety climate.
48	'Enhancing Workplace Safety: A Comprehensive Action Plan for Duong Huy Coal Company (2021–2025)'	Nga et al. (2020)	Vietnam	Mining (coal)	Large	3	Case study (survey)	Most participants had worked at the company for ten years or more.	93 safety managers and 379 workers	Proposed an action plan to reduce workplace accidents within a large coal mining organisation, suggesting that strong commitment and active involvement from senior leadership are crucial to the plan's success.
49	'Critical Drivers towards Generative Process Health and Safety Culture'	Nyawera & Haupt (2021)	South Africa	Petrochemical	Large	4	Quantitative (survey)	Median age 38, 80.6% male	259 participants	Found that the key health and safety critical drivers needed to grow a health and safety culture were leadership commitment, chemical exposure management, health and safety risk assessment, process hazard analysis and permit to work.
50	'Are Employees Safer When the CEO Looks Greedy?'	O'Sullivan et al. (2024)	United States	Multiple	Large	3	Quantitative (multiple datasets)	Focuses on large, multi-establishment, publicly traded companies – mainly from high-hazard industries (manufacturing, transportation, warehousing, food products, metals and minerals, etc.) – with establishments typically having more than 100 employees and firms with multi-billion-dollar asset bases.	34,746 observations from 16,434 establishments of 629 US firms (2002–2011)	Firms led by CEOs perceived as greedier (based on excessive compensation) experience fewer workplace safety failures (i.e. fewer injuries and fatalities per 100 employees). This result is counterintuitive: while CEO greed is generally viewed negatively, the study finds that perceived greed can motivate CEOs to prioritise workplace safety, likely to avoid adverse stakeholder reactions in the event of safety failures.
51	'Role of Supervisor Behavioral Integrity for Safety in the Relationship Between Top-Management Safety Climate, Safety Motivation, and Safety Performance'	Peker et al. (2022)	Türkiye	Manufacturing (domestic appliances)	Large	4	Quantitative (survey)	Demographic data were used in the analysis, but not reported in the paper	389 blue-collar employees	The findings show a correlation between top management's safety climate and employees' safety behaviours, and the mediating effect of safety motivation. Additionally, the data reveal that this mediation – where safety motivation channels the influence of top management's safety climate on safety behaviours – is more pronounced among employees who perceive their supervisors as highly consistent and reliable in their commitment to safety.

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52	'Multilevel Safety Culture Affecting Organization Safety Performance: A System Dynamic Approach'	Qayoom & Hadikusumo (2019)	Pakistan	Oil and gas	Large	4	Mixed: literature review and workshop	Six HSE managers (10–15 years' experience on average), three operations managers (10 years' experience on average), and two field managers (15 years' average) were invited to share their perspectives. To include worker input, five safety supervisors with about six months' experience joined the workshop as workforce representatives.	16 employees participated in the workshop	Safety culture at the tactical and operational levels (middle management) had a more significant positive impact on safety performance than at the strategic level (top management).
53	'Better Safe Than Sorry: CEO Regulatory Focus and Workplace Safety'	Qian et al. (2023)	United States	Multiple	Medium to large	3	Quantitative (multiple datasets)	The vast majority of CEOs were male (mean = 0.01 for female CEO). The average age was about 55 years, ranging from 39 to 78.	Not detailed	CEOs with a prevention focus (concerned with safety, responsibility, and avoiding losses) are associated with fewer workplace injuries. In contrast, CEOs with a promotion focus (driven by growth, achievement, and risk-taking) are associated with higher injury rates.
54	'Influence of Covid-19 on Corporate Leadership Behaviour towards Workforce Safety and Business Objectives'	Rahul (2020)	India	Multiple	Large	3	Quantitative (survey)	87% Male, with 53% from a company of fewer than 10,000 employees. Of these, 53% were Head, Director, Vice President, Sr. Vice President	207 respondents from multiple companies	Shows that the corporate leaders surveyed generally provided adequate care and support to their workforce during COVID-19 (e.g. most took adequate measures, allowed employees to work remotely, and some even took a pay cut), balancing employee safety and business objectives.
