

# Investigating the Influence of Stress on Occupational Safety Risks Among Construction Workers: A Scoping Review

Endah Kumala Dewi<sup>1</sup>, Ayu Kurnia<sup>2\*</sup>, Aprilia Kusuma Putri<sup>3</sup>, Dita Indah<sup>4</sup>

{[endahkumaladewi@lecturer.undip.ac.id](mailto:endahkumaladewi@lecturer.undip.ac.id)<sup>1</sup>, [ayukurnias@ump.ac.id](mailto:ayukurnias@ump.ac.id)<sup>2\*</sup>,  
[apriiakusumaputri@gmail.com](mailto:apriiakusumaputri@gmail.com)<sup>3</sup>, [ditaindah@gmail.com](mailto:ditaindah@gmail.com)<sup>4</sup>}

Universitas Diponegoro, Jl. Prof. Soedarto No.13, Tembalang, Kec. Tembalang, Kota Semarang, Jawa Tengah 50275<sup>1</sup>; Universitas Muhammadiyah Purwokerto, Jl. KH. Ahmad Dahlan, Dusun III, Dukuhwaluh, Kec. Kembaran, Kabupaten Banyumas, Jawa Tengah 53182<sup>2\*</sup>; Universitas Diponegoro, Jl. Prof. Soedarto No.13, Tembalang, Kec. Tembalang, Kota Semarang, Jawa Tengah 50275<sup>3</sup>; Universitas Diponegoro, Jl. Prof. Soedarto No.13, Tembalang, Kec. Tembalang, Kota Semarang, Jawa Tengah 50275<sup>4</sup>

**Abstract.** Numerous studies have extensively discussed the correlation between job stress and workplace safety. Conversely, investigations into stress suggest that it can yield not just adverse outcomes (distress) but also beneficial effects (eustress). This research aims to explore the various impacts of stress on the health and occupational safety of construction workers, as well as the most commonly experienced types of stressors. This research employs a scoping review design technique. The main database sources used in this study are Science Direct, SpringerLink, Jstor, Ebsco, ProQuest, PubMed, Eric, Portal Garuda, Emeraldinsight, and Google Scholar. Data synthesis in this research will utilize the narrative synthesis method. The research findings show that 13 articles, accounting for 92.8% of the total, indicate that stress has a negative effect on health and occupational safety. Construction workers face various stressors, including emotional stressors like job pressure and physical stressors such as heat stress, hindrance stressors, and noise. This scoping review has highlighted the significant influence of stress on occupational safety risks among construction workers. Through continued research and implementation of effective strategies, the construction industry can better safeguard its workforce, ultimately leading to enhanced productivity and reduced incidence of work-related injuries and accidents.

**Keywords:** Cross-cultural adaptation; validation; benevolent childhood experiences

## 1 Introduction

Research on the safety of construction workers has been extensively conducted [1] and often linked to high rates of workplace accidents and fatal injuries [2]. In 2019, the construction industry in Korea reported 517 cases of fatal injuries due to workplace accidents [2]. Additionally, in 2018, the U.S. construction industry reported 1,038 fatal workplace accidents,

accounting for over 19% of total work-related deaths [2]. Despite significant technological advances and management practices in the construction industry, accidents frequently occur due to unsafe working conditions, particularly related to worker behavior [3]. Construction workers represent one of the largest labor forces globally. In 2022, there were 2.69 million construction workers in the UK, 1.18 million in Australia [4]. More specifically in Southeast Asia, there were 97.7 thousand construction workers in Singapore, 1.71 million in Indonesia, 4.4 million in Vietnam, and 1.38 million in Malaysia [4,5].

Supporting factors for construction workers' safety awareness include education and training [6]. Workers with lower educational backgrounds often have poorer understanding of safety theories, resulting in inadequate safety knowledge and risk prevention abilities [6]. Additionally, the level of prosocial behavior or cooperation among workers also contributes to their safety [7]. This occurs because personal factors influence individuals' awareness and openness to change [8]. Moreover, workers with high proactivity exhibit better safety performance as they take more initiative to participate in safety education and training [9].

