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Safety mandates, legal requirements, and management practices to provide employees with a safe and healthful work environment

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Abstract

A commitment to safety is not a once-a-year endeavor that requires minimum training or awareness, but rather, it is a comprehensive concern for all stakeholders. Every business should provide a safe environment for their workers. This paper provides an overview of safety concerns, legal requirements, and best practices based on a review of the literature and government fatality data in the workplace, especially in the construction industry. Managers and human resource professionals must ensure their workplace places are as safe as possible. Using personality assessments to identify high-safety risk professionals can be one tool in their toolbox for creating and sustaining a safe and healthy work environment.

1. INTRODUCTION

Workers' safety is a legal right for each employee in the United States of America, and it includes working "conditions that do not pose a risk of serious harm", while receiving timely information and training in the dominant language and vocabulary that the worker understands about hazards in their workplace (OSHA Fact Sheet, 2023). The training and information communication should be specific and clearly explain what employees need to do to prevent any injury or harm to themselves and others in their vicinity. Employees also have the right to review workplace records of any injuries and illnesses related to their functions so they can be aware and hopefully prevent such unfortunate incidents in the future. They have a right to file complaints, without any retaliation, regarding unsafe working conditions with the Occupational Safety and Health Administration (OSHA) so they can inspect the department or firm for real or perceived severe hazards.

OSHA has authority over approximately 7 million businesses or workplaces in the United States (OSHA Fact Sheet, 2016). They generally inspect places of imminent danger, such as those situations or hazards that could cause death or serious physical harm. Other priority inspection places include those that cause severe injuries and illnesses, sites where workers report a complaint, and noted referrals of hazards from

government-related agencies, individuals, organizations, or the media. Furthermore, OSHA inspections focus on targeted workplaces with high rates of injuries and illnesses and follow-up inspections to ensure a safe and healthful work environment is achieved. In cases of serious work-related injuries and fatalities, American employers are required to report them to specific local government offices within 8 hours (OSHA Fact Sheet, 2016) so data can be compiled and relevant actions initiated in a timely manner. Of course, enforcement of laws and standards is critically important to create a culture of safety and a healthful work environment in each organization locally, nationally, and internationally.

As can be seen from the data in Figure 1, people can die from many illnesses, but about 15% of the workplace deaths are attributable to accidents and violence. Workplace accidents and violence are 100% preventable and, therefore, more should be strategically implemented always to keep employees safe.

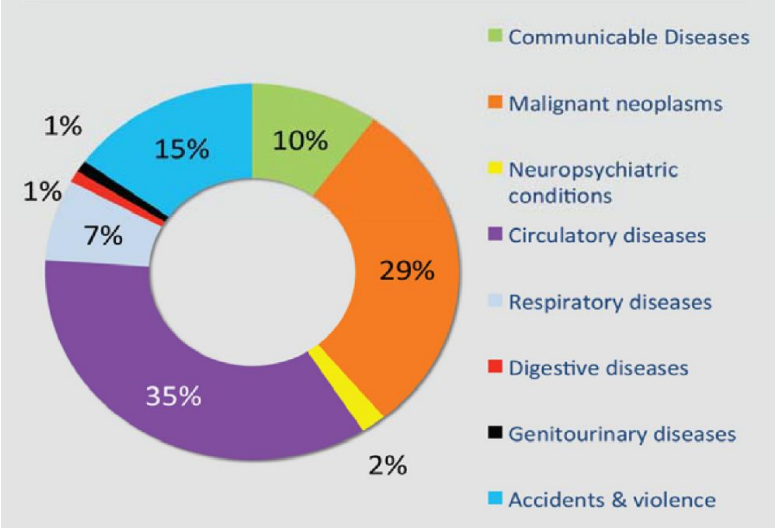

Figure 1. Percentage of Work-Related Mortality for 2010-2011 (Takala et al. 2017)

The good news is that workplace accidental deaths in the U.S. have decreased from a high of 38 fatalities a day in 1970 to 13 a day in 2020. Nonetheless, 351 construction workers died of various accidental falls in 2022 (National Census of Fatal Occupational Injuries, 2021). In one case, contractors ignored safety requirements, which led to a worker's 65-foot fall from an elevated scaffold in Denver, Colorado**.** As a result, the contractors were found guilty of serious and willful violations of safety standards (OSHA News Release – Region 8, 6 July. 2022).

In another incident, a Florida company was cited for safety failures when a 22-year-old diver working in a canal drowned. The diver was removing sand when sediment above collapsed directly onto him, leaving him trapped until he drowned (OSHA News Release, 2022). It was concluded that the diver's employer did not follow the required safety standards. The reality is that even large employers such as Amazon, Dollar Stores, Target, Walmart, and other national brands have been criticized for unsafe working conditions. Sometimes, professionals can be stressed due to paperwork, leading to burnout, dissatisfaction, distraction, and mistakes. For example, "occurrences of physical burnout have reached epidemic numbers, and the electronic health record (HER) is a commonly cited cause of the distress", which affects their professional activities (Skeff, Brown-Johnson, Asch, Zionts, Winget, & Kerem, 2022, p. 339). The best management practice is acknowledging the unsafe situation and immediately removing the danger to protect employees and customers. As a different example, in September 2022, a 53-year-old female (T.E.) died in a fall incident from a roof in the city of Seminole, Oklahoma (OSHA Inspection #: 1622790).

A recent tragic international example of workplace fatality is when a coal mine explosion took place on Wednesday, 15 March, 2023, where 21 people died in Sutatausa, a town 40 miles north of the capital, Bogota, Colombia. The explosion occurred due to the

accumulation of gases that exploded after a worker's tool caused a spark, and it spread through the connected mines. Sadly, there have been 1,260 mining incidents in Colombia between 2011 and 2022, averaging about 103 deaths per year. Experts suggest that government guidelines intended to stop irresponsible corporate mining are insufficient, and stricter laws and consistent enforcement are needed to prevent these tragic accidents and environmental damage from mining (Al Jazeera, 2023).