55	'Factors Influencing Implementation of OHSAS 18001 in Indian Construction Organizations: Interpretive Structural Modeling Approach'	Rajaprasad & Chalapathi (2015)	India	Construction	Small (presumed but not explicitly stated)	4	Mixed: review of secondary sources and survey data	Experts were invited to respond to the survey. Six (38%) had worked for less than 15 years, and 10 (62%) for >10 years. The majority of respondents held senior positions in their organisations, with 40% as corporate safety managers, 28% as safety managers, and 32% as consultants/auditors.	16 respondents	Found that management commitment and safety policy are critical factors influencing the implementation of OHSAS 18001 in Indian construction organisations.
56	'Factors Affecting Workplace Well-Being: Building Construction Projects'	Rani et al. (2022)	Malaysia	Construction	Multiple	3	Mixed: Qualitative (interviews and literature review) and quantitative (survey)	Of the survey respondents, 72.2% were contractors; 44.9% had 2–5 years' experience, and 75.6% came from large enterprises.	Interviews: 21 industry professionals. Survey: 205 responses	Relationships and collaboration between top management and employees were among the critical factors for workplace well-being identified in this study.

No.	Study title	Author(s), Pub. Year	Country	Sector	Organisational size	Level	Study Design	Population/ Participants characteristics (e.g. gender, age and ethnicity)	Sample Size	Summary of Key Findings related to the review questions
57	'Work-Related Musculoskeletal and Mental Health Disorders: Are Workplace Policies and Practices Based on Contemporary Evidence?'	Robertson et al. (2021)	Australia	Multiple: Health care; Retail; Transport/ Logistics	Large (>500)	4	Mixed: interviews and policy analysis	Interviews with Work, Health & Safety (WHS) Managers from the healthcare, retail and transport/logistics sectors, including 17 females and 8 males. Most were aged 35– 44.	25 interviews	Revealed several key themes affecting risk management strategies, such as the lack of a holistic approach to risk management and the role of senior management. It was noted that supportive senior leadership facilitates more effective risk management.
58	'Engaging Senior Management to Improve the Safety Culture of a Chemical Development Organization Thru the SPYDR (Safety as Part of Your Daily Routine) Lab Visit Program'	Rosso et al. (2019)	United States	Chemical and Synthetic Developments	Medium-large (>200)	4	Qualitative (structured consultations, lab visits, feedback survey)	Each senior leader is assigned to meet with 2–5 scientists in their respective laboratories. Each lab is visited by 2–3 senior leaders annually, and each leader visits 4–6 different labs per year.	Over 300 lab visits have been conducted as part of the programme since 2013.	Senior leadership engagement through the lab visits programme significantly improved safety culture by fostering trust, open communication and accountability. Leaders' direct involvement helped uncover hidden safety concerns, demonstrated commitment to safety, and strengthened relationships across organisational levels.
59	'The Implementation of Ergonomics Advice and the Stage of Change Approach'	Rothmore et al. (2015)	Australia	Multiple	Medium-large	3	Mixed: qualitative (interviews and document reviews) and quantitative (survey).	Managers were aged 30–62 with a range of experience spanning 0.33–20 years. Participants were divided into two groups: one received tailored ergonomic advice, the other did not.	25 managers from different organisations	Workgroups that received ergonomics advice tailored to their profiles implemented more changes than those that received standard advice. Managers who understood and supported the SOC approach were more successful in implementing changes. Leadership engagement, budget control and decision-making authority were key facilitators.
60	'Barriers, challenges and opportunities to improve occupational health and safety management in small and medium enterprises in Serbia: case study approach'	Savković et al. (2019)	Serbia	Not specified	Small-Medium	5	Qualitative (literature reviews, interviews and observations)	Not detailed	Not detailed	A lack of top management support was identified as a key barrier to improved health and safety in Serbian SMEs.
61	'EXECUTIVE Safety Responsibility'	Schorn (2023)	United States	Manufacturing	Not specified	5	Document and literature review (non-systematic)	N/A	N/A	Executives play a key role in workplace safety by actively driving safety management systems and modelling core values. Their visible commitment, authentic communication, and support for supervisors and systems are essential to fostering a strong safety culture and reducing injury rates.

No.	Study title	Author(s), Pub. Year	Country	Sector	Organisational size	Level	Study Design	Population/ Participants characteristics (e.g. gender, age and ethnicity)	Sample Size	Summary of Key Findings related to the review questions
62	'Small plus Safe plus Well: Lessons Learned from a Total Worker Health® Randomized Intervention to Promote Organizational Change in Small Business'	Schwatka et al. (2022)	United States	Multiple	Small-medium (<500)	1	Quantitative (Randomised controlled trial)	Most employees were female (74%), White/ non-Hispanic (87%), and non-managers (63%).	36 businesses and 250 employees met the inclusion criteria for the RCT and were included in the analysis.	Tested a Total Worker Health®(TWH) leadership development intervention for small business owners and senior leaders. Businesses improved their TWH policies and programmes scores from baseline to one-year follow-up, regardless of whether they participated in the leadership development intervention. However, there were no measurable improvements in employee-reported measures after one year.