Stress among construction workers is a significant issue [10]. In Indonesia, 52.7% of construction workers experience moderate stress, 21.8% experience severe stress, and 25.5% experience mild stress [10]. This marks an increase from previous research by Widyastuti [11], which indicated that 33.33% of construction workers experienced severe stress. In Australia, 28% of construction workers exhibit high levels of stress [12]. In Gandhinagar, Gujarat, India, 2.1% of participants reported "extreme stress" and 85.4% reported "high stress" [13]. Furthermore, according to a survey conducted by Evans [14] among over 2,000 construction industry professionals in the UK, 97% of construction workers experienced stress in the past year.

Numerous studies have reported on the relationship between job stress and safety outcomes [15]. Job stress encompasses both physical and emotional stress [16]. Workers experiencing job stress are twice as likely to have workplace accidents compared to those without job stress [17]. Research by Alsulami et al. [18] indicates that workers may feel highly stressed due to unsafe job tasks, coupled with poor communication and working conditions, increasing their susceptibility to workplace accidents. Construction workers, often positioned at the bottom levels of nearly every construction project, frequently experience stress due to directives from their superiors [19]. This situation sometimes leads workers to deprioritize their safety while focusing more on task completion efforts [20]. Additionally, Leung et al. [21] suggest that physical stress correlates negatively with safety behavior. Construction workers also face heat stress, increasing their vulnerability to serious accidents such as falls or being struck by falling objects, leading to fatalities [2].

On the other hand, studies on stress not only highlight its negative impacts (distress) but also recognize its potential positive effects (eustress) [22]. Psychology and sociology view eustress as closely related to positive perceptions and cognitive enhancement, while biomedical perspectives generally associate eustress with better survival, health, or increased longevity [22]. Stressors from superiors significantly impact work productivity [19]. This is because stressors can serve as external motivation for workers [19].

A comprehensive understanding of stress among construction workers needs to be examined to formulate appropriate policies for its management [22]. To date, there has been no research mapping the various impacts of stress on construction workers, as well as the most prevalent

forms of stress experienced by them. This study aims to explore the various health and safety impacts of stress on construction workers, along with the most commonly perceived stressors.

## 2 Method

### 2.1 Participants

The inclusion criteria for participants in this study are construction workers from around the world.

### 2.2 Research Questions

The research questions in this study are:

- a. What are the impacts of stress on the health and safety of construction workers?
- b. What are the most commonly perceived types of stressors among construction workers?

### 2.3 Inclusion and Exclusion Criteria for Selected Articles

This stage is conducted to determine the eligibility of data used in the study. The inclusion and exclusion criteria for articles in this research are outlined in Table 1.

**Table 1.** Inclusion and Exclusion Criteria for Selected Articles

Criteria	Inclusion	Exclusion
<b>Language</b>	Research articles written in English or Indonesian	Research articles written in languages other than English or Indonesian
<b>Year of Publication</b>	Research articles within the last 10 years (2014-2024)	Research articles not within the last 10 years (before 2014 and after 2024)
<b>Type of Publication</b>	Research articles and published	Apart from research articles (theses, dissertations, conference papers, books, handbooks, book chapters, papers, opinions, and so on) or grey literature and unpublished works
<b>Research Method</b>	Primary Research (Quantitatif, Qualitatif, or <i>mixed method</i> )	Secondary Research ( <i>literature review, narative review, scoping review</i> )
<b>Accessibility</b>	Open Access	Inaccessible research journals

### 2.4 Search Strategy

The primary databases used in this study include ScienceDirect, SpringerLink, JSTOR, EBSCO, ProQuest, PubMed, ERIC, Portal Garuda, Emerald Insight, and Google Scholar. The selection of these databases was based on their accessibility for easy retrieval. Secondary data sources were obtained through hand searching, complemented by Google as a supplementary base for primary databases.