Workers can face unsafe working conditions due to physical distractions, psychological stresses, biological or chemical hazards, and interpersonal incidents. While females tend to face safety issues related to physical distractions like men, they also deal with more cases of harassment, which human resources can prevent by having solid anti-harassment laws. Such unfortunate tragedies continue to impact all workers in the U.S. The top frequently cited standards by OSHA in the fiscal year 2021 for inspection were the following (Commonly Used Statistics, 2022):

1. Fall Protection, construction.
2. Respiratory Protection, general industry.
3. Ladders, construction.
4. Hazard Communication, general industry.
5. Scaffolding, construction.
6. Fall Protection Training, construction.
7. Control of Hazardous Energy (lockout/tagout), general industry.
8. Eye and Face Protection, construction.
9. Powered Industrial Trucks, general industry.
10. Machinery and Machine Guarding, general industry.

Since the construction industry provides many opportunities for any situation to go wrong while workers deal with ladders, scaffolding, and other equipment, often while moving high up on the roofs and walls, we can look at how this industry is trying to keep people safe.

2. LITERATURE REVIEW

Nations worldwide consider the construction industry a major stimulant to their economic growth and development (Okoye et al., 2018). For example, Salomaki et al. (2022) explain that "Occupational safety (O.S.) or, more precisely, its lack has remained a problem in the construction industry around the world. At the same time, the construction industry is a significant industrial branch, creating employment and affecting national and regional economies" (p. 41). As nations speed up construction projects, focusing on the short-term and long-term safety implications of expediting these projects becomes imperative. Anumba (1999) reported that there is an economic benefit when safety is considered at the design stage. With so many professionals working on a myriad of tasks, budgets, regulations, and deadlines, the final product can either be a success or a complete failure. According to Alarcón, Acuña, Diethelm and Pellicer (2016), the construction industry is project-based, with many stakeholders consisting of professionals such as designers, building developers, contractors, subcontractors, and workers, among others, working as a team to achieve a common goal.

Construction standards are created to guide construction managers and personnel to follow for everyone's safety. In the event of a natural disaster, buildings and structures will need to withstand inevitable forces such as flooding, earthquakes, landslides, heat waves, and/or cyclones. Moreover, proper planning can help alleviate the severity of a natural disaster (Mujtaba & Meyer, 2022). As a case in point, on 30 May 2015, Japan experienced a 7.8 Mw earthquake (Ogasawara Earthquake), resulting in zero casualties and less than 20 injuries (Cook, 2017; Yamaguchi, 2015). In contrast, on 6 February 2023, a catastrophic and destructive 7.8 Mw earthquake struck southern and central Turkey, as well as northern and western Syria, resulting in over 50,000 fatal casualties (Rasheed et al., 2023). The difference might be creating a national culture with relevant standards to keep everyone safe, enforcing specific construction laws, and a less corrupt

environment where employees are empowered and engaged to speak up without fears of retaliation.

The discrepancy in global construction standards is highly evident in the literature (Yidirim et al., 2022; Kartam et al. 2000; Jain, 2007) and needs to be addressed from a pragmatic perspective in hopes of creating best practices to ensure that safety is not compromised due to a nation's lack of resources, planning, and/or governance. Safety policies, ethical obligations, Key Performance Indicators (KPIs), and mandated regulations should become the norm in all nations worldwide without bias. As a case in point, Yildirim et al. (2022) explain that "The Turkish construction industry is problematic with its inferior occupational safety practices and labor standards" (p. 1). Kartam et al. (2000) conducted a study on Kuwait's construction and safety standards and mentioned the following, "Safety departments in different ministries work independently and do not share information " (p. 175). Although the construction industry is a significant stimulant to a nation's economic growth and development, one must inquire about the processes and protocols used and a nation's capacity to manage large-scale construction projects. According to Jain (2007), construction safety management is challenging due to the dynamic nature of construction activities coupled with the involvement of an unskilled, illiterate, and mobile workforce in India.

2.1 Surfside Building Collapse in South Florida

The Surfside building collapse is a tragic catastrophe that took place on 24 June 2021, after midnight at approximately 1:22 a.m. in South Florida's Champlain Towers South, which was a 12-story beachfront condominium in Miami. It caused the deaths of 98 people who were sound asleep in their beds. About one year later, on 23 June 2022, there was a $1.02 billion settlement to compensate the victims' families for their loss in this building collapse (Surfside Building Collapse, 2022). The lawsuit stated that the guard on duty that night called 911 to report this emergency about 10 minutes before the collapse but failed to activate the building-wide in-unit voice alarm to let the residents know of this imminent threat.

According to the Miami Herald's investigation and reporting, "the collapse began when the ground-floor parking area and pool deck caved in and found that design failures, shoddy construction, damage, and neglect over the past 40 years lined up like dominoes to create the perfect conditions for a deadly chain reaction" (Delgado, 2022, para. 2). As noted by one of the peer reviewer colleagues for this article, the tragic Surfside building collapse is related to safety in facility management and not necessarily construction management. However, we cite it here to emphasize that safety is everyone's job, and all employees, vendors, suppliers, government officials, union leaders, and even residents and customers must be empowered to voice their concerns in a concurrent manner to prevent such incidents in the future and maintain a culture of safety in each organization or community (Anumba, 1999).