63	'Total Worker Health Leadership and Business Strategies Are Related to Safety and Health Climates in Small Business'	Schwatka et al. (2020)	United States	Multiple	Small-medium (<500)	3	Quantitative (survey)	The average age of the survey respondents was 4. The majority were female (66.6%), White (80%), and nearly 40% worked in a supervisory role. The types of work the employees engaged in varied, including hourly-paid (47%) and shift work (14%).	1,271 from 53 organisations	Leadership commitment plays a crucial role in shaping employees' perceptions of safety climate. While Total Worker Health (TWH) strategies enhance the health climate, their impact is moderated by leadership commitment. In businesses with poor leadership commitment, having more TWH strategies still improves the health climate. In businesses with strong leadership commitment, the effect of TWH strategies on health climate is less pronounced.
64	'Health and Safety Communication Strategy in a Malaysian Construction Company: A Case Study'	Siew (2020)	Malaysia	Construction	Large (presumed but not explicitly stated)	4	Case study	Not detailed	Not detailed	The company's top management implemented a communication strategy that reduced fatalities and incidents by 78%, with estimated cost savings of US$86,000. While causation is not definitively proven, the positive trend suggests effective top-down communication and leadership.
65	'Systematic Industrial OH&S Advancement Factors Identification for Manufacturing Industries: A Case of Ethiopia'	Sileyew (2020)	Ethiopia	Manufacturing	Multiple: 140 large organisations, 47 medium, and 1 small	3	Mixed: surveys, observations and interviews.	The majority of participants were aged 30–39 (49.7%), followed by 22.8% aged 20–29, 19.0% aged 40–49, 3.7% aged 50–59, and 2.1% aged 60 or older. The sample included 70.4% male and 29.6% female participants. Occupations included engineering, administration, quality management, safety and health experts, among others.	189 manufacturing workers	The study reveals that insufficient top management commitment and weak leadership are major challenges for OSH in Ethiopian manufacturing industries. Despite the presence of safety programmes and committees, their effectiveness is limited by a lack of strategic planning and decisive action. Greater leadership and active involvement from senior management are considered crucial to improving workplace safety.

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66	'From the Boardroom to the Jobsite: Female Board Representation and Workplace Safety'	Son et al. (2025)	United States	Multiple	Multiple (range: 10–219,310)	3	Quantitative (multiple datasets)	Data sources included OSHA Workplace Safety Data (injuries and illnesses); ISS (Institutional Shareholder Services) Board Composition and Director-Level Data.	1,442 firm-year observations across 266 firms between 2002 and 2011	Female board representation improves workplace safety when women have more power and when boards face greater accountability pressures. Minority board representation improves workplace safety when minority directors have more power. Female and minority board representation have a synergistic positive effect on workplace safety.
67	'AN APPLICATION OF 24MODEL TO ANALYSE CAPSIZING OF THE EASTERN STAR FERRY'	Suo et al. (2017)	China	Transport (ferry)	Not specified	4	Case study	Case study based on the official accident investigation report, technical specifications and modifications of the ferry, weather data at the time of the accident, organisational and regulatory information.	N/A	Identified several key leadership elements associated with the ferry disaster, attributing it to factors such as limited safety awareness, decision-making challenges under pressure, and aspects of the company's safety culture. Other contributing factors included inadequate safety management systems, ship maintenance practices, and regulatory oversight.
68	'Creation of Satisfactory Safety Culture by Developing Its Key Dimensions'	Tappura et al. (2022)	Finland	Multiple: the infrastructure, building industry and chemical industries	Multiple (1,300 and 200 employees, respectively)	3	Quantitative (survey)	Included blue-collar employees, supervisors, administrative employees, safety experts, middle management, and top management; 48% had worked with their present employers for more than 10 years, and everyone else for less time.	289 respondents from 2 organisations.	Employee commitment is the primary determinant of overall satisfaction with safety culture. This commitment is shaped by both supervisor commitment and the quality of safety training, each of which is further influenced by the level of top management commitment.