Literature selection in this research was facilitated by the Mendeley Desktop and Mendeley Web Importer applications. The selection process followed the PRISMA 2009 flow diagram, which includes identification, screening, eligibility assessment, and inclusion. This study employs

specific search terms aimed at finding research results relevant to its objectives. Additionally, it utilizes Boolean search operators AND and OR. Table 2 illustrates the search terms used in this research.

**Table 2.** Keywords in the search

<b>Language</b>	<b>Main Keywords</b>	<b>Alternative Supporting Keywords</b>
English	Construction Worker	Builder, Carpenter, Blacksmith, Mason, Foreman,
	Stress	Psychological Pressure Pressure
	Occupational Health and Safety	K3
	Construction Industry	-
Indonesian	<i>Pekerja Konstruksi</i>	<i>Tukang Bangunan, Tukang Kayu, Tukang Besi, Tukang Batu, Mandor</i>
	<i>Stress</i>	<i>Tekanan Psikologis</i>
	<i>Kesehatan dan Keselamatan Kerja</i>	<i>Tuntutan Pekerja</i>
	<i>Industri Konstruksi</i>	K3
		-
<i>Keyword with boolean search operator</i>	English: (“Construction Worker” OR “Builder” OR “Carpenter” OR “Blacksmith” OR “Mason” OR “Foreman”) AND (Stress OR “Psychological Pressure” OR Pressure) AND (“Occupational Health and Safety” AND Construction Industry)	
	<i>Indonesian: (“Pekerja Konstruksi” OR “Tukang Bangunan” OR “Tukang Kayu” OR “Tukang Besi” “Tukang Batu” OR “Mandor”) AND (Stres OR “Tekanan Psikologis” OR Tekanan) AND (“Kesehatan dan Keselamatan Kerja” AND Industri Konstruksi)</i>	

## 2.5 Data Collection

Data collection involves creating a list or chart to extract data from relevant studies related to the research questions, using tables or diagrams. The information considered relevant depends on the research questions and topics. The extracted information typically includes details related to inclusion criteria and covers various aspects of the research, such as the title of the study, year of publication, participant details, study location, research objectives, methods, and findings. Data extraction is performed by four individuals to minimize errors and reduce potential biases.