2.2 Safety Culture

Construction managers should consider the vast benefits of creating a safety culture before, during, and after the construction process. According to Teo et al. (2005), "Management's attitude towards safety has always been the foremost priority in enhancing the safety performance of an organization. As such, change in culture is inevitable" (p. 337). Each phase of a construction process should have a common denominator which must be focused on safety. This starts with the safety of the professionals involved in the construction process and the safety of the individuals who will eventually use the newly constructed structure, road, and/or bridge. In the 1940s, Maslow discussed the importance of safety needs for human motivation. "Safety needs" is referred to as the sturdy desire of humans for safety and security to remain secure or safe from any harm. Thus, creating a safety culture includes the combination of attitudes, values, norms, and perceptions in the production process (Clarke, 2000). A study conducted by Latief et al. (2017) delineates the dimensions of creating a safety culture as 1) Leadership, 2) Policy, 3) Strategy, 4) Employee, 5) Process, 6) Behavior, 7) Safety Culture Expenses, 8) Contract System, 9) Value System.

Some researchers have even recommended an incentive program for construction workers in hopes of increasing safety levels. For example, Kim et al., (2019) explain that "In order to promote safety culture, workers' safety incentive programs employ an integrated threshold for safety performance. This safety performance threshold is supposed to reward workers who successfully fulfil the requirements of a certain performance criterion" (p. 50). Kim and colleagues (2019) further elaborate by stating, "The results showed that the interaction of safety incentives, subcontractors' involvement, and safety accountability with safety management systems (SMS) have positive and significant impacts on safety performance" (p. 52). If all stakeholders embrace a safety culture, the construction process will be more successful, leading to more security and fewer casualties during a natural disaster. Zwetsloot et al. (2017) explain that safety commitment is the extent to which organizational leadership is represented by the willingness to prevent and promote safety as part of organizational goals, values, and morale. Safety performance is a concept of commitment approach based on establishing safety programs.

2.3 Key Performance Indicators (KPIs)

A nation can use KPIs to assist with construction projects. According to Mahmoud et al. (2020), "Key performance indicators refer to a tool used to assess the efficiency of construction facilities" (p. 392). Transparency with tracking data and sharing data can enhance the levels of safety. According to Thibault (2021), the emphasis on data in construction isn't new. Still, the depth of related financial losses and human losses is a reminder of how important carefully gathering and crunching the numbers is for the industry. Furthermore, sharing best practices and information transfer can help create more awareness and accountability. According to Teo et al. (2005), "Effective communication and information transfer between management and employees will yield better safety standards and enhance the achievement of safety policies" (p. 331). Data on local conditions should also be taken into consideration. Ashebir et al. (2020) explain that setting proper safety management systems based on the local conditions plays an important role in developing infrastructure projects.

2.4 Ethical Obligations

When a structure is constructed without a focus on safety, which may be due to meeting specific benchmarks and/or cutting costs, accountability and ethics become more prevalent. According to Kartam et al. (2000), "The main concern of a contractor is how to save money and reduce costs. Safety is usually considered a secondary priority in the company's plans. Most contractors consider Safety a waste of money since they may be unaware of the effectiveness of safety prevention programs in reducing costs and increasing productivity" (p. 175). According to Yildirim et al. (2022), "The rapidly disseminated subcontracting led to the recruitment of workers with lower-tier subcontractors who do not have the competency to adapt to labor standards and intend to dismiss them when not appropriately inspected" (p. 1).

Accepting responsibility and being held liable for managing an unsafe project should become the norm in the global construction industry. According to Mahmoud et al. (2020), "The developer is the main party in the construction industry and the beneficiary of the end product, thus, plays a very significant role during the construction project life circle" (p. 375). A manager or foreman needs to embrace the responsibility of safety first. According to Ikau et al. (2019), "In general, safety is always regarded as an independent function in the management system. The management wrongly assumes safety as a specialist function separate from their normal management activities" (p. 6).

2.5 Mandated Regulations

With mandated regulations, a government will be able to better control and track all construction projects within a nation and there will be more accountability and transparency in the construction process. For example, in Indonesia, "the government has issued various laws and regulations concerning the Construction Health and Safety Management Standards to be adhered to and implemented by construction services

business entities to protect the work safety of construction workers, construction service companies and also the environment in which construction projects are carried out" (Prasetio et al., 2019, p. 3). On the contrary, according to a study in Kuwait by Kartem et al. (2000), the authors mentioned that the "Current governmental safety inspection programs are ineffective because the inspectors are limited both in their number and qualifications" (p. 176). Prasetio et al. (2019) state that "One of the successes of a construction operation is determined by the service provider as the executor of construction activity so that the competency of the service provider will determine the implementation of construction activities. The performance of construction work is said to be good if it meets the time, quality and costs following the contractual agreement that has been agreed with the service user" (p. 1). In a different study, Yildirim et al. (2022) explain that "Findings revealed that the industry represents a drastically problematic context with high rates of occupational accidents, job insecurity, and excessive working time, and the inspection and enforcement system is still immature, calling for additional institutional arrangements to establish a collaborative and sustainable environment" (p. 1). Of course, productivity in any industry, including construction, can be best achieved through proper hiring, training, and lean manufacturing processes without putting undue pressure on employees that can lead to unsafe working conditions, anxiety, and stress (Ibrahim, Imtiaz, Mujtaba, Vo, & Ahmed, 2020; Nguyen, Mujtaba & Ruijs, 2014; Tajaddini & Mujtaba, 2010). While mandated regulations should be designed by experts in the construction industry and policymakers, this paper seeks to determine what human resource professionals and managers can do to create a safer and more healthful work environment for everyone.

3. Review

Safety challenges can escalate and get worse when not solved promptly through proper interventions such as fixing imminent problems and implementing new policies, regulations, training, and certification. As the physics concept confirms in Newton's Laws of Motion, an object in motion will continue its momentum unless there is an intervention by an outside or unbalanced force. Since situational variables change and there cannot be a possible template that can be applied to all circumstances, researchers in the legal field are often taught to think critically about "problems in such a way that allows them to discern the legal implications of different facts and situations—often called "leaning to think like a lawyer" (Murray & DeSanctis, 2015). Legal experts also learn certain basic principles that are foundational to everyone in every jurisdiction. The researchers are also required to learn "how to find the correct sources of the law and teach themselves the current law that governs the problems before them (Murray & DeSanctis, 2015). As Murray and DeSanctis (2015) explained, "every research project starts with a problem," which allows a researcher to use the facts to identify issues regarding people, places, events, things, rights and relationships.