69	'Managers' Viewpoint on Factors Influencing Their Commitment to Safety: An Empirical Investigation in Five Finnish Industrial Organisations'	Tappura et al. (2017)	Finland	Multiple: energy, chemical processing, and industrial services	Large (320, 700, 550, 1,500 and 7,800 employees)	4	Qualitative (interviews and workshop)	Included middle managers and line managers (e.g. production managers, maintenance managers, project managers) and supervisors.	45 interviews with managers across 5 organisations	Organisational factors influence managers' commitment to safety. Hindering factors include: role overload, production demands, overly formal safety procedures, inability to influence safety goals, negative workforce attitudes, and lack of management commitment at different levels. Promoting factors include: increasing managers' safety awareness, influencing safety attitudes, recognising safety commitment, clear safety responsibilities, adequate safety procedures, support from superiors, benchmarking, understanding the economic effects of safety, and seeing safety improvements.

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70	'Safety in the C-Suite: How Chief Executive Officers Influence Organizational Safety Climate and Employee Injuries'	Tucker et al. (2016)	Canada	Multiple: public sector (43%), manufacturing (20%), service sector (13%), commodity and wholesale (11%), building construction (7%), and others (e.g., road construction).	Multiple (range = 15–3,085)	3	Quantitative (survey)	Not provided. However, the researchers controlled for the effect of employee gender on injury rates in their analyses, noting that males experience higher injury rates than females.	Frontline employees: 2,714 Supervisors: 1,398 Top management team member: 229 All from 54 organisations.	The CEO's impact on injury rates is indirect and depends on the collective involvement and actions of various organisational groups. CEOs can establish a Top Management Team (TMT) safety climate. However, addressing frontline injuries requires the combined experience and effort of the TMT, as well as the immediate influence supervisors have over frontline employees.
71	'Conceptualization of Senior Management Support to the Safety Management in Aviation Organizations in Turkey'	Üzülmez & Gerede (2023)	Türkiye	Aviation	Small (presumed but not explicitly stated)	5	Qualitative (interviews)	Safety Management System and Compliance Monitoring managers working in Turkish aviation organisations. Participants had an average of 13 years of aviation experience.	21 interviewees	The study identified six core components of senior management that support safety: leadership, planning, resource allocation, performance control, culture and stakeholder coordination. The most critical actions of senior managers include building trust, promoting a reporting culture, allocating resources, and encouraging other managers, highlighting that visible commitment, strategic integration and active engagement are essential for effective safety leadership.
72	'Senior Managers' Awareness of Sun Protection Policy Predicts Implementation of Worksite Sun Safety in a Randomized Trial'	Walkosz et al. (2019)	United States	Public sector	Multiple	2	Quantitative (Randomised controlled trial)	Included public sector organisations based in Colorado, including cities, counties, and special taxing districts.	98 local government organisations	Senior managers' awareness of sun safety policies significantly predicted the implementation of sun protection measures at worksites. Manager awareness was associated with greater policy implementation and more employee-level sun protection behaviours. Sun safety implementation was higher in organisations where managers were engaged early in the intervention and there was ongoing communication and support from leadership.
73	'Identifying TOXIC LEADERSHIP & Building Worker Resilience'	Winn & Dykes (2019)	Multiple	Multiple	Not specified	5	Document and literature review (non-systematic)	N/A	N/A	Discusses how toxic leadership undermines trust, communication and morale, which are essential to maintaining a strong safety culture. Promoting values-based leadership through honour codes and ethical training might help prevent toxic behaviours from emerging.

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74	'CEO Inside Debt and Employee Workplace Safety'	Wu et al. (2023)	United States	Private sector, excluding financial and regulated industries.	Medium-large (average of 160 employees)	3	Quantitative (multiple datasets)	The data sources included the OSHA Data Initiative (ODI) for workplace safety, ExecuComp for CEO compensation, and Compustat for firm financials.	30,795 establishment-year observations between 2006 and 2011	Firms whose CEOs hold more inside debt report fewer workplace injuries and illnesses among employees. This effect is more significant in firms with high workers' compensation premiums and larger government contracts, and weaker in firms with more secured debt. Additional analysis suggests CEOs may lower injury rates by increasing safety investments.