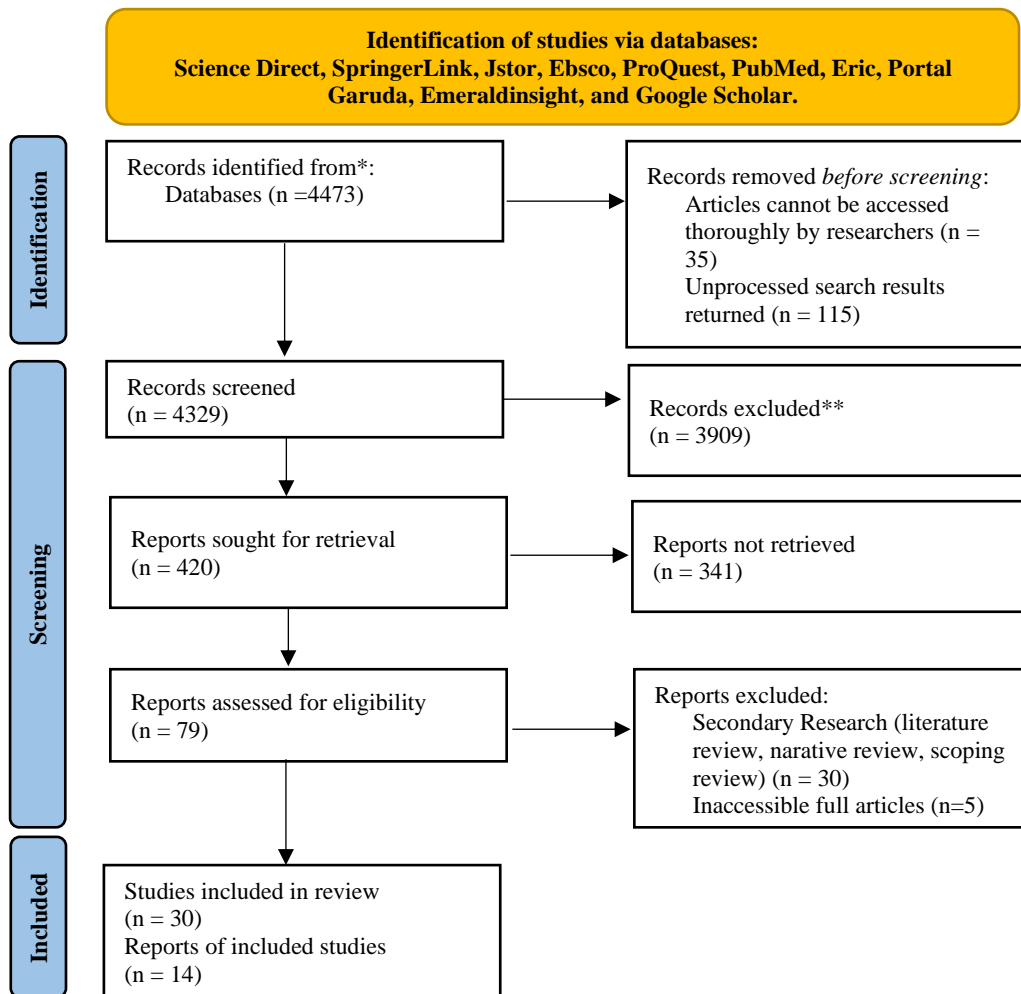
## 2.6 Synthesis of The Result

The synthesis of data in this study will utilize a narrative synthesis method. The synthesis will be adapted to review literature of various types, including quantitative, qualitative, and mixed methods. The synthesis process will be aided by using tables or diagrams to map and sort through various research issues and questions.

## 3 Result

The article retrieval process took place between May 1, 2024, and June 30, 2024, resulting in a total of 4,473 articles. These articles underwent screening based on their titles, abstracts, keywords, and full texts, leading to the identification of 79 articles. Further selection was then

conducted according to the study's inclusion criteria. By July 15, 2024, 68 articles were excluded: 15 were secondary studies, 50 did not fully meet all study variables, and 3 involved subjects that differed from those specified in the study criteria. Ultimately, 14 relevant articles were identified that aligned with the research objectives. The process and outcomes of the article search are depicted in Figure 1.



**Fig. 1.** Architecture of a typical wireless sensor node.

Figure 1 illustrates the systematic process of article selection. Initially, 79 articles were identified focus discuss of the effect of stress on construction worker in industrial construction, but only 14 met the selection criteria and were analyzed following PRISMA guidelines. The results of this analysis are summarized in Table 3. Table 3 synthesizes the findings from all the research articles. The synthesis indicates that 13 articles (92.8%) suggest stress negatively impacts health and safety at work, while one article specifically found no significant relationship between job stress and hypertension among construction workers [23]. The stressors experienced by construction workers include emotional stressors such as pressure from job

demands or social stressors [24], and physical stressors such as heat stress [25, 26], hindrance stressors [27], and noise [28].

In more detail, the articles provide the following findings: Zheng et al. [27] discovered that challenge and hindrance stressors are positively associated with workplace accidents. Huang et al. [15], Hussen et al. [29], Gordon & Lyn [30], and Yuliani et al. [31] found significant contributions of job stress to workplace accidents. Leung et al. [21] identified a relationship between stress and workplace accidents, with women experiencing higher stress levels and injuries compared to men. Dreher et al. [24] highlighted that social stressors lead to health complaints, particularly headaches (68.3%), colds (55.3%), and back pain (50.7%). Elshaer, Meleis & Mohamed [28] observed that 71% of workers exposed to noise stress suffer from hearing impairments. Petropoulos et al. [25] emphasized that heat stress and heat strain impact workplace safety. Calkins et al. [26] concluded that outdoor heat exposure increases the risk of traumatic injuries in workers. Jung et al. [32] indicated that work environment and occupational stress influence safety behavior. Their study also revealed that job demands, lack of job control, lack of recognition, and organizational injustice negatively affect safety behavior. These comprehensive findings from the 14 articles illustrate various aspects of how stress and stressors influence the health, safety, and behaviors of construction workers.

