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Employees' Burnout and Adverse Safety Performance Metrics Model (ASPMM) Solutions in High-Risk Industries

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Abstract

Globally, employee burnout has become rampant, particularly in high-risk industries. Yet, contemporary research on employee burnout and the prevalence of adverse safety incidents in high-risk industries is scarce. This study investigates employees' perceptions of burnout in high-risk industries and proposes an Adverse Safety Performance Metrics Model (ASPMM) for effective management. The key research question is: To what extent do high-risk workers agree that burnout contributes to adverse safety outcomes? Using an explanatory sequential mixed-methods design, 67 questionnaires and seven semi-structured interviews were conducted across construction, agriculture, and oil and gas industries, validated with four years of THOR archive data (2019-2022). The research data were analysed using thematic analysis and MS Excel for their descriptive statistics. Findings show that 74% of participants identified excessive workload, poor personal habits, and burnout as major contributors to adverse safety incidents. Also, organisational leadership, time, and work pressure have a significant impact on employees' burnout. The ASPMM is proposed as a proactive framework for detecting and managing burnout-related risks. Other impactful findings are reported in the conclusion section of the paper.

Keywords

Adverse Safety Incidents, Employee Burnout, High-Risk Industries

1. Introduction

The concept of a ***"burnout epidemic"*** has gained increasing attention due to its

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prevalence in high-risk industries such as construction, agriculture, and healthcare. This was acknowledged by [1] that millions of employees in diverse industries experience extreme burnout. Many scholars have examined employees' burnout from different perspectives (e.g., from stressors of employee burnout, [2] [3], and performance perspective, [4]). Although burnout has been studied in healthcare, education, and telework [5]-[7], limited research has examined its relationship with adverse safety incidents in high-risk industries.

The UK Health and Safety Executive (HSE) stated that over 16.4 million workdays were lost in 2023/2024 due to workers' stress, anxiety, or depression [8]. Similarly, the latest annual burnout report of Mental Health UK revealed that the risk of employees' burnout remains prevalent, with 9 in 10 workers experiencing high levels of pressure or stress [9]. Consequently, this study addresses this gap by assessing employees' perceptions of burnout and its impact on safety, and by proposing an Adverse Safety Performance Metrics Model (ASPMM) to manage these challenges. Thus, the study's importance stems from its awareness creation on the inherent potential of the ASPMM in providing a trusted framework for measuring employee safety performance in line with the workload. Therefore, in contemporary times, this study significantly offers compelling solutions to advance knowledge on employee burnout in high-risk work environments.

2. Literature Review

The concept of employee burnout was first introduced by Freudenberger over five decades ago in terms of physical signs and behavioural indicators [10]. Over time, burnout has been defined as a state of physical, mental, and emotional exhaustion that typically occurs when an individual experiences stress over the long term and feels under constant pressure [9]. Similarly, the American Psychological Association (APA) defined burnout as an occupation-related syndrome occurring from chronic workplace stress that has not been well managed [11].

Globally, the nature of high-risk operations requires their employees to be agile and physically and mentally fit. Unfortunately, the demands of project completion sometimes put many high-risk industry workers under huge pressure. [12] asserts that employee burnout is a wide-ranging, multi-sector phenomenon that affects the well-being of employees. However, the interest of this study is to examine employee burnout from the perspective of high-risk workers regarding the occurrence of adverse safety incidents. Besides, a typical high-risk environment is often infamous for adverse safety incidents. This view is further corroborated by the 2024/2025 report of the Health and Safety Executive (HSE), which confirmed that 58 employee fatalities occurred in high-risk industries, such as construction and agriculture [13]. Although the figure may appear small in context with the number of workers in the UK's high-risk industries, the death of one employee will be one too many.

