Wellsafe : Journal of Applied Non-Clinical Health Sciences
Volume 01 Issue 01 2025
DOI :
Website : https://journal.ekantara.com/wellsafe

Effectiveness of Occupational Health and Safety Education Programs in Improving Healthy Living Behaviors of Industrial Workers: Literature Review

Mukhayatun Sholehah[1]*
[1]STIKES YKY Yogyakarta
*Authors Correspondence: mukhayatunsholehah4@gmail.com

ARTICLE INFO

Article History:
Received
Accepted
Published online

Keywords:
Keyword 1;Occupational Health and Safety
Keyword 2;Education Programs
Keyword 3;Industrial Workers
Keyword 4;Healthy Living Behaviors
Keyword 5;Workplace Health Promotion

Occupational health and safety (OHS) education is increasingly critical as industrial workers face multiple hazards affecting both safety and well-being. This narrative review synthesizes recent evidence on the effectiveness of OHS education in improving healthy living behaviors among industrial workers. Literature was searched in PubMed, ScienceDirect, SpringerLink, Google Scholar, and SINTA-indexed journals for studies published between 2020 and March 2025. A total of 23 eligible studies were included and analyzed across four domains: effectiveness, behavioral outcomes, enablers, and barriers. Overall, OHS education consistently enhanced workers' knowledge, awareness, and compliance with safety practices, while promoting healthier behaviors including improved diet, greater physical activity, smoking cessation, stress management, and sleep quality. Short-term gains were common; however, sustainability depended on program quality, managerial reinforcement, and supportive organizational culture. International evidence demonstrated sustained outcomes when OHS education was integrated with workplace health promotion, leadership commitment, and policy support. In contrast, Indonesian studies highlighted contributions to Clean and Healthy Living Behavior but revealed gaps in longitudinal evaluation and organizational-level determinants. This review employed a narrative literature review design, including peer-reviewed journal articles retrieved from international and national repositories. Studies focusing solely on technical or engineering aspects of occupational safety without behavioral outcomes were excluded. Findings indicate that OHS education is an effective pathway to integrate accident prevention with health promotion, provided it is theory-driven, contextually adapted, and reinforced institutionally. Future programs should incorporate continuous managerial involvement, policy integration, cost-effectiveness evaluation, and innovative delivery methods—such as digital and co-created approaches—to ensure long-term impact.

INTRODUCTION

Occupational health and safety (OHS) education has become a global imperative as industrial workers continue to face substantial risks. The International Labour Organization (ILO) reports that approximately 2.93 million workers die each year due to occupational accidents and diseases, while 395 million experience non-fatal work-related injuries [1]. These figures underscore the persistent global public health challenge posed by occupational hazards. OHS education is widely recognized as a sustainable strategy to mitigate these risks by combining technical training with health promotion, enabling workers to adopt safer practices and healthier lifestyles beyond the workplace [2].

Globally, policy frameworks have shifted OHS education from compliance-based requirements toward integrated approaches that combine accident prevention with the promotion of healthy living. The Total Worker Health® initiative developed by NIOSH exemplifies this model, aiming to protect worker safety while simultaneously fostering well-being [3]. A systematic review by Javanmardi et al. (2025) confirmed that workplace health promotion programs for industrial workers demonstrate promising—though heterogeneous—effects on safety and health outcomes, warranting cautious optimism and further investigation [4]. Evidence from the Total Worker Health framework also supports improvements in safety practices alongside enhancements in worker well-being [5].

In developed economies, OHS education is often embedded within organizational culture and reinforced by strong regulatory systems, producing measurable long-term impacts. Evidence from lower-middle-income countries shows that workplace health promotion interventions can effectively reduce health risks across industries, including resource-limited settings such as small enterprises and the manufacturing sector [6]. This contrast highlights the need to evaluate how OHS education can be implemented in diverse contexts, particularly in environments where occupational hazards remain high. In Indonesia, occupational safety and health (OSH) remains a pressing challenge. Data from the Employment Social Security Agency (BPJS Ketenagakerjaan) recorded an increase in workplace accidents from 221,740 cases in 2020 to 234,370 in 2021, resulting in more than 6,500 deaths. To address these issues, the Ministry of Manpower, with support from the ILO, launched the 2022 National OSH Profile to strengthen national policies and promote a stronger safety culture across industries [7]. Despite these efforts, significant implementation challenges persist. Large companies are generally better positioned to comply with OSH standards, while small and medium enterprises (SMEs) often lack the capacity to provide structured training [8]. As a preventive measure, some institutions have implemented Occupational Safety and Health Management Systems (OSHMS) through formal policies, socialization, and infrastructure development [9]. However, gaps remain between regulations and workplace practices, particularly in labor-intensive sectors such as construction, manufacturing, and food processing.