The methodology in this paper has been based on the literature review to better understand the workplace safety issue based on facts, assess the influence of the human element, and make practical recommendations for human resource professionals and managers to deal with its resolution proactively. So, our research method is based on the goal of worker safety and an employer's responsibility to provide a healthful work environment. Since reputable organizations such as OSHA and Center for Disease Control (CDC) make some of the national and state level data available, we decided to conduct this exploratory research to understand the problem better, assess best practices in managing the safety goal, and provide practical recommendations.

Safety in the construction industry, healthcare, and any other workplace should be the highest priority for any employee, manager, or entrepreneur. As such, we propose the following exploratory research question:

Preventable fatalities continue to happen in the American workplace due to various causes. What can human resources professionals and managers do to prevent workplace fatalities?

4. RESULTS

For the proposed exploratory research question, the fact is that preventable fatalities do exist since even one serious injury or fatality is one too many. While much progress has been made over the past four decades to reduce injuries and fatalities, such factors as management pressure, human errors and unnecessary risks appear to be some of the common variables. As such, we can explore what managers and professionals in the construction industry do to keep their employees safe.

The construction industry is one area where safety is often discussed, explored, and successfully implemented to save lives and rightly so. For example, in 2019, about 11.4 million workers were involved in some element of the construction industry, and this number increased by 25% from eight years earlier in 2011 (CDC Statistics, 2023). The employment of Hispanic construction workers in the U.S. rose by more than 55% from 2011 to 2019. Most workers in the construction industry are male (90.8%), the largest minority group is Hispanic (28.6%), and nearly a quarter of them are foreign-born (24.7%). Data from the Center for Disease Control (CDC) shows that there was a total of 991 construction-related fatalities in 2019.

Furthermore, falling to a lower level of the building is a major cause of work-related deaths in the construction industry, as it makes up about 36.4% of the fatalities. Other causes of construction fatalities range from struck-by incidents (15.4%), electrocutions (7.2%), and caught-in/between incidents (5.4%). An alarming trend is that fatalities among Hispanic construction workers rose by 90% from 2011 to 2019. Perhaps safety training, as recommended by OSHA, in the workers' dominant language can be a significant factor in the prevention and reduction of these fatalities in today's culturally diverse workforce. Another significant issue is that small employers with less than 20 workers accounted for 75% of fatal falls from 2015 through 2017 (CDC Statistics, 2023). Perhaps there is less training regarding safety in smaller firms or less oversight, but it is a critical issue that requires immediate attention.

The Occupational Safety and Health Administration is authorized by the Occupational Safety Health Act of 1970 (OSH Act) to ensure that firms and managers provide safe and healthful environments for their workers. In other words, the work environment must be free of known hazards by setting, communicating, and enforcing high safety standards through relevant and timely training, outreach, education, and technical assistance to all workers in their native or dominant language. OSHA has established cooperative programs to partner with employers, employees, and other stakeholders to provide a safe and healthful workplace. The goal is to eliminate and reduce the possibility of workplace injuries, illnesses, and fatalities. For example, as shown in Table 1 for the year 2021, OSHA was involved in 24,333 total inspections, 57% (13,749) of which were unscheduled due to employee complaints, injuries/fatalities, and referrals (OSHA Inspection Data, 2023).

Table 1. OSHA Inspection Statistics (OSHA Inspection Data, 2023)

	F.Y. 2016	F.Y. 2017	F.Y. 2018	F.Y. 2019	F.Y. 2020*	F.Y. 2021*
Total Inspections	31,948	32,408	32,023	33,393	21,710	24,333
Total Programmed Inspections	12,731	14,377	13,956	14,900	8,729	10,584
Total Unprogrammed Inspections	19,217	18,031	18,067	18,493	12,981	13,749
~ Fatality/Catastrophe Inspections	890	837	941	919	1,498	1,386
~ Complaints Inspection	8,870	8,249	7,489	7,391	4,592	4,955
*~ Referrals**	6,691	6,286	6,463	6,718	4,810	5,310
~ Other Unprogrammed Inspections	2,766	2,659	3,174	3,465	2,081	2,098

**The COVID-19 global pandemic caused by the novel coronavirus SARS-CoV-2 occurred during this time.*

In 2016, there were 890 fatality inspections, which went up incrementally over the next five years to 1,498 in 2020 and 1,386 in 2021. During the same period, there was a

decrease in the number of complaint inspections, which was 8,870 in 2016 but went down to 4,955 in 2021 – perhaps some of this reduction is due to the Covid-19 quarantine periods where many workers were telecommuting.

For the years 2017-2022, the OSHA data (as of 20 March 2022) shows a total of 6,799 work-related fatalities in the United States that were investigated. OSHA must investigate all workplace fatalities within six months to determine whether a citation should be issued for each incident.

