

An Integrative Review of Strategies and Solutions for Preventing Workplace Hazards and Related Occupational Injuries

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Abstract

Hazard identification is an important part of safety management that could help reduce the number and severity of work-related injuries in any workplace. Workplace injuries are considered a serious worldwide concern because they result in human suffering, lost productivity, and significant financial consequences. To prevent such injuries, adherence to occupational safety regulations and a comprehensive, integrated approach that combines evidence-based methods with innovative solutions is required. This research synthesizes information from many industries to identify workable methods of preventing workplace injuries. Evaluation of the impact of treatments on industrial health, safety, and environmental outcomes is the goal of this study. As a result, after reviewing over fifty papers, some of the key dangers were identified, such as physical, psychological, ergonomic, chemical, biological, and workplace violence and harassment problems. For companies, legislators, and researchers looking to improve occupational safety systems and lessen the burden of workplace injuries, this thorough review's emphasis on best practices and prospects can be very beneficial. Employers will be able to lower the risks related to occupational accidents and injuries by using the study's findings to help them identify all potential safety concerns. Additionally, by providing a systematic synthesis of the body of existing literature, it will promote future study avenues.

Keywords

Workplace hazards, Occupational injuries, Risk factors, Control strategies, Workplace safety

1. Introduction

Ergonomics is typically associated with people and their occupations. It studies humans' physiological, psychological, and behavioral capacities and limitations in a broader sense. Ergonomics experts normally base their designs on research on human limitations and capabilities, either creating new work environments or altering existing ones (Jaffar, Abdul-Tharim et al. 2011). Instead of coexisting as separate initiatives, there is mounting evidence that workplace health promotion and occupational health and safety should be integrated and coordinated. Achieving completely integrated worker health initiatives requires first identifying implementation problems and how to solve them. A scoping review was carried out to determine what supports and hinders integrated work health approaches. Furthermore, suggestions on how these initiatives should be put into practice were also provided (Biswas, Begum et al. 2022).

Health, safety, and wellness initiatives at work are some of the most important things in the world today. By reviewing pertinent studies, identifying and evaluating various program types that impact employee engagement and productivity, and are implemented in various industries and sectors, this scoping review seeks to thoroughly examine and synthesize the body of literature on the effects of diverse workplace safety, health, and wellness programs on employee engagement and productivity (Juba 2024).

Vitharana et al. (2015) characterized a hazard as any possible source of injury or detrimental health impact. Finding hazards is the first step in good management. This is the basis for plans to get rid of, lessen, or reduce risks. Hazard identification is very important in any workplace as it helps keep people safe. This is because dangers that aren't recognized before work starts are more likely to cause accidents on the job site (Mihić 2020, Sanni-Anibire, Mahmoud et al. 2020). But dangers are routinely missed, which makes injuries worse and costs the sector billions of dollars each year (Sanni-Anibire, Mahmoud et al. 2020). This could be because people who are supposed to recognize hazards don't have enough experience, they don't think hazards are serious enough, or they tend to take hazards on their own (Goh and Chua 2010). Keeping in mind the volatile conditions of workplaces, risks must be identified at all stages of a project so that safety plans may be made (Alizadehsalehi, Yitmen et al. 2018). Moreover, hazards differ among the residential, commercial, industrial, and heavy construction sectors, making them harder to spot and putting workers at risk of a wide range of accidents.

An overview of workplace hazards and related occupational injuries in the construction industry is the aim of this article. Workplace hazards are unsafe situations or behaviors that might cause injuries on the job. These injuries can be short-term or long-term health problems that happen because of work exposure. Physical risks like trips, falls, noise, and working at heights are among the most common hazards, according to the literature; ergonomic risks like heavy lifting, repetitive motions, and poor posture; chemical risks from toxic substances; biological risks like infectious agents; psychosocial risks like workplace stress and bullying; and workplace violence and harassment, including physical assaults and threats. Severe fractures, head injuries, musculoskeletal conditions, hearing loss, chemical burns, and chronic illnesses are among the associated injuries that highlight the importance of appropriate hazard identification and control strategies. The research objectives of the study are as follows:

- i. to recognize and analyze workplace hazards and the associated injuries,
- ii. to figure out what causes injuries and hazards at work and come up with a way to lower them and
- iii. to investigate into the things that assist employers in finding all the potential safety risks in workplaces, which lowers the chances of their workers getting hurt or having accidents on the job.