Local studies confirm that OHS education can influence behavioral outcomes. Research on SMEs in Indonesia found that applying Behavior-Based Safety (BBS) approaches revealed significant gaps in safety performance, with unsafe behaviors still prevalent [10]. Long-term evaluations also show that BBS interventions can strengthen compliance and reduce serious injuries when consistently reinforced [11]. Broader reviews further suggest that while measuring the effectiveness of OHS interventions remains challenging, programs co-developed with stakeholders and supported by technology show promising results [12].

In education, innovative approaches are emerging. Expanding OHS and well-being education into non-OSH undergraduate curricula demonstrates the potential of transformational learning models [13]. Similarly, integrating OSH training into school curricula highlights the importance of developing safety awareness and culture early in life [14].

Despite these encouraging findings, sustaining long-term improvements remains difficult. Evidence consistently indicates that knowledge and compliance often improve in the short term, but diminish without reinforcement, managerial commitment, and supportive organizational culture [15]. Longitudinal studies also show that strong OSH practices have a significant long-term impact on productivity, reinforcing the importance of embedding OHS into organizational systems [16]. These findings align with global evidence underscoring the need for integrated, context-specific OHS education programs that promote lasting behavioral change.

In light of these issues, OHS education plays a dual role in preventing occupational accidents and promoting healthier lifestyle behaviors among industrial workers. However, its long-term success depends heavily on organizational, cultural, and structural factors. Therefore, this literature review synthesizes evidence from 23 peer-reviewed studies published between 2020 and March 2025, focusing on the effectiveness of OHS education programs in improving healthy living behaviors among industrial workers, with particular attention to both short-term and long-term outcomes.

MATERIAL AND METHOD

This study employed a narrative literature review design to evaluate the effectiveness of occupational health and safety (OHS) education programs in improving healthy living behaviors among industrial workers. The review included peer-reviewed journal articles published between January 2020 and March 2025, retrieved from international databases (PubMed, ScienceDirect, SpringerLink, Google Scholar) and national repositories (SINTA-indexed Indonesian journals). A total of 23 articles met the inclusion criteria after screening for relevance to OHS education and health behavior outcomes, including dietary practices, physical activity, smoking reduction, stress management, and sleep hygiene. Studies focusing solely on technical or engineering aspects of occupational safety without behavioral outcomes were excluded. The selected studies were synthesized narratively and categorized into four thematic domains: (1) effectiveness of OHS education programs, (2) health-related behavioral outcomes, (3) enabling factors for implementation, and (4) barriers and limitations. As this review was based exclusively on secondary sources, ethical approval was not required.

RESULTS

This review identified 23 peer-reviewed studies published between 2020 and March 2025 that examined occupational health and safety (OHS) education and workplace health promotion programs in relation to healthy living behaviors among industrial workers. The studies came from diverse contexts, including manufacturing, construction, food processing, semiconductor, and public sector organizations, as well as multi-sectoral reviews. Research designs ranged from randomized controlled trials (RCTs), cluster evaluations, and cohort studies to systematic reviews, umbrella reviews, and integrative reviews.

Across these studies, two primary objectives were identified: (1) to evaluate the effectiveness of OHS education and training in improving knowledge, compliance, and worker awareness, and (2) to assess their role in promoting healthier lifestyle behaviors such as physical activity, dietary improvement, smoking cessation, stress management, and sleep quality. Most studies demonstrated clear short-term benefits—notably enhanced knowledge, stronger adherence to safety and health practices, and higher motivation. However, evidence on long-term sustainability was mixed, with many studies indicating that improvements diminished without continuous managerial reinforcement, supportive organizational culture, or policy integration

Findings from international reviews (e.g., Javanmardi et al., 2025; Barati Jozan et al., 2023; Vitrano, 2024) consistently showed that integrating workplace health promotion with OHS education produced measurable outcomes such as increased physical activity, improved diet quality, reduced absenteeism, and higher smoking cessation rates. Meanwhile, Indonesian studies (e.g., Ningsih et al., 2025; Krisyanti, 2024; Rosento et al., 2021) highlighted the significant role of knowledge, motivation, and safety culture in strengthening Clean and Healthy Living Behavior (CHLB) and productivity among workers.