75	'Relation between Senior Managers' Safety Leadership and Safety Behavior in the Chinese Petrochemical Industry'	Xue et al. (2020)	China	Petrochemical	Medium (presumed but not explicitly stated)	3	Quantitative (survey)	Workers (not senior managers) from two petrochemical companies in China. Gender: Male: 83.9% Female: 16.1% Age: 21–29 years: 60.6% 30–39 years: 24.5% 40–49 years: 11.6% 50+ years: 3.3%	Preliminary test: 77 usable responses (out of 88). Formal test: 155 usable responses (out of 180).	Senior managers' safety leadership positively influences safety behaviours, both directly and indirectly. Safety climate mediates the relationship between leadership and safety behaviour. Safety concerns had the strongest positive effect on safety compliance. Safety vision had the strongest positive effect on safety participation. Personal character influenced safety behaviour indirectly via safety climate. Safety inspiration and safety awards/ punishments negatively affected safety compliance due to perceived unfair workload and a blame culture.
76	'Project Characteristics Indicating Safety Performance'	Yiu & Chan (2018)	Hong Kong	Construction	Large (> 500 employees)	4	Mixed: quantitative (survey) and qualitative (literature review and interviews)	Interviews: construction stakeholders registered as safety officers or auditors. Mainly consultants, contractors and clients with at least eight years of working experience in Hong Kong construction projects. Survey: experts with more than eight years of working experience in managerial roles or above in construction projects.	Survey: 18; Interviews: 11.	The study identified the key characteristics that distinguish safety performance in Hong Kong. 'More support and commitment from senior management' ranked as the most influential, while 'Top management of the firm with higher safety awareness' and 'Better safety culture' ranked 18th and 20th, respectively.
77	'The Safety Attitudes of Senior Managers in the Chinese Coal Industry'	Zhang et al. (2016)	China	Mining (coal)	Large	3	Quantitative (survey)	Participants included: Chairmen of the board, General managers, Safety Administration Chiefs and Chief Engineers.	168 senior managers from 48 large coal enterprises. Two data-collection time points: 84 participants in 2009 and 84 in 2014.	Senior managers shape the organisation's safety climate through their attitudes and decisions, directly impacting safety systems, training, and accident prevention. Positive leadership improves safety culture and results, while negative or indifferent attitudes can weaken safety performance and decrease investment in safety.

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78	'Leading Safely: The Impact of Generalist CEOs on Workplace Safety'	Zhang et al. (2025)	United States	Multiple	Multiple	3	Quantitative (multiple datasets)	CEOs were categorised as generalists or non-generalists based on their General Ability Index (GAI).	The final sample consists of 64,530 establishment-year observations and 4,969 firm-year observations with sufficient data on general ability measures.	Firms led by generalist CEOs have 12.72% lower rates of work-related injuries and illnesses than those led by non-generalist CEOs. This effect is both statistically and economically significant, based on OSHA injury data between 2002 and 2011.
79	'The Impact of Organizational Culture on Concurrent Engineering, Design-for-Safety, and Product Safety Performance'	Zhu et al. (2016)	Multiple	Manufacturing (toys)	Multiple: 11.4% had fewer than 500 employees, 48.2% had 500-5000 employees, and 40.4% had over 5000 employees.	3	Quantitative (survey)	Respondents included quality managers (78.8%), engineering managers, product managers, and executives. Firms varied in size, R&D intensity, and ownership (Chinese vs. overseas)	255 responses from quality and engineering directors across 126 firms in the juvenile manufacturing sector.	While the article focuses on product safety rather than occupational safety, it suggests that management commitment, directly and indirectly, influences attitudes and processes (in organisational culture terminology: values and artefacts) that promote a positive safety-oriented culture, using specific safety-inducing incentives (such as setting policies and allocating resources).
80	'The Importance of Commitment, Communication, Culture and Learning for the Implementation of the Zero Accident Vision in 27 Companies in Europe'	Zwetsloot et al. (2017)	Multiple European countries: Belgium, Denmark, Finland, Germany, the Netherlands, Poland and the UK	Multiple	Medium-large (100–10,000+ employees)	3	Mixed: quantitative (survey) and qualitative (interviews and workshops)	Interview participants: 3–5 people per company were interviewed across 22 companies. Included senior managers, safety experts, and worker representatives. Workshop participants: Representatives from 23 companies attended national workshops. Included stakeholders involved in safety and Zero Accident Vision (ZAV) implementation.	Quantitative: 27 companies, 8,819 respondents. Qualitative: interviews in 22 companies and national workshops in 7 countries (23 companies participating).	Management commitment to safety is a critical success factor for implementing the Zero Accident Vision (ZAV), together with communication, culture and learning.