This research contributes to the body of knowledge on construction safety by presenting a broad coverage of all existing construction hazards, evaluating the frequency with which they were cited in the literature, and offering a systematic review of various aspects of this subject matter. Furthermore, it will support future research directions by presenting an organized synthesis of the existing literature.

2. Related work

As per Salvendy (2012), human factors and ergonomics are commonly used interchangeably in professional settings. Both of them discuss how the worker and the job expectations affect each other. The difference is that ergonomics looks at how work affects workers, whereas human factors look at designs that help individuals not make mistakes. Workers' injuries can be avoided by addressing environmental and conventional risk factors, according to (Bongers, Kremer et al. 2002). In the past, people set up workplaces to move things or make machinery perform better. People have always seemed to be able to adapt, but not much thought has been paid to how they fit into the workplace. More and more accidents are happening at work because of repetitive motion, too much force, and incorrect posture. This is why ergonomics is becoming a highly important part of workplace safety.

As workplace dangers and injuries have a substantial influence on worker health, organizational productivity, and financial expenses, they have been thoroughly studied across industries. On the other hand, a worker-friendly environment in the workplace increases job satisfaction. But ironically, workplaces are not designed ergonomically (Ashik, Parvez et al. 2025). Previous research studies have categorized risks into physical, chemical, biological, ergonomic, and psychological categories, emphasizing the distinct ways in which each of these factors contributes to occupational illnesses and accidents. For instance, Baladaniya (2024) examines how to incorporate new technologies into all-encompassing workplace injury prevention plans in order to create a safer future. The current study highlights potential advantages, difficulties, and best practices for successful implementation as it explores methods for integrating these technologies harmoniously. This paper offers a vision for utilizing emerging technology to improve workplace safety and provide favorable results, with an emphasis on continual development. The paper highlights the significance of using data analytics to guide decision-making, adjusting to changing operational requirements, and encouraging cooperation between staff, safety specialists, and management. Implementing the framework has major

organizational advantages, such as lower workplace dangers, better worker wellness, and quantifiable financial gain from cost savings and higher productivity. The paper highlights that a considerable number of injuries still occur in high-risk sectors. The purpose of this systematic review is to investigate the efficacy of behavioral interventions in reducing both fatal and non-fatal injuries in high-risk industries. Relevant meta-analyses and systematic reviews on this topic were identified through searches in the Scopus database. The research provides an overview of the risk factors related to ergonomics in the construction business. The goal is to provide a concise overview and precise description of ergonomics. The ergonomic risk factors regarding people and their work environments will be included in the study. The purpose of the paper is to determine and examine risk variables as well as the impact of ergonomics on musculoskeletal illnesses in the workplace. Through content analysis of numerous previously published literature sources, this study investigates the different components that contribute to musculoskeletal illnesses using qualitative approaches based on literature review studies. By learning about the various hazards at work and what could happen when workers do, businesses can put in place specific plans and actions to lower hazards and stop accidents and illnesses on the job.

3. Research methodology

The most scientific, thorough, and repeatable review technique used in systematic literature review research (Inkinen 2016), which has gained widespread acceptance in the research community, was used in this work. Figure 1 shows the overall framework of the technique. The next phase after implementing a risk determination approach to identify workplace hazards and related injuries was to create a plan to lower the risk of workplace injuries.