**Table 3.** Syntesis Result

No	Title	Year of Publication	Writers	Research Participant	Research Location	Research Aims	Research Methode
1	Linking Challenge–Hindrance Stressors to Safety Outcomes and Performance: A Dual Mediation Model for Construction Workers	2020	Junwei Zheng, Xueqin Gou, Hongyang Li, Xong Xue, Hongtao Xie	105 safety supervisors and 379 construction workers in China.	China	The objective of this study is to investigate the relationship between challenge stressors and hindrance stressors on the task performance of construction workers through safety outcomes (i.e., workplace accidents).	Multi-source data over two timepoints (questionnaire survey)
2	Relationships between Social Support, Social Status Perception, Social Identity, Work Stress, and Safety Behavior of Construction Site Management Personnel	2021	Ying-Hua Huang, Chen-Yu Sung, Wei Tong Chen, Shu-Shun Liu	287 management personnel at construction industry sites in Taiwan.	Taiwan	This study explores the relationship between job stress, safety behaviors, professional identity, perception of social status, and social support among personnel in construction site management.	Structural equation modeling (SEM)
3	Factors Associated with Occupational Injury among Hydropower Dam Construction Workers, South East Ethiopia, 2018	2018	Jemal Hussen, Henok Dagne, Dawit Getachew Yenealem	405 construction worker Genale Dawa hydropower dam	Ethiopia	This research was conducted to determine the prevalence and factors associated with workplace accidents among construction workers at the Genale Dawa Hydroelectric Dam.	Institutional-based cross-sectional study
4	Nonfatal Occupational Injuries among Workers in Microscale and Small-Scale Woodworking Enterprise in Addis Ababa, Ethiopia	2020	Hailemichael Mulugeta, Yifokire Tefera, Meaza Gezu	634 workers from 194 micro and small-scale carpentry enterprises in Addis Ababa.	Addis Ababa	The objective of this study is to estimate the prevalence of injuries and associated contributing factors within this sector.	A cross-sectional study
5	Usia, Aktivitas Fisik, Stress Pekerja Dan Obesitas Berisiko Terhadap Kejadian Hipertensi	2017	Ira Marti Ayu, Decy Situngkir, Dwi Apriliawati	Employees at PT Pulauintan Bajaperkasa	Jakarta	The objective of this study is to analyze the factors associated with the incidence of hypertension	Cross sectional study