High-risk industries in both the global North and South are renowned for their economic contribution, but also high levels of injuries and fatalities, largely due to their hazardous operations and work environment. For instance, the construc-

tion industry was classified as a high-risk industry, as it accounts for a high percentage of injuries and fatalities [13]. In the UK, high-risk industries such as construction have remained a major contributor to economic growth, with a total workforce estimated at over 1.4 million workers [14]. Perhaps the rise in the economic and infrastructure needs of many countries has led to increasing work exigencies in many high-risk industries, such as construction and agriculture. Thus, an assessment of employee burnout as a major underlying factor in the cause of persistent adverse safety incidents in high-risk industries becomes expedient.

[15] avow that once workers feel the excessive task to be a burden, physical and mental fatigue will set in and, in turn, reduce performance. [16] assert that burnout has become a global concern due to the numerous stressors associated with the stress and emotional experiences of workers. As the work demand for high-risk workers soars, employee burnout becomes inevitable and arguably, employees involved in daily site operations are the most vulnerable to burnout. Moreover, [17] asserts that most projects are fast-paced, with many site workers often required to work long and intermittent hours, which could lead to burnout. Despite the pressure on high-risk workers to deliver on projects within a specified time frame, yet, there are limited studies assessing workers' views on burnout as a trigger of adverse safety incidents in high-risk industries.

[18] suggests that high-risk workers' experiences may not only be about burnout, but the impact of burnout could lead to negative consequences. Similarly, [19] states that the demands of the high-risk construction industry raise job burnout, which adversely affects the safety performance of workers on construction sites. Also, workers' excessive workload, overtime, and an unsupportive environment can lead to work stress [20]. Scholars such as [21] have also suggested that overwhelming exhaustion, cynicism, and detachment from the job are triggers of employee burnout. Furthermore, [22] observed that burnout and work stress are due to routine and high pressure, causing exhaustion, depression, and anxiety. Also, [23] avow that unsafe behaviour and construction accidents are linked to both physical and mental exhaustion due to fatigue. [24] described the five-factor model as a primary depiction of the prominent features of the personality of workers.

Curiously, an underlying root cause factor of some of the recorded fatalities in many high-risk industries could be due to employee burnout. For instance, fatigue has been noted to lead to errors, accidents, ill health and injury and is often the root cause of major accidents in high-risk industries such as the Herald of Free Enterprise, Chernobyl, Texas City, Clapham Junction, Challenger and Exxon Valdez [25]. Also, in terms of cost, employee fatigue has cost the UK £115 - £240 million per year in terms of work accidents [25]. Succinctly put, unsafe behaviours performed by humans are usually the primary cause of accidents [26].

The establishment of safety performance metrics has been stated as not a guarantee of a timely response to critical safety issues in industries [27]. Besides, [28] asserts that many workplaces rely on traditional methods of evaluating workplace safety and often depend on lagging indicators, such as accident reports and injury

records. Similarly, [29] asserts that the Job Demands Resources (JD-R) theory can be used to outline the impact of the organisational environment on employee well-being and performance. Hence, the influence of safety leadership on different aspects of safety performance measured by workplace accidents, injuries, and fatalities is important to the organisational metric of safety outcomes [30].

3. Research Methodology

The study adopted an explanatory sequential (QUAN+QUAL) mixed-method research approach and was guided by a pragmatic paradigm. Additionally, the study is grounded in empirical data from the 4-year archive (2019-2022) of the Occupation and Health Research (THOR). [31] argues that conducting quantitative research along with qualitative research and mixed methods research helps to overcome some of the drawbacks that are peculiar to qualitative research. Therefore, to have a robust understanding of the research variables of employee burnout and adverse safety incidents in construction sites, the study adopted a mixed-method approach.

The quantitative aspect was conducted by administering a questionnaire to UK professionals working in three high-risk industries, namely agriculture, construction, and offshore oil and gas. A purposive sampling strategy was adopted based on the experience and expertise of participants on the subject and on the assumption that the sample size will be homogeneous and representative of the population of interest. [32] suggested that purposive sampling can be considered in samples where the researcher prioritises considerations for experience, knowledge, and expertise. Hence, a purposive sampling method was deemed more suitable for the study than other types of sampling strategies.