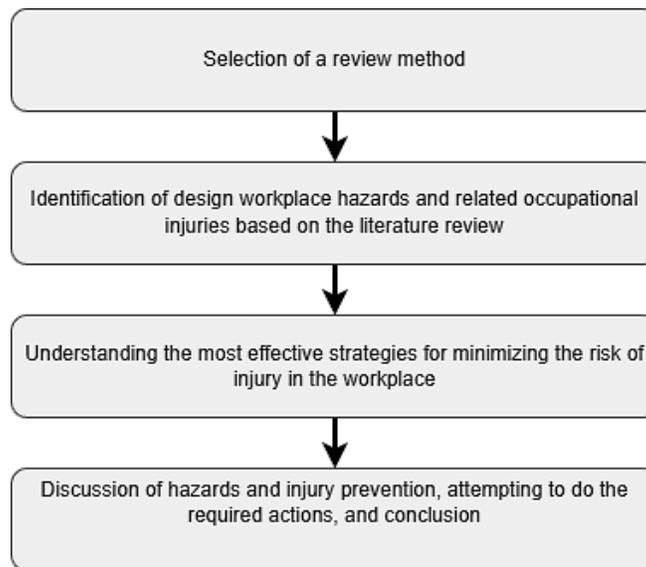


Figure 1. Research Methodology

3.1 Selection of a review method

Firstly, the primary goal of the first literature study was to identify all potential hazards that could occur in any workplace. A systematic literature review was used to achieve this, which included compiling a list of relevant journal articles and using an online database for scholarly articles like Scopus in conjunction with keywords like workplace hazards, injuries, risk factors, and strategies and solutions for injuries and hazards. This initial search only looked at articles that had the keywords in the title, abstract, or defined keywords. After the first examination, which found six construction dangers, each of the hazards was looked up in more detail in the literature. Articles discussing the impact of safety hazards on individuals, both in general and within the construction industry in particular, were also examined (Almaskati, Kermanshachi et al. 2024). The search procedure was reiterated for all six indicated dangers present in the title, abstract, or keywords of the publication. After the first evaluation, which found six construction hazards, a second literature search was done for each of the hazards. This secondary search was done in the same way: the name of the hazard was put in the topic part of the databases listed before. The keyword search yielded a substantial quantity of scholarly publications; hence, a multi-step technique was developed to refine the selection of articles for in-depth

examination and to exclude those deemed irrelevant to this analysis. Figure 2 shows how the screening and exclusion process works. After the screening procedure, every relevant literature produced between 1995 and 2025 was examined and analyzed to ensure that the results were in line with what scholars are now interested in.

The identification phase involved using the search technique on every information source, putting the articles into one database, and getting rid of duplicates with EndNote X9 and double-checking the references (Shupti, Hossain et al. 2024).

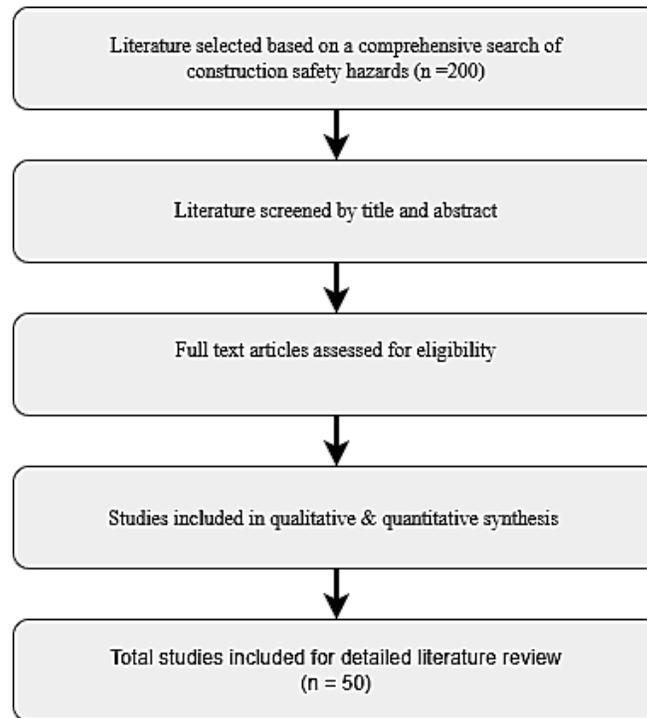


Figure 2. An overview of the method used in this research

3.2 Identification of design workplace hazards and related occupational injuries based on the literature review

Everyone must be aware of the potential hazards that employees may encounter in order to ensure a safe working environment. These hazards can arise from various areas and could cause injuries, illnesses, or accidents at work (Baladaniya 2024). One of the main causes of occupational injuries in all industries, workplace hazards represent a major risk to the health and safety of employees. These risks can be physical, chemical, biological, ergonomic, workplace violence and harassment or psychosocial, and they can all lead to various kinds of illnesses and injuries. Fractures, wounds, burns, musculoskeletal illnesses, respiratory conditions, and stress-related disorders are common occupational injuries that can arise from hazardous work settings, inappropriate equipment use, and insufficient safety management. Therefore, it is crucial to identify and manage workplace hazards effectively in order to lower injury rates, enhance worker well-being, and guarantee long-term organizational effectiveness.