	Pada Pekerja di PT Pulau Intan Baja Perkasa Konstruksi Jakarta Tahun 2017			Construction in Jakarta.		among workers at PT Pulauintan Bajaperkasa Construction in Jakarta in the year 2017.	
6	Impact of Job Stressors and Stress on the Safety Behavior and Accidents of Construction Workers	2016	Mei-Yung Leung, Qi Liang, Paul Olomolaiye	Construction Worker on Cina	China	This study aims to investigate the relationship between job stress, stress, safety behavior, and accidents.	Statistical tools
7	The Relationship between Work-Life Balance, Stress, and Injury in Construction Trade Workers	2019	Gordon, Leanna Lyn	291 Construction workers in the State of Washington.	Washington State	This study aims to investigate the relationship between work-life balance, stress, and injuries among construction trade workers, aiming to inform policy changes that promote a safe working environment for employees.	Cross-sectional analysis
8	Hubungan antara Pengetahuan, Penerapan Prosedur Kerja, Punishment dan Stres Kerja terhadap Safety Behavior pada Pekerja Konstruksi di PT X [The relationship between Knowledge, Implementation of Work Procedures, Punishment, and Job Stress on Safety Behavior among Construction Workers at PT X.	2021	Muthia Yuliani, Ida Wahyuni, Ekawati	60 construction worker	Tidak disebutkan	This study aims to analyze the relationship between knowledge, implementation of work procedures, punishment, job stress, and safety behavior.	Cross-sectional Study
9	Hubungan antara Stres Kerja dengan Kecelakaan Kerja pada Pekerja Bagian Bekisting PT Konstruksi X di Kota Semarang	2019	Muhammad Miftah Farid, Siswi Jayanti, Ekawati	70 construction worker Bekisting X on Semarang	Semarang	This study aims to analyze the relationship between job stress and workplace accidents.	Cross-sectional Study
10	Social stressors and social resources at work and their association with self-reported health complaints among ready-made garment workers in	2022	Annegret Dreher, Rita Yusuf, Hasan Ashraf, Syed A. K. Shifat Ahmed, Christian Strümpell & Adrian Loerbroks	1.118 garment workers in Dhaka, Bangladesh	Bangladesh	This study aims to measure the psychosocial conditions of garment workers, including the stress they experience, and its relationship with workers' health.	Cross-sectional Study



	Bangladesh: a cross-sectional study						
11	Prevalence and correlates of occupational noise-induced hearing loss among workers in the steel industry	2023	Noha Elshaer, Dorria Meleis & Abdelrahman Mohamed	606 Steel factory workers in Egypt	Mesir	This study aims to examine the influence of noise stress on hearing impairments among workers.	Quantitatif research
12	Heat stress and heat strain among outdoor workers in El Salvador and Nicaragua	2023	Zoe E Petropoulos , Sinead A Keogh , Emmanuel Jarquín , Damaris López-Pilarte , Juan José Amador Velázquez , Ramón García-Trabanino , Magaly Rosario Amador Sánchez , Raúl Guevara , Alexa Gruener , Dustin R Allen , Jessica H Leibler , Iris S Delgado , Michael D McClean , David J Friedman , Daniel R Brooks , Madeleine K Scammell	569 outdoor workers on El Salvador and Nicaragua	El Salvador dan Nicaragua	This study aims to investigate the levels of heat stress experienced by outdoor workers in five industries in El Salvador and Nicaragua and its association with occupational health and safety (K3) practices.	Quantitatif research
13	A case-crossover study of heat exposure and injury risk among outdoor construction workers in Washington State	2019	Miriam M Calkins, David Bonauto, Anjum Hajat, Max Lieblich, Noah Seixas, Lianne Sheppard, June T Spector	1005 construction worker	Washington	This study aims to assess the relationship between heat stress and traumatic work injuries among construction workers.	Case-crossover study
14	Impact of work environment and occupational stress on safety behavior of individual construction workers.	2020	Minhyuk Jung, Soram Lim, dan Seokho Chi	399 Construction workers working at 29 construction sites in South Korea.	Korea selatan	This study aims to investigate how the work environment and psychological conditions influence the perceptions and safety behaviors of construction workers.	Quantitative research utilizing Structural Equation Modeling (SEM) to examine the relationships among variables in the model.

## **4 Discussion**

This research seeks to investigate the diverse effects of stress on the health and safety of construction workers, as well as the prevalent stressors they typically experience.

### **4.1 The impact of stress on the health and safety of construction workers**

The research findings reveal that 13 articles, or 92.8% of the articles, indicate that stress negatively impacts the health and safety of workers. The stressors experienced by construction workers encompass emotional stressors such as pressure from job demands or social stressors [24], and physical stressors including heat stress [25,26], hindrance stressors [27], and noise [28].