The questionnaire consists of five causal factors identified from the literature, and participants were required to select their perceived factor(s) that are responsible for adverse safety incidents. Before the commencement of the data collection, ethical approval was sought and granted by the University of East London Ethics Committee. The questionnaire was designed using MS Forms, and 70 questionnaires were distributed between February and May 2024 across the three high-risk industries of construction, agriculture, and oil and gas. 67 questionnaires were returned and properly filled with the statistical distribution as follows: Construction ($\Sigma nC = 52$), Agriculture ($\Sigma nA = 9$), Oil and Gas (Σn O&G = 6). A descriptive and inferential statistical analysis was performed using Microsoft Excel to explore and gain insights into the data.

A qualitative inquiry involved conducting a semi-structured interview with 7 professionals across the three high-risk industries considered in the study. The question attempted to elicit from participants factors that could adversely affect the safety of workers. The interview was conducted using MS Teams, and responses were transcribed verbatim and analysed using thematic analysis. To ensure the veracity of views from participants interviewed, researchers adopted a member checking technique. [33] suggests that member checking in interviews

allows participants the opportunity to confirm or correct the interviewer's interpretation of their words. Thus, participants' perceived views were substantiated with further clarifications during the interview.

The study's sample of 67 respondents and 7 interviewees was considered adequate for exploratory mixed-method research in high-risk industries. Although not statistically large, it offers sufficient diversity across the three high-risk industries considered in the study. Also, the statistical distribution broadly reflects the relative workforce sizes in each industry, enhancing the representativeness of participants. Furthermore, a pilot study and content validity of the questionnaire were adopted to ensure that the key questions were covered by the research instrument. [34] avow that the content validity of a questionnaire determines the extent to which all aspects aimed at being investigated are included in the research instrument. Additionally, the validity and reliability of both the quantitative and qualitative data were enhanced using a 4-year archive of data from the Occupation and Health Research (THOR) network, spanning 2019 to 2022 [35].

4. Findings

The study's research findings are discussed in the sub-sections as follows:

4.1. Quantitative Findings

Quantitative research shows that 74% of participants agreed that excessive workload (30%), bad personal habits (25%), and employee burnout (19%) are major contributors to adverse safety incidents in high-risk sites. The chart breakdown of participants' views of contributory factors to adverse safety incidents in the high-risk industry is shown in **Figures 1-2**. Data on participants' choices of contributory factors to employee burnout are attached in the appendix. To examine whether perceptions of burnout differed across the high-risk industries, a one-way ANOVA inferential test was performed on adverse safety incident scores, as shown in **Figure 3**. Results indicate that no significant differences occur in burnout perceptions of employees across the three high-risk industries.

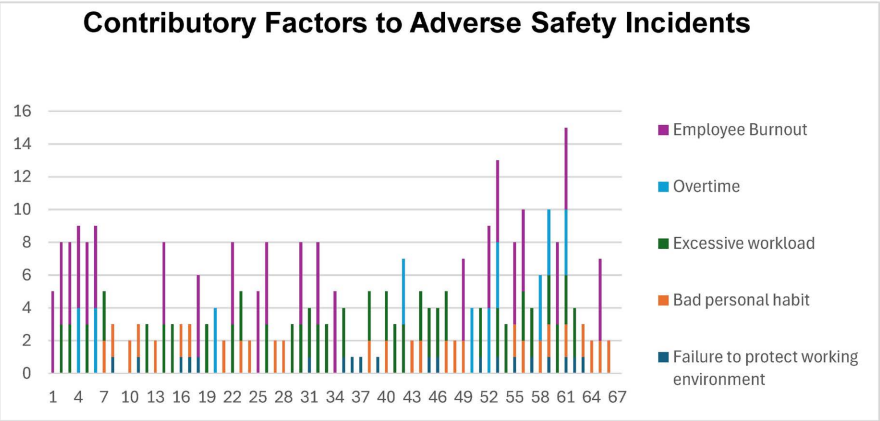

Figure 1. Study participants' views on perceived factors causing adverse safety incidents in high-risk industries.