As shown in Table 2, the following are some examples of what is reported by OSHA regarding falls and other fatalities in Florida during 2021:

1. *"At 4:30 p.m. on 29 June 2020, Employee #1, an electrician employed by an electrical services company, was working on an electrical problem at a one-story residential structure. He was troubleshooting a 300-watt electrical transformer when he encountered a live wire. Employee #1 was killed by electrocution.*
2. *At 5:00 a.m. on 3 June 2020, an employee was working on roofing repairs. At some point, the employee accessed a ladder to climb down and slipped. The employee fell thirty feet and was killed.*
3. *At 5:21 p.m. on 3 June 2020, Employee # 1 was operating a handheld control panel for a hydraulic arm and roller assembly while loading product into an enclosed semi-trailer. The assembly started to rotate briefly and started to rise. The employee bent his body over the arm assembly as it was starting to rise. He was caught between the hydraulic arm and the side of the trailer. He suffered crushing injuries and internal injuries (lungs, ribs, liver, and chest). He was killed.*
4. *At 3:42 p.m. on 2 May 2020, Employee #1, a 22-year-old employee, was working for a new car dealer. He and three coworkers were riding on a Club Car golf cart within the company's property. They were headed to move vehicles from one section of the lot where pavement activity was conducted to another area. Two of the coworkers were in the front driver's and passenger's seat. The employee and the third coworker were standing on the rear footrest of the golf cart. The golf car was headed forward when the driver made a sudden turn. The employee fell off during that sharp turn. He hit his head on the concrete or asphalt pavement. He suffered head trauma. He was hospitalized that same day. He died on 11 May 2020."*

Table 2. Sample Federal Reports of fatalities in Florida for 2020 (OSHA Fatalities Report, 2023)

Date	City	Hazard Description	Inspection #	Citation?
6/29/2020	Fort Lauderdale	Worker electrocuted by transformer.	1481876	No
6/3/2020	Royal Palm Beach	Worker died in fall from ladder.	1477346	Yes
6/3/2020	Sanford	Worker fatally crushed between hydraulic arm and trailer.	1477512	Yes
5/28/2020	Clewiston	Worker fatally struck by motor vehicle.	1476969	No
5/27/2020	Port Saint Lucie	Worker fatally struck by lightning.	1476605	No
5/20/2020	Fort Lauderdale	Worker died when scissor lift fell over.	1476145	Yes
5/2/2020	Tallahassee	Worker died in fall from golf cart.	1475057	Yes

As shown in Table 3, the following are some examples of what is reported by OSHA regarding falls and other fatalities in Florida during 2022.

1. *"At 6:37 p.m. on 27 June 2022, an employee had just removed a panel of roof shea thing from a rooftop when he stepped onto the underlying roof insulation and fell through the roof. The employee was not using fall protection and fell approximately 18 feet. As the employee fell, he struck a cabinet, shelving, and the concrete floor and was killed.*
2. *At 4:56 p.m. on 28 June 2022, an employee was working as a member of a crew that was setting up trusses when a truss was put down by the crane operator. The employee and his crew undid the truss and secured one side of it. The employee moved to the middle of the truss to secure it when the truss gave way and he fell to the ground.*
3. *At 3:48 p.m. on 2 July 2022, an employee was sweeping the roof. The employee fell off the roof 11 feet 8 inches. The employee struck his head on the concrete floor and was killed. The task at the site involved the repair of an existing roof, and the employees were in the process of tearing off the old roof.*
4. *At 2:17 p.m. on 6 July 2022, an employee was cleaning windows on the 9th story of a building. The employee completed the first window and was hanging. As the employee went over a parapet wall using a bosun chair, he fell nine stories to the group with the rope and equipment. The employee was killed."*

Table 3. Sample Federal Reports of fatalities in Florida for 2022 (OSHA Fatalities Report, 2023)

Date	City	Hazard Description	Inspection #	Citation?
06/27/2022	Pinellas Park	GM (39) died in fall through roof.	1603377	Yes
06/28/2022	Poinciana	F.E. (35) died in fall from truss.	1604878	Yes
07/01/2022	Miami Beach	D.M. (52) fatally shot.	1606956	Yes
07/02/2022	Pompano Beach	K.C. (54) died in fall from roof.	1605736	Yes
07/05/2022	Sarasota	L.F. (58) fatally crushed by garbage truck compactor.	1605930	Yes
07/06/2022	Coral Gables	EDCS (43) died in fall while cleaning windows.	1606191	Yes
07/07/2022	Jacksonville	SVR (44) drowned in pond pinned under mower.	1606675	Yes
07/07/2022	Vero Beach	TJM (41) electrocuted by power line while trimming trees.	1609493	Yes

Based on the hazard description (Table 3), one can draw the following conclusions.

1. In the City of Pinellas Park, the employee was not using fall protection and fell approximately 18 feet to his death.
2. The Poinciana City employee and his crew undid the truss and secured one side of it. The employee moved to the middle of the truss to secure it when the truss gave way, and he fell to the ground.
3. On 1 July 2022, an employee denied entry to a nightlife establishment to a non-hotel guest. The non-hotel guest assaulted the employee and shot him six times with a gun.
4. In the Pompano Beach case, the employee was sweeping the roof. The employee fell off the roof 11 feet 8 inches. The employee struck his head on the concrete floor and was killed. The task at the site involved the repair of an existing roof, and the employees were in the process of tearing off the old roof.
5. In the City of Sarasota, after the employee slid open the side garbage compactor door, bypassing the safety sensor with a magnet, he stuck his head inside to identify the leak and was crushed.

6. An employee in Coral Gables completed the first window, and was hanging. As the employee went over a parapet wall using a bosun chair, he fell nine stories to the group with the rope and equipment.
7. In Jacksonville, an employee became stuck in the mud at the edge of the pond and asked his coworkers to get a tow strap to pull the mower out. When the coworkers returned from fetching the strap, they found the employee underneath the unpowered mower, with his head partially submerged in water.
8. In Vero Beach, an employee was involved in trimming a tree. A tree branch made contact with an overhead powerline, and the employee was electrocuted.

The four cases (1, 2, 5, 7) above may suggest the personality traits of "resistant" and "impulsive" (Table 4) contributed to the risk of fatalities, indicating the need for both training and personality assessment."