Previous studies have identified several factors linking stress to workplace safety: (1) physiological and psychological effects of stress, as continuous stress triggers physiological responses such as increased levels of stress hormones (e.g., cortisol) and activation of the autonomic nervous system. This can lead to sleep disturbances, weakened immune systems, and increased risks of cardiovascular diseases, as well as psychological disorders such as depression and anxiety [33]. (2) Reduced focus and concentration on tasks, which in turn can increase the risk of accidents and human errors in the workplace [34]. (3) Risky behaviors and poor decision-making. Stress can impair an individual's ability to make rational decisions and reduce compliance with safety procedures in the workplace, potentially resulting in more risky behaviors and a lack of understanding of safety consequences [35, 36]. (4) Stress-inducing work environments, such as noise, time pressure, and high job demands, can increase fatigue levels and worker frustration. This may reduce alertness and reactions to emergency situations or safety-threatening conditions [37, 38].

The findings of this study, particularly the article by Ayu et al. [23], indicate that there is no significant relationship between job stress and hypertension among construction workers. This outcome may be attributed to other factors such as variability in workplace conditions and environments, which can have different impacts on stress levels and cardiovascular health [39]. Additionally, there is a possibility that other factors influence the relationship between job stress and hypertension, such as dietary patterns, physical activity, or family medical history. However, Ayu et al. [23] did not extensively explore the specifics of work conditions and the work environment at the research site, namely PT Pulauantan Bajaperkasa Konstruksi Jakarta.

### **4.2. Types of stressors experienced by construction workers**

The types of stressors experienced by construction workers include emotional stressors such as pressure from job demands or social stressors, as well as physical stressors like heat stress, hindrance stressors, and noise.

Dreher et al. [24] emphasized that social stressors contribute to health issues, notably headaches (68.3%), colds (55.3%), and back pain (50.7%). Social stressors in the context of industrial psychology refer to psychological pressure arising from social interactions or interpersonal relationships in the workplace. Common forms of social stressors experienced by construction workers include interpersonal conflicts among individuals or groups, ambiguity regarding job

roles and responsibilities, isolated working environments, remote locations or extreme weather conditions, and workers' perceptions of unfairness in decision-making, recognition, or fair treatment by management or supervisors. However, the study by Dreher et al. [24] is limited by participants self-assessing their physical health conditions without clear indicators, highlighting the need for further research improvement.

Physical stressors identified in this study include heat stress [25,26], hindrance stressors [27], and noise [28]. Calkins et al. [26] concluded that exposure to outdoor heat increases the risk of traumatic injuries among workers. Furthermore, Elshaer, Meleis & Mohamed [28] observed that 71% of workers exposed to noise stress suffer from hearing impairments. Construction workers are often exposed to high levels of heat at their work sites, particularly during summer or in tropical regions [40]. Excessive heat can lead to various health issues such as dehydration, heat fatigue, and even heat stroke. Moreover, excessive heat can impair workers' concentration and mental sharpness, thereby increasing the risk of workplace accidents [40].

Hindrance stressors encompass various obstacles or challenges that hinder workers from effectively completing their tasks [41]. Examples include strict regulations, inflexible policies, or organizational constraints that slow down workflow. Hindrance stressors can reduce worker motivation and productivity, as well as increase levels of fatigue and stress [41]. Regarding noise stressors, it is reported that construction workers are often exposed to high levels of noise, especially at work sites involving heavy machinery and noisy equipment. This noise exposure can lead to long-term hearing impairments, stress, sleep disturbances, and communication difficulties. These conditions not only disrupt workers' physical health but can also diminish their alertness to hazards around the workplace [42].

## 5 Conclusion

This scoping review has emphasized the considerable impact of stress on occupational safety hazards among construction workers. These workers encounter diverse stress factors, such as emotional stress from job pressures and physical stress like heat stress, hindrance stressors, and noise. By advancing research and employing effective strategies, the construction industry can improve the protection of its workforce, thereby boosting productivity and decreasing the occurrence of work-related injuries and accidents.

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