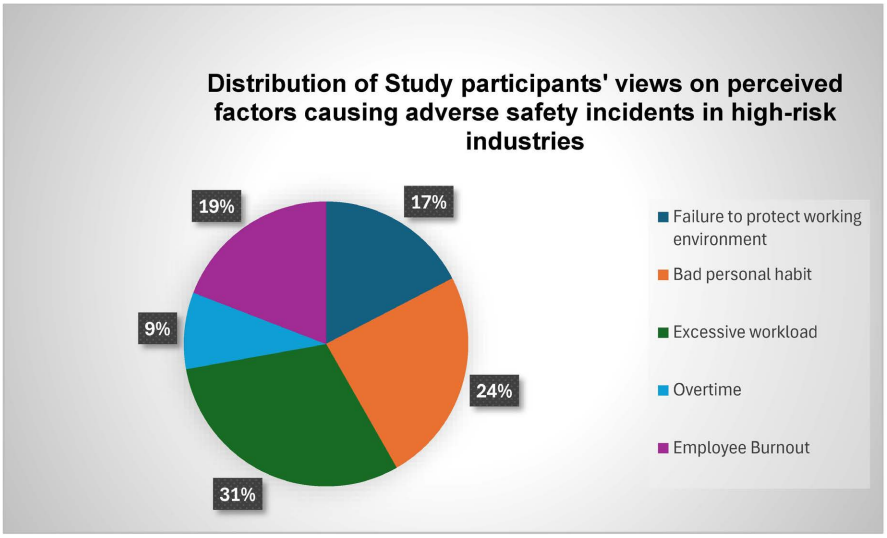

Figure 2. Percentage distribution of study participants' views on perceived factors causing adverse safety incidents in high-risk industries.

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Failure to protect working environment	67	20	0.298507	0.212573
Bad personal habit	67	56	0.835821	0.987788
Excessive workload	67	102	1.522388	2.283582
Overtime	67	40	0.597015	2.062415
Employee Burnout	67	110	1.641791	5.597015

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	91.39104	4	22.84776	10.25172	7.78E-08	2.399013
Within Groups	735.4627	330	2.228675			
Total	826.8537	334				

Figure 3. Single Factor ANOVA inferential test.

4.2. Qualitative Findings

Results from the semi-structured interviews were transcribed verbatim and analysed using thematic analysis. For better clarity, interview responses from the seven participants were trimmed. A participant ID number identified them, and key excerpts are highlighted as follows:

Have you noticed any new trends among workers that expose them to accidents?

"Yes, in construction, it can be due to the pressure from the global economy, which has been passed down from companies to the workers. Due to an increase in demand for production, an increase in demand for production has been more haste and fatigue. This makes workers prone to making mistakes, leading to safety errors. In some instances, the errors are not because of knowledge gaps; they are sometimes from mental lapse because of pressure and fatigue". **(Senior Health and Safety Manager, Process Safety. This view was expressed 6 times by P 3, 4, 5, 2, 1, 9, 10).**

How do you think adverse safety practices leading to accidents can be reduced to near 0?

"….In an organisation where there is a high workload and tight deadlines, that kind of culture will only promote adverse safety incidents. I think leadership plays a major role in this, and when there is a lack of leadership, safety suffers" **(Health, Safety & Wellbeing, Construction Manager. This view was expressed 8 times by P 2, 3, 4, 9, 5, 1, 10).**

Are there patterns among workers that expose them to accidents

"….In many organisations, the time pressure to deliver on tasks exposes workers to accidents". ***(Agriculture Executive. This view was expressed 5 times*** **by P 1, 2, 4, 5, 3, 10, 9)**

Do you think these observed pressures can be managed?

"Yes, it can be managed; however, it depends on the cause of the adverse safety. If it is an internal factor, it means that there is pressure from the company internally, such as production issues. To manage work pressures, the organisation needs to improve the psychological safety of workers". **(Senior Health and Safety Manager, Process Safety. This view was expressed 7 times by P 1, 3, 4, 10, 2, 9, 5)**

What do you think supervisors on sites can do to reduce incidents of adverse safety?