Table 4. Safety-Related Personality Traits

Trait	Higher Risk Employees	Lower Risk Employees
Resistant	Tend to disregard authority and rules	Comply with rules
	Resist feedback	Follow training and guidelines
Anxious	Freeze or panic when faced with unexpected safety-sensitive situations	Are confident
	Doubt their ability to respond to the threat	Stay calm under pressure
Irritable	Tend to be easily annoyed, especially when under stress	Are less irritable. Can control emotions under stress
Distractible	Seek stimulation	Less likely to become distracted
	Lose focus easily	Can stay focused and alert
Impulsive	Take risks	Are careful
	Underestimate the consequences of their actions	Evaluate their options before making decisions

Empirical research has shown that, in general, female employees tend to be more concerned about the personal safety of everyone at work and, therefore, are likely to behave cautiously and under safer conditions compared to men. In a study about safety, safety responses, and bystander intervention intentions for 270 men and 821 women, the researchers found that the two most consistently associated factors about safety were higher perceived risk of violent victimization and safety efficacy (Logan & Walker, 2021). Logan and Walker also found that different patterns of factors are associated with different safety responses, demonstrating the importance of examining a wide variety of safety responses, and gender is a significant factor.

Many studies have included physical, psychological/psychosocial, biological, and chemical hazards (Zeeshan, Batool, Raza, & Mujtaba, 2023; Biswas et al., 2021). Biswas and colleagues (2021) explain that most studies reported that "men were exposed to noise, vibration, medical radiation, physically demanding work, solar radiation, falls, biomechanical risks, chemical hazards, and blood contamination, while women were exposed to wet work, bullying and discrimination, work stress, and biological agents." Furthermore, in the same occupations, men were more likely to be exposed to physical hazards in a variety of industries. Additionally, men, compared to women in the same occupations, did experience higher work stress as they reported more exposure to hazardous chemicals. According to Biswas and colleagues (2021, para. 3), "men and women have different exposures to occupational hazards, and these differences are not solely due to a gendered distribution of the labor force by occupation", and additional research findings can inform prevention efforts to reduce gender inequalities in occupational health. It should be noted that the inclusion of more females in higher-level management and leadership positions can enhance relationships and, thus, create a safer work environment for all (Mujtaba, 2023a).

About 160 million adults around the globe suffer from some form of work-related injury or illness every year (Takala et al., 2017), and many of these physical fatalities and injury victims are men. As such, perhaps targeting "gender and sex differences at work can have important public health and social implications" (Biswas et al., 2021). For

example, men are more likely to be impulsive and risky compared to women, and, therefore, should receive relevant tasks and assignments based on their personality assessments.

5. DISCUSSION

Companies need to take additional measures to ensure that they hire the right people and create a safe environment for their employees. There may be a personality link to why accidents occur (Hogan et al., 2022). Companies might consider designing a more inclusive approach that extends beyond traditional approaches such as on-the-job training (OJT) to manage safety. An emphasis on personality may contribute to the creation of a climate of safety that requires a focus on the people. Personality assessments may serve as an additional tool to reduce harm as a component of the safety management kit. To improve safety, understanding antecedents to safety performance and outcomes is key. Personality assessment may prove useful in identifying high-risk individuals, with an understanding of when and how personality influences workplace safety.

Personality assessments can also play a role in promoting safe behavior in the workplace. Overall, research suggests that personality traits and assessments can be useful tools for promoting safety behavior in the workplace. As such, organizations may benefit from incorporating personality assessments into their safety training programs and leveraging the insights gained to tailor their approach to promoting safe behavior.

5.1 Personality Assessments: A Tool to Reduce Workplace Accidents

Companies have legal, financial, and ethical obligations to create safe work environments. To encourage safety as a strategic initiative, companies typically strive to enhance protocols/SOPs (standard operating procedures), address counterproductive behaviors, reduce occupational stress, implement risk management initiatives, and promote safety values. These standard approaches support the design and delivery of on-the-job training that focuses on education, equipment, and protocol, leading to safer employees at work and their interactions with the digital world where cybercrimes have been growing (Mujtaba, 2023b).

Research on the relationship between personality, assessments, and safety behavior in the workplace is growing. Clarke et al. (2005) study found that employees who scored high on conscientiousness, a personality trait characterized by being organized, responsible, and reliable, were more likely to engage in safe behavior in the workplace. Khabda et al. (2019) explored the relationship between emotional intelligence, risk perception, and safety behavior in the oil and gas industry, and indicated that employees with higher levels of emotional intelligence were less likely to engage in risky behavior. Yet the safety gap remains, as training alone has not satisfactorily reduced the number of workplace injuries. Themes from safety studies suggest 1) inadequate organizational infrastructure, 2) insufficient leadership effectiveness, 3) inadequate efforts to keep pace with national and international standards, and 4) the values of team participation impact the creation and promotion of safety culture (Farokhzadian et al., 2018). Studies further identify the complexity of organizational factors such as culture, structures, processes, and change management methods. Hogan and colleagues (2021) study findings indicate a relationship between safety climate and injuries and perceived management commitment to safety as the most consistent predictor of injuries (Switzer & Mosier, 2022). Human error contributes to most workplace incidences, resulting in employee injury, property damage, or both (Wiegmann & Shappel, 2005). Research also suggests incident involvement occurs in unequal proportions across individuals and implies that screening out incident-prone individuals during selection could reduce workplace incidents (Doer, 2022).

In the healthcare setting alone, adverse events related to unsafe care are the top ten causes of death and disability, and many appear preventable (Bates et al., 2021). Consistent with other studies, the work conditions and environment, e.g., mental and emotional climate, shift work, fatigue, lack of control over complex and unsafe working conditions, and workload, negatively impact patient safety (Weaver et al., 2013).

Industries such as construction, oil, and gas requiring greater physical labor, are at risk from accidents at work and injuries.