Table 1 below shows some of the risks that can happen at work, like physical, psychosocial, ergonomic, chemical, biological, workplace violence and harassment, and those that have to do with aggression and harassment. Specific risks that could endanger or harm employees are handled by each section.

Table 1. Workplace Hazards and Associated Occupational Injuries

Category	Hazards	Injuries	References
Physical exposures	<ul style="list-style-type: none"> - Noise exposure - Extreme temperatures - Vibration - Radiation - Slips, trips, and falls - Mechanical hazards 	<ul style="list-style-type: none"> - Fractures - Head injuries - Lacerations -Contusions - Crush injuries - Amputations - Hearing loss 	(Abdalla, Apramian et al. 2018), (Baladaniya 2024)
Psychosocial exposures	<ul style="list-style-type: none"> - Work-related stress - Workplace bullying, harassment, and discrimination - Job insecurity - Poor work-life balance - Lack of social support - Violence and aggression at work 	<ul style="list-style-type: none"> -mental disorder - musculoskeletal disorder - Issues with health caused by stress - depression 	(Abdalla, Apramian et al. 2018)
Ergonomic Hazards	<ul style="list-style-type: none"> - Repetitive movements - Awkward postures - Prolonged sitting - Prolonged standing - Manual handling of loads - Poor workstation design 	<ul style="list-style-type: none"> - Carpal tunnel syndrome - Tendonitis - Back pain and injuries - Sprains and strains - Muscle fatigue and weakness 	(Baladaniya 2024) (Mona, Chimbari et al. 2019), (Bentley, Onnis et al. 2023).
Chemical Hazards	<ul style="list-style-type: none"> - Exposure to toxic gases - Handling solvents and flammable liquids - Contact with acids and alkalis - Exposure to dust and particulates - Improper storage of chemicals 	<ul style="list-style-type: none"> - Poisoning - Chemical burns - Respiratory issues - Skin irritation and dermatitis - Occupational cancers 	(Baladaniya 2024), (Gao, Gonzalez et al. 2018)
Biological Hazards	<ul style="list-style-type: none"> - Bacteria and viruses - Fungi and molds - Blood borne pathogens - Animal and insect exposure - Biological toxins 	<ul style="list-style-type: none"> - Infectious diseases (e.g., HIV, hepatitis, tuberculosis) - Allergic reactions - Insect bites and stings 	(Baladaniya 2024) (Żukiewicz-Sobczak, Cholewa et al. 2015), (Stave and Wald 2016)
Workplace Violence and Harassment	<ul style="list-style-type: none"> - Physical violence - Verbal abuse - Sexual harassment - Psychological harassment/bullying - Threats from clients/patients/public 	<ul style="list-style-type: none"> - Physical injuries (bruises, cuts, fractures) - Psychological trauma (anxiety, depression, PTSD) - Stress-related disorders 	(Baladaniya 2024), (Hoel, Zapf et al. 2002), (Einarsen, Hoel et al. 2020)

3.3 Understanding the most effective strategies for minimizing the risk of injury in the workplace

Physical exposures

Any agent, element, or situation that has the potential to be harmful upon contact is considered a physical hazard. They fall into one of two categories: environmental or occupational hazards. Ergonomics, radiation, heat and cold stress, vibration, and noise are examples of physical dangers. To reduce physical risks, engineering controls are frequently employed. In many sectors, physical risks are a common cause of injury. Although they may be inevitable in some sectors, including mining and construction, humans have created safety protocols and practices over time to reduce the dangers of bodily harm at work. Table 2 provides a summary of risk factors, physical hazards, and control strategies.