"Managers or supervisors should ensure to incentivize workers. They can be rewarded for exemplary practices. Also, site operatives can be rewarded when they come up with a good solution or they are just well-behaved on site and are considerate of the safety of their fellow workers". ***(Senior Safety Manager, Construction Industry. This view was expressed 6 times*** **by P 1, 2, 4, 3, 10, 5, 9*)***

4.3. Thematic Analysis

Thematic analysis was used to gain deeper insights into the interview data, and four dominant themes emerged: workload, time and work pressures, reward for good habits, and organisational leadership, as shown in Table 1.

Validation of Findings

The study, as shown in Table 2, used the four-year archive data obtained on request from the Health and Occupation Research (THOR) network to validate both the quantitative and qualitative findings. This is justified by the availability of the THOR data in the repository of the Health and Safety Executive (HSE) and

Table 1. Breakdown of the percentage of participants and category of people responsible for each theme.

Theme	Category of people responsible	Frequency	No. of Participants	Percentage of Participants
Workload	Workers	8	6	85.7
Time and Work Pressures	Organisation	6	5	71.4
Reward for good habits	Organisation	3	4	57.1
Organisational leadership	Organisation	5	6	85.7

the reliability of the dataset provided by the network that monitors the incidence of work-related ill-health in the UK.

Furthermore, the study harmonised the THOR variables by re-coding THOR's "precipitating event" and "factor intrinsic to job" categories with the thematic findings in Table 1, allowing direct trend comparison from 2019-2022.

Table 2. Archive Data from the Health and Occupation Research (THOR) network 2019-2022.

S/N	YEAR	Precipitating Event (Factors intrinsic to the job)	Percentage Report to OPs	Percentage Report to GPs
1	2022	Workload, Demand, Work Schedule, Poor management & Responsibilities	43	25
2	2021	Workload, Demand, Work Schedule, Poor management & Responsibilities	45	32
3	2020	Workload, Demand, Work Schedule, Poor management & Responsibilities	40	35
4	2019	Workload, Demand, Work Schedule, Poor management & Responsibilities	41	29

5. Discussion

Findings from the study reveal that excessive workload, bad personal habits, and employee burnout are of significant concern in the high-risk industries considered. Perhaps the increase in workload might be responsible for reduced work performance and missing work, which is noticeable in some high-risk industries. The result aligns with the view of [15] that a higher workload comes with a reduction in employee performance. Similarly, findings from the study's thematic analysis correlate with the archive data based on the precipitating events from factors intrinsic to the job reported to the Occupational Physicians (OPs) and General Practitioners (GPs) [35]. Also, the average percentage rate of reporting precipitating events and factors of burnout to the OPs and GPs is high at about 73%. Therefore, it can be inferred that a significant number of employees in high-risk industries are experiencing burnout because of excessive workload.

Besides, the findings also indicate that bad personal habits of employees could encourage exhaustion, and a reward for good safety habits can be its antidote. [24] alluded to the fact that some personality traits of employees, such as those with higher levels of neuroticism but reduced agreeableness, are most likely to experience job burnout. Further evidence suggests that the time and work pressures associated with high-risk operations predispose individuals to adverse safety incidents. This outcome is in tandem with [26], who opine that employees under a lot of work pressure are less likely to use safety equipment or start and report adverse

safety incidents. Thus, this shows that the contributory factors of employee burnout can be better managed at the supervisory and managerial levels of the organisation.