5.2 Personality Assessments

To develop and maintain a safe work environment and attract the right people companies are including personality analysis in the hiring process. Personality testing can be integrated into the talent management strategy across industries. Safety assessments are a component of pre-selection, along with candidate experience and expertise. An assessment of strengths and weaknesses that considers all important personality traits of candidates inclined to safety that differentiate them from the candidates less inclined to safety can be a useful tool (Hogan Systems, 2019). Applying safety assessment in pre-selection assists in avoiding hiring people with demonstrably high safety risks and/or as a development tool for incumbents, a prescribed plan for areas of attention can be created. Consequently, every team should have at least one person who is highly safety-focused.

5.3 Safety-Related Personality Characteristics

Research demonstrates an empirical basis for how and when personality translates into safe behavior at work and proffers a theoretical explanation for the mixed results among previous studies of personality's relationship with safety (Clarke et al., 2005; 2008; Doer, 2022). Companies need people who think and act safely. Assessments can identify "low safety risk" individuals or identify employees who are a "high safety risk" as a part of the pre-employment testing helps determine what aspect of the candidate's behavior contributes to higher risk, providing opportunities to address those areas hindering safety. The assessment will focus on training and development for current employees to enhance a positive safety culture. As presented in Table 4, employees can be assessed for being high risk or low risk on such traits as being resistant, anxious, irritable, distractible, and impulsive. A team with all high-risk members should be provided with more safety training and relevant supervision if they are involved in tasks that have a higher chance of serious injury or harm.

Personality assessments that examine panic under pressure, attending to important safety precautions, and becoming easily distracted or bored are recommended. Conscientiousness, agreeableness, extraversion, and openness have all shown significant positive correlations with safety behavior. Neuroticism is significantly negatively correlated with safety behavior (Doer, 2022). Conscientiousness is defined as a person's willingness to follow rules. For example, low-scoring individuals ("low scorers") may tend to ignore the rules, while high-scoring employees ("high scorers") tend to follow the rules without hesitation.

Neuroticism and dealing with stress. Low scorers are prone to stress; these employees are easily panicked under pressure and tend to make mistakes. High scorers usually stay consistent and predictable. Low scorers may lose control and make mistakes more easily, while high scorers know how to control themselves.

Risk Propensity. Low scorers tend to take unnecessary risks. High scorers, on the other hand, avoid risky actions. Consolidation is about the ability to concentrate. Low scorers are more distracted and may be more likely to make mistakes. On the other hand, high scorers can concentrate longer (Hogan Systems, 2019).

Personality assessments for safety examine panic under pressure, attending to important safety precautions, and becoming easily distracted or bored are recommended. Such assessments are designed to assess patterns of thinking and acting that predict safe behavior and the likelihood of remaining free from workplace safety incidents. The valid and reliable instruments presented provide insight and predictiveness into safety behaviors that can be used in a developmental or selection context. Each scale predicts different behaviors influencing safety (Hogansystems.com; Psychometrics.com).

The Hogan safety competency model examines the best safety practices through six scales: compliance, poise, cautiousness, trainability, vigilance, and strength. Each contributes to a different aspect of an employee's safety potential reported on a 5-range

normative scale and predicts different types of behaviors influencing safety performance (Hogansystems.com).

Many dimensions are included in the WorkSafe Predictor assessment (Psychometics.com), including the following:

1. *Attentional Focus* – The ability to maintain attention focused on a task correlates with occupational safety incident involvement.
2. *Harm Avoidance* – The ability to avoid and manage harmful energies predict workplace safety incidents.
3. *Personal Work Standards* – This scale can be viewed as a measure of conscientiousness of an individual's tendency to strive for achievement, seek improvement, and be deliberate and reliable.
4. *Operating Care* – The acknowledgement of proper and careful use of equipment and procedures.
5. *Safety Ownership* –An active concern for others' safety contributes to an overall decrease in workplace safety incidents. Low agreeableness, characterized by a lack of trust, low altruism, and poor group relationships, has been demonstrated to predict occupational accidents.
6. *Safety Trust* – Safety climate is defined as an "open-door policy for hazard and accident reporting, sincere concern for employee well-being, and fairness in accident investigations."
7. *Stress Response* – One of the most researched factors relating to occupational safety incidents has been a reaction to and management of stress.

5.4 Integration of Personality Assessments

Conscientiousness rule following/breaking. In the case of the Chernobyl disaster in Ukraine, on 26 April 1986, the world witnessed the costliest accident in history. The death toll attributed to Chernobyl, including people who died from cancer years later, is estimated at 125,000. The total costs, including cleanup, resettlement, and compensation to victims, have been estimated at $200 billion. The accident was officially attributed to power plant operators who violated plant procedures and ignored safety requirements. The analysis of this event applying Hogan WorkSafe assessment scales based upon the Workplace Place Big Five research identified specific personality contributors: Scale Defiant – Compliant - Low scorers defy authority and may ignore company rules, and high scorers tend to follow rules and guidelines (Switzer et al, 2022).

Risk. In the case of the Costa Concordia cruise ship disaster, on 13 January 2012, the Costa Concordia struck a reef off the Italian coast, tearing a 50m gash in its side. With 4,229 people on board, 32 individuals died. Captain Francesco Schettino was found guilty of manslaughter and abandoning the ship. He had turned off warning systems because he "knew the seabed well" but admitted he did not follow procedure. The salvage was completed in 2014 at a cost of $2 billion. The analysis of this event applying Hogan WorkSafe assessment scales based upon the Workplace Place Big Five research identified specific personality contributors: Scale: Reckless – Cautious - Low scorers are prone to taking unnecessary risks, and high scorers tend to evaluate options before making risky decisions (Switzer et al., 2022).