Table 2. Physical Hazards, Risks, and Control Strategies

Physical Hazards	Risk Factors	Control Strategies (with references)
Noise exposure (machinery, equipment, vehicles)	Hearing impairment, stress, and communication difficulties	Use of ear protection (PPE), soundproofing, and regular hearing tests (Mona, Chimbari et al. 2019; Huei, Ya-Wen et al. 2020).
Extreme temperatures (heat and cold)	Heat stress, heat stroke, frostbite, hypothermia	Work-rest schedules, hydration, climate-appropriate PPE, ventilation/heating systems (Bentley, Onnis et al. 2023; Cuenca and Ramírez 2023).
Vibration (tools, machinery)	Hand-arm vibration syndrome, musculoskeletal disorders	Tool maintenance, anti-vibration gloves, work rotation (Mona, Chimbari et al. 2019; Bentley, Onnis et al. 2023) .
Radiation (ionizing, non-ionizing, UV)	Burns, eye damage, and long-term cancer risk	Shielding, limit exposure time, PPE (lead aprons, goggles) (Huei, Ya-Wen et al. 2020).
Slips, trips, and falls (wet floors, uneven surfaces)	Sprains, fractures, and head injuries	Non-slip flooring, housekeeping, proper footwear, signage (Gao, Gonzalez et al. 2018; Bentley, Onnis et al. 2023).
Mechanical hazards (unguarded machines, moving parts)	Cuts, crush injuries, amputations	Machine guarding, emergency stop systems, training (Mona, Chimbari et al. 2019; Aldhaen 2022).

Psychosocial exposures

Psychosocial exposures are things about the workplace, its design, organization, or management that can make work-related stress, mental health problems, and physical health problems more likely. Some of these exposures are excessive job demands, bullying, sexual harassment, lack of support from supervisors, job uncertainty, lack of appreciation, and being around traumatic occurrences. Table 3 shows a summary of the psychosocial hazards, risk factors, and strategies to control them.

Table 3. Psychosocial Hazards, Risks, and Control Strategies

Psychosocial Hazards	Risk Factors	Control Strategies (with references)
Work-related stress (high workload, long hours, unrealistic deadlines)	Anxiety, depression, burnout, reduced productivity	Workload management, adequate staffing, flexible scheduling, and stress management training (Mona, Chimbari et al. 2019; Bentley, Onnis et al. 2023).
Workplace bullying, harassment, and discrimination	Emotional distress, low job satisfaction, absenteeism, turnover	Anti-bullying policies, reporting systems, awareness training, and supportive organizational culture (Huei, Ya-Wen et al. 2020; Aldhaen 2022).
Job insecurity (temporary contracts, fear of layoffs)	Anxiety, reduced motivation, decreased organizational commitment	Transparent communication, fair employment practices, and employee assistance programs (Bentley, Onnis et al. 2023; Cuenca and Ramírez 2023).

Poor work-life balance (excessive overtime, lack of flexibility)	Family conflict, fatigue, decreased well-being, turnover	Flexible work arrangements, leave policies, wellness programs (Gao, Gonzalez et al. 2018; Aldhaen 2022).
Lack of social support (from supervisors or colleagues)	Isolation, low morale, mental health problems	Team-building, mentoring programs, supportive leadership (Mona, Chimbari et al. 2019; Huei, Ya-Wen et al. 2020).
Violence and aggression at work (from clients, patients, or co-workers)	Post-traumatic stress disorder (PTSD), fear, and absenteeism	Violence prevention training, security measures, and incident reporting systems (Bentley, Onnis et al. 2023; Cuenca and Ramírez 2023).

Ergonomic Hazards

An ergonomic hazard is a workplace condition that increases the likelihood of muscle, bone, joint, and nerve injuries. Some common examples include repetitive tasks, standing in an awkward position, lifting heavy objects, experiencing vibrations, having a poorly designed workstation, and exposure to extreme temperatures. These hazards can cause musculoskeletal disorders (MSDs) like carpal tunnel syndrome, tendonitis, and back pain, which shows how important it is to find and fix these problems in any workplace. Table 4 shows a summary of the hazards associated with ergonomic risk factors and strategies to control them.