Consequently, the design of the Adverse Safety Performance Metrics Model (ASPMM) is in response to the quantitative and four key thematic findings of the study vis-à-vis organisations' expectations and workers' reactions. The proposed Adverse Safety Performance Metrics Model (ASPMM), as shown in **Figure 4**, is novel and designed to provide a timely measure that would enable the manager or safety supervisor to take note of employee safety performance progress in line with the workload. As the findings have shown, organisational leadership plays a significant part in adverse safety incidents. [30] affirms that the impact of safety leadership on different aspects of safety performance is important to the organisational metrics of measuring safety outcomes. Thus, with the ASPMM, it is envisaged that the implementation of the model will propel proactive measures, identify emerging predisposing behaviours during safety training and toolbox meetings, and manage possible causes that could lead to employee burnout in high-risk industries. Also, each ASPMM component is theoretically grounded. Workload monitoring aligns with the Job Demands–Resources (JD-R) model, where excessive job demands influence burnout [29]. Leadership actions correspond with safety-leadership theory emphasising transformational and participative behaviours [30]. Reward systems reflect reinforcement theory, suggesting that recognition of safe behaviours strengthens compliance and engagement. Together, these create a feedback mechanism linking human and organisational factors in safety outcomes.

Proposed Adverse Safety Performance Metrics Model (ASPMM) for High-Risk Industries

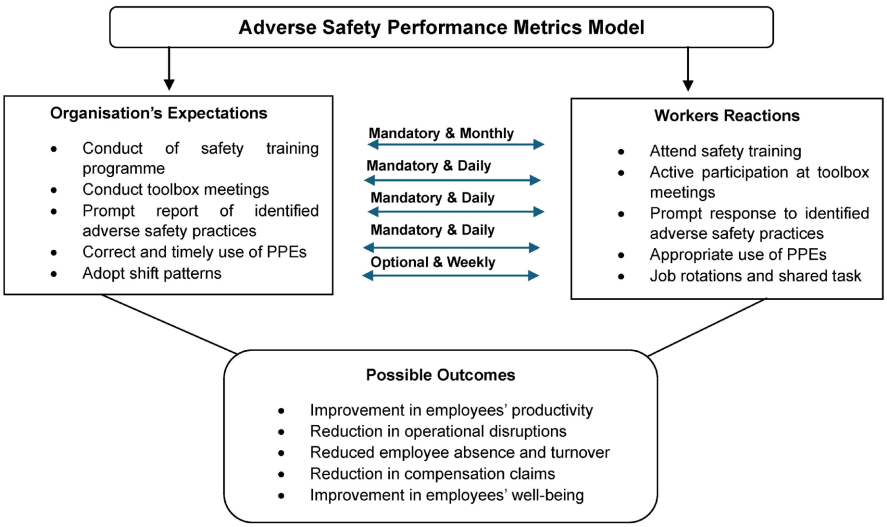

Figure 4. Proposed adverse safety performance metrics model (ASPMM) for high-risk industries (Researcher's idea).

Similarly, it is envisaged that using the ASPMM will allow managers and super-

visors to effectively track the workload of workers and adopt a flexible shift pattern and job rotation. Although [27] argues that establishing safety performance metrics will not always guarantee a prompt response to critical safety issues, however, the proposed Adverse Safety Performance Metrics Model (ASPMM) shows promise in proactively identifying and managing employee burnout in high-risk industries. The model is expected to detect unsafe working conditions early, unlike traditional models that often fail to capture real-time safety conditions [28]. Additionally, the ASPMM provides a timeframe for workers to react to organisational expectations, allowing for better management of unforeseen adverse incidents.

6. Conclusion

Employee burnout undeniably exists in high-risk industries, particularly among site operatives. 74% of study participants agreed that the main causes of employee burnout in high-risk work environments are workload, bad personal habits, and time pressure to deliver on projects. Study findings also revealed that employee burnout is a leading contributor to adverse safety incidents in high-risk industries. Hence, safety outcomes in high-risk projects can be positively influenced when workload and pressures are properly managed. Perhaps the findings will make more managers and supervisors conscious of the implications of excessive workload in accident causation. This study demonstrates that burnout significantly contributes to adverse safety incidents in high-risk industries. The proposed ASPMM offers a novel framework for proactively identifying and mitigating burnout-related risks. Future research should validate the ASPMM with a larger sample across diverse industries.

Limitation

From an analytical comparison perspective, the study was limited by its inability to obtain data from major high-risk companies and had to rely on small and medium-scale companies. Also, the results may be affected by common-method bias. Future research could mitigate this by triangulating survey responses with objective indicators such as incident logs or fatigue data.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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