Stress, Emotional Regulation Composure. In the "Miracle on the Hudson" case on 15 January 2009, U.S. Airways flight 1549 crash-landed in the Hudson River near New York City. All 155 passengers and crew survived. The pilot, Captain Chesley B. Sullenberger, was described as "calm, cool and collected" as he made a safe water landing. Due to Sullenberger's focus and composure, a tragic accident was averted. The analysis of this event applying Hogan WorkSafe assessment scales based upon the Workplace Place Big Five research identified specific personality contributors: Scale: Irritable Poised, with low scorers easily losing their temper and high scorers tend to remain calm, even in stressful situations (Switzer et al., 2022).

5.5 Practical Implications for Companies

Investments in reducing harm can lead to substantial savings and, more importantly, improve worker safety outcomes. There are challenges ahead for cultivating an effective

and positive safety culture in companies. More focused efforts are required to have an effective and positive safety culture. Employing specific methods of organizational behavior including personality assessment to intentionally improve the institutionalization of safety culture and to make a difference in decreasing workplace accidents. Studies and cases suggest that selecting employees who are wired to possess personality characteristics for safety can improve the company's safety culture. Hiring employees naturally inclined to care about safety enhances a safe environment, likely leading to fewer injuries, increased productivity, and improved morale.

The blending of traditional safety training and personality assessment to help assess safety-related behavior may positively impact a company's safety and costs. Depending on the industry and specific safety concerns of the organization, relevant "self-assessment" tools should be developed or selected, implemented, assessed periodically, and adjusted based on data. As presented in Table 5, a self-assessment tool on safety may offer a gateway into the use of more formal psychometrically valid personality assessments, such as the tool from Sexton et. al (2005), which may serve as a template to be customized for the company/industry.

Table 5. The Safety Attitudes Questionnaire (Psychometric properties, benchmarking data, and emerging research)

Scale: Definition	Example items
Teamwork climate: perceived quality of collaboration between personnel.	–Disagreements are appropriately resolved (i.e., not *who* is right, but *what* is best for the patient). –Our doctors and nurses work together as a well-coordinated team.
Job satisfaction: positivity about the work experience.	–I like my job. –This ICU is a good place to work.
Perceptions of management: approval of managerial action.	–Management supports my daily efforts in this ICU. –Management is doing a good job.
Safety climate: perceptions of a strong and proactive organizational commitment to safety.	–I would feel perfectly safe being treated here. –ICU personnel frequently disregard rules or guidelines.
Working conditions: perceived quality of the work environment and logistical support (staffing, equipment etc.).	–Our levels of staffing are sufficient to handle the number of patients. –The equipment in this ICU is adequate.
Stress recognition: acknowledgement of how performance is influenced by stressors.	–I am less effective at work when fatigued –When my workload becomes excessive, my performance is impaired.

It is possible to offer customized self-assessments to increase awareness about attitudes and perceptions relevant to the safety of selection and development regarding the contexts in which employees work.

The research and case studies confirm developing and designing a comprehensive approach encompassing leadership, culture, and stakeholder engagement to create a safety culture. The recommendation for integrating the worker personality as a component of selection and development requires organizations to focus on people beyond the typical training, process, and systems to create a safe and healthful work environment.

The cases reviewed here support the value of assessing personality to identify workers who are more likely to be involved in accidents. A worker's attentional and cognitive failures—such as lack of attention, inability to identify a tripping hazard, or misperception about a hazard's risks—can lead to unsafe behaviors as identified in the cases. Previous literature has shown that individual characteristics such as personality may affect a human's selective attention. In terms of accidents and injuries, research suggests that conscientiousness is an important trait because of individuals'

dependability in terms of following policies and protocols (i.e., employees consistently abide by safety regulations) and inherent motivation to perform safely.

This study will be helpful for the owners, contractors, project managers owners, and governmental authorities in adopting effective strategies to improve workers' health and safety, such as using personality assessments for screening and training programs.

6. CONCLUSIONS

"Construction projects are by nature long-lasting, complex, and dynamic" (Sidani et al., 2022). Accidents, injuries, and mistakes are realities of work life that cause serious injuries and death. We must plan to avoid all injuries and "near misses" in the workplace. Employers must create approaches for employees to start safely, work safely and finish safely every day (Mujtaba & Kaifi, 2023). An effective safety and health program can increase worker engagement, enhance the company's reputation, and it can allow employers to remain sustainable in today's competitive environment. Safety training programs incorporating personality assessments and providing relevant feedback to participants on their personality traits can help workers be safer on the job. Of course, the goal of any safety training program should be to keep people safe, and the following steps can be a starting point:

1. Define and communicate responsibilities and authorities for accountability.
2. Develop specific criteria and examples for workers so they can follow the procedures.
3. Assess the diverse personalities of the workforce while providing examples of risk-taking traits and how they can be effectively managed to keep everyone safe.
4. Engage all workers by allowing and empowering them to be responsible for all safety measures around them.
5. Require that workers report any safety concerns immediately.
6. Establish a process to report serious injuries within 8 hours, which must include near misses and health matters.
7. Empower workers to temporarily suspend work they feel is unsafe.
8. Provide positive reinforcement to workers who participate in safety measures.
9. Maintain an open-door policy, inviting workers to speak to managers about safety and health.
10. Give workers access to safety and health information.
11. Ensure all workers participate in safety decisions.

Based on over thirty years of authors' experience, we recommend that the mode of safety training in dangerous work settings should be face-to-face in small workshops with 20-30 employees before they initiate their jobs, to emphasize the importance of the safety, as well as to provide sufficient time for questions, discussion, and reflection. Additionally, safety training should be conducted periodically to remind everyone about keeping themselves and others safe at all costs.

The above recommendations are kept generally to be helpful for our readers and practitioners in most industries and work environments. As such, one limitation of the study is that it is not specific; thus, some elements may not apply to certain organizations. In future research, to consider the cross-cultural implications, the study could benefit from a wider analysis and research outside the United States of America, where worker behaviors, related risks and consequent accidents may vary.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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