Table 4. Ergonomic Hazards, Risks, and Control Strategies

Ergonomic Hazards	Risk Factors	Control Strategies (with references)
Repetitive movements (typing, assembly line work)	Musculoskeletal disorders (MSDs), carpal tunnel syndrome, and tendonitis	Job rotation, ergonomic tools, micro-breaks, stretching exercises (Mona, Chimbari et al. 2019; Bentley; Onnis et al. 2023).
Awkward postures (bending, twisting, overhead reaching)	Back pain, neck strain, joint injuries	Adjustable workstations, ergonomically designed furniture, and worker training (Gao, Gonzalez et al. 2018; Huei, Ya-Wen et al. 2020).
Prolonged sitting (office work, drivers)	Lower back pain, obesity, cardiovascular issues	Sit-stand desks, active breaks, posture awareness programs (Aldhaen 2022; Bentley, Onnis et al. 2023).
Prolonged standing (factory, retail, healthcare jobs)	Varicose veins, leg pain, fatigue	Anti-fatigue mats, job rotation, supportive footwear (Huei, Ya-Wen et al. 2020; Cuenca and Ramírez 2023).
Manual handling of loads (lifting, carrying, pushing/pulling)	Muscle strains, herniated discs, and shoulder injuries	Mechanical aids (hoists, trolleys), team lifting, safe lifting training (Mona, Chimbari et al. 2019; Bentley, Onnis et al. 2023).
Poor workstation design (non-adjustable chairs, monitor height)	Eye strain, headaches, musculoskeletal discomfort	Ergonomic assessment, adjustable chairs/monitors, workplace redesign (Gao, Gonzalez et al. 2018; Aldhaen 2022).

Chemical Hazards

Chemical hazards are the risks that chemicals pose to people and the environment. These include health risks like cancer and acute poisoning, as well as physical concerns like fire, explosions, and corrosion. These chemicals can be solids, liquids, or gases, and they can hurt your health or the environment in different ways, such as by breathing them in, touching them, eating them, or injecting them. To understand chemical dangers, you need to know what kind of risk there is, what the chemicals are, and what safety steps you should take, including wearing personal protection equipment (PPE) and making sure there is enough air flow. Table 5 gives a summary of the chemical hazards, risk factors, and strategies to control them.

Table 5. Chemical Hazards, Risks, and Control Strategies

Chemical Hazards	Risk Factors	Control Strategies (with References)
Exposure to toxic gases (e.g., ammonia, chlorine)	Respiratory problems, chemical burns, poisoning	Proper ventilation, gas detection systems, use of respirators, and emergency response training (Kalupahana Liyanage; Premasiri et al. 2019)
Handling solvents and flammable liquids (e.g., benzene, acetone)	Fire hazards, skin irritation, organ damage	Flammable storage cabinets, PPE (gloves, goggles), safe handling procedures, spill containment (Verma, Pandit et al. 2022)
Contact with acids and alkalis (e.g., sulfuric acid, sodium hydroxide)	Skin burns, eye injuries, and respiratory irritation	Chemical-resistant gloves and aprons, eye protection, safety showers, neutralization procedures (Gao, Gonzalez et al. 2018)
Exposure to dust and particulates (e.g., silica, asbestos)	Lung diseases (silicosis, asbestosis), coughing, irritation	Dust extraction systems, wet methods for dust suppression, and respiratory protection (Aldhaen 2022)
Improper storage of chemicals	Explosions, chemical reactions, and environmental contamination	Proper labeling, segregated storage, regular inventory checks, safety training (Gao, Gonzalez et al. 2018; Cuenca-Lozano; Ramírez-García et al. 2023)

Biological Hazards

Bacteria, viruses, parasites, and molds or fungi are all biological health risks. When breathed in, ingested, or touched by skin, they can be bad for people's health. The chart in Table 6 below gives a summary of the biological hazards that have been found, their risk factors, and ways to control them.

Table 6. Biological Hazards, Risks, and Control Strategies

Biological Hazards	Risk Factors	Control Strategies (with References)
Bacteria and viruses (e.g., <i>Salmonella</i> , <i>E. coli</i> , influenza)	Infections, illness outbreaks, respiratory problems	Vaccinations, hand hygiene, PPE (masks, gloves), isolation of infected individuals, proper sterilization of equipment (Drizaj, Gugu et al. 2024)
Fungi and molds	Allergic reactions, respiratory issues, and infections	Adequate ventilation, moisture control, PPE, regular cleaning, and mold remediation (Żukiewicz-Sobczak, Cholewa et al. 2015; Stave and Wald 2016)
Blood-borne pathogens (e.g., HIV, hepatitis B & C)	Infections through cuts, needle stick injuries, and contact with contaminated fluids	Safe handling of sharps, PPE, vaccination (Hepatitis B), proper disposal of contaminated materials, training (Bien, Davis et al. 2020; Drizaj, Gugu et al. 2024)
Animal and insect exposure (e.g., rodents, mosquitoes, ticks)	Zoonotic diseases, bites, and allergic reactions	Pest control, protective clothing, vaccination where available, sanitation, and waste management (Żukiewicz-Sobczak; Cholewa et al. 2015; Bien, Davis et al. 2020)
Biological toxins (e.g., botulinum, ricin, aflatoxins)	Poisoning, organ damage, allergic reactions	Proper handling and storage, PPE, monitoring, emergency response procedures (Stave and Wald 2016; Drizaj; Gugu et al. 2024)

Workplace Violence and Harassment

Workplace violence and harassment include a wide range of unwelcome actions, including verbal abuse, property destruction, physical assault, and even suicide. These actions can hurt people physically, mentally, and financially. It encompasses any action in which a person is abused, threatened, intimidated, or assaulted at work, and it might involve coworkers, bosses, clients, or strangers. Table 7 gives a quick overview of the hazards, risk factors, and strategies to control workplace violence and harassment.

Table 7. Workplace Violence and Harassment Hazards, Risks, and Control Strategies

Hazard Type	Risk Factors	Control Strategies (with References)
Physical violence (assault, fighting, attacks by colleagues or clients)	Injuries (cuts, bruises, fractures), psychological trauma, stress, and absenteeism	Security measures, reporting systems, training on conflict resolution, CCTV, zero-tolerance policies (Magnavita 2014; Lim, Jeffree et al. 2022)
Verbal abuse (shouting, threats, intimidation)	Anxiety, depression, reduced productivity, stress-related illnesses	Anti-bullying policies, training on communication skills, mediation programs, supportive management (Hoel, Zapf et al. 2002; Einarsen, Hoel et al. 2020)
Sexual harassment (unwanted sexual advances, comments, or gestures)	Psychological trauma, depression, anxiety, and reduced job satisfaction	Clear reporting procedures, awareness campaigns, HR interventions, training on workplace ethics (McDonald 2012; Fitzgerald and Cortina 2018)
Psychological harassment/bullying (isolation, humiliation, constant criticism)	Stress, burnout, mental health disorders, decreased motivation	Anti-bullying policies, counseling services, conflict resolution training, supportive supervision (Hoel, Zapf et al. 2002; Einarsen, Hoel et al. 2020)
Threats from clients/patients/public (especially in healthcare, retail, or security sectors)	Physical injuries, stress, PTSD, and absenteeism	Risk assessment, training in de-escalation techniques, security personnel, reporting and monitoring systems (Magnavita 2014; Lim, Jeffree et al. 2022)

4. Discussion

The purpose of this review of strategies and solutions for preventing workplace hazards and related occupational injuries was to present the most recent findings from comprehensive reviews and analyses regarding the effectiveness of behavioral safety interventions in high-risk workplaces and to try to pinpoint important elements that might be involved. This analysis emphasizes that workplace risks are multifaceted, encompassing physical, chemical, biological, ergonomic, and psychosocial aspects, in addition to workplace violence and harassment. The research suggests that addressing hazards in isolation is inadequate; rather, prevention necessitates integrated strategies that amalgamate regulatory adherence, corporate culture, and creative methodologies. The results of this integrative analysis show how important it is to identify hazards before they happen and to have thorough safety plans in place to reduce workplace injuries in many different fields, especially in construction. There are many different types of workplace hazards, such as physical and ergonomic dangers, psychological stressors, chemical and biological exposures, and workplace violence. These hazards are all connected in ways that make it necessary to take a comprehensive strategy to prevention instead of a separate one. The convergence of evidence from over fifty analyzed studies substantiates that fragmented interventions are inferior to integrated systems that tackle safety at organizational, managerial, and individual levels.

The analysis emphasizes the increasing acknowledgment of psychosocial concerns, such as stress, exhaustion, and workplace harassment. These risks, which were not given enough attention in workplace safety plans earlier, are now seen as substantial causes of both direct injuries and indirect effects on productivity and health. Adding psychological safety to occupational safety and health programs is a vital step forward in prevention methods. New technology, such as digital monitoring systems and predictive analytics, makes it possible to find problems in real time. At the same time, psychological risks like stress, weariness, and harassment need just as much attention because they have a big impact on both productivity and health. Limited resources, particularly in smaller enterprises, and the insufficient acknowledgment of psychological dangers persist as significant obstacles. To fill these gaps, we need to work together, learn from each other across sectors, and make rules that balance enforcement with support for new ideas.

Despite these developments, several issues still exist. Small and medium-sized businesses (SMEs) generally don't have the resources they need to fully use safety solutions. Cross-sector collaboration is still limited, even though areas like aviation and healthcare have lessons to teach about managing risk that may be used in other fields. Also, even

while new technologies have a lot of potential, there isn't enough real-world evidence yet to know how well they will function in the long run or how well workers will embrace them.

In essence, a strong workplace safety culture is still built on the human element. But with the help of powerful new technologies, the goal of having no workplace injuries has never been more possible. Organizations that are willing to lead this technological transformation are laying the groundwork for the future today.

5. Conclusion

A comprehensive approach that understands how physical, ergonomic, psychosocial, chemical, biological, and violence/harassment hazards combine to cause injury is necessary to prevent workplace dangers and the injuries they cause. The research compiled here demonstrates that strategies based on ongoing hazard identification, integrated within a robust safety culture, and linked with the hierarchy of controls, yield the most consistent decreases in injury frequency and severity. Although the construction and process sectors operate differently, they both gain from the same fundamental strategy: transparent learning from accidents and near misses, disciplined change management, worker participation, leadership commitment, and engineering controls that are appropriate for the job. This study found that workplace dangers vary and significantly cause occupational injuries across industries. By methodically identifying and assessing these hazards, the research shows that unsafe working circumstances cause injuries. The findings also show that most workplace injuries are caused by human, organizational, and environmental variables, showing that safety measures alone are insufficient. The study highlights the importance of employers in injury prevention through proactive hazard identification, risk assessment, and control techniques. Safety management, worker awareness, and a positive safety culture can significantly reduce workplace accidents and injuries, creating safer and more sustainable workplaces. Heterogeneity in definitions, measures, and settings restricts direct comparability because the review compiles over fifty papers from various businesses and hazard types. While psychological and violence-related consequences are frequently under-measured or regarded as secondary endpoints, publication bias probably inflates favorable findings on innovative therapies. Future assessments should standardize outcome sets that incorporate environmental, safety, and health criteria; stratify findings by workforce mix, contractor complexity, and sector maturity; and assess integrated bundles of controls rather than discrete strategies.

Practical Implications for Decision Makers

- **Employers:** Implement the hierarchy of controls to rank solutions and keep track of both leading and lagging indicators at the crew/area and enterprise levels. Established a single hazard-identification backbone that feeds all programs (physical, ergonomic, psychological, chemical/biological, violence/harassment).
- **Supervisors:** Regularizing risk assessments before starting a job, making sure there are controls in place, working before the job begins, and closing the loop on dangers brought up by workers during the same shift.
- **Policymakers:** Requiring specific psychological risk management in addition to conventional hazard control, and combining enforcement with incentives for capacity-building (training grants, shared services, sectoral standards).
- **Researchers:** By using long-term studies that assess packaged interventions across hazard categories rather than just single-exposure controls, the body of evidence can be strengthened.

Integrating all hazard categories into a single management system, implementing frontline risk assessments and rapid control verification, elevating psychosocial risk prevention to the same level as physical hazard control, and using leading indicators to drive continuous improvement instead of depending on injuries to signal system weakness are the practical steps that employers and site leaders can take going forward. Policymakers and researchers need to make this integration stronger by using standards, incentives, and strict assessment designs that measure integrated HSE outcomes. When put together, these measures provide a feasible way to minimize the number of work-related injuries, improve workers' health, and make organizations more resilient.

Conflict of Interest

The authors declare no financial or personal interests that may have influenced the work presented in this study.

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Data availability statement

No data associated with the study has been deposited into a publicly available repository. The authors confirm that the data supporting the findings of this study are available within the article.

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