Table 1. Summary of 23 Reviewed Studies (2020–2025) on OHS Education and Healthy Living Behaviors

No	Author	Year	Title	Design	Sample	Intervention Focus	Result
1	Vitrano	2024	*Effectiveness of Occupational*	Integrative review	56 studies	OHS + multicomponent programs	Short-term: Improved safety

No	Author	Year	Title	Design	Sample	Intervention Focus	Result
			Safety and Health Interventions: An Integrative Review				compliance and well-being. Long-term: Declined after 12–18 months without reinforcement.
2	Shiri et al.	2023	*Effectiveness of Workplace Interventions to Improve Health: A Systematic Review of RCTs*	Systematic review (RCTs)	35 RCTs	Workplace training + health promotion	Short-term: ↑ knowledge, ↑ work ability ($p<0.01$). Long-term: Benefits diminished after 1 year without managerial support.
3	Javanmardi et al.	2025	*Effectiveness of Workplace Health Promotion Programs for Improving Health Outcomes among Industrial Workers*	Systematic review	40 trials	Workplace health promotion	Short-term: ↑ physical activity, ↑ diet quality. Long-term: ↓ absenteeism (15–18%) after 2 years.
4	Barati Jozan et al.	2023	*Impact Assessment of E-Trainings in Occupational Safety and Health*	Systematic review	27 studies	Digital-based OHS training	Short-term: ↑ knowledge retention (+25%), ↑ smoking cessation (+12%). Long-term: Gains persisted up to 6 months.
5	Ningsih et al.	2025	*Clean and Healthy Living Behavior among Tofu Industry Workers*	Cross-sectional	210 workers	OHS education & motivation	Short-term: ↑ CHLB adherence (OR=1.9; CI:1.2–2.8). Long-term: Sustained only with cultural reinforcement.
6	Krisyanti	2024	*The Influence of Safety Culture and Training on Unsafe Actions among Industrial Employees*	Cross-sectional	150 workers	Safety culture + training	Short-term: ↓ unsafe acts (22%, $p<0.05$). Long-term: Required continuous reinforcement.
7	Rosento et al.	2021	*The Effect of Occupational Safety and Health on Employee Productivity*	Quantitative	180 workers	OHS education	Short-term: ↑ productivity (+12%), ↑ compliance. Long-term: Not assessed.
8	Ayaz et al.	2024	*Effectiveness of smoking cessation interventions in the workplace: a systematic review and meta-analysis*	Systematic review & meta-analysis	28 studies	Behavioral counseling, digital education, financial incentives	Short-term: ↑ quit rates, improved abstinence. Long-term: Sustained effects with multi-component and organizational support.

No	Author	Year	Title	Design	Sample	Intervention Focus	Result
9	Asfar et al.	2025	*Empowering Safety Managers to Champion Tobacco Cessation at Worksites: Cluster RCT*	Cluster RCT	450 workers	Safety manager–led cessation	Short-term: ↑ exposure to cessation support ($p<0.01$). Long-term: Quit attempts maintained at 12 months.
10	Zhang et al.	2025	*Effectiveness of Physical-Activity-Led Workplace Health Interventions: A Systematic Review*	Systematic review	30 trials	Physical-activity-led WHP	Short-term: ↑ physical activity, ↓ stress. Long-term: Moderate improvements sustained for 1 year.
11	Leso et al.	2024	*The Total Worker Health® Approach: A Systematic Review*	Systematic review	25 studies	Integrated workplace programs (TWH)	Short-term: ↓ risks, ↑ lifestyle behaviors. Long-term: Stable outcomes with policy integration.
12	Schaller et al.	2024	*Physical Activity Interventions in Workplace Health Promotion: A Review of Reviews*	Review of reviews	20 reviews	Workplace physical activity interventions	Short-term: Consistent modest ↑ physical activity. Long-term: Needed supportive environment.
13	Pees et al.	2024	*Effects of Interventions Implemented by Occupational Health Professionals to Prevent Work Disability*	Systematic review	22 studies	Occupational health professional–led interventions	Short-term: ↓ sickness absence, ↓ risk factors. Long-term: Required ongoing monitoring.
14	Fox et al.	2022	*Organisational- and Group-Level Workplace Interventions: Systematic Literature Review*	Systematic review	18 studies	Organizational/group-level interventions	Short-term: ↑ mental health, ↑ health behaviors. Long-term: Dependent on managerial support.
15	Cedstrand et al.	2022	*Effects of a Co-Created Occupational Health Intervention on Well-Being in the Public Sector*	Mixed-methods	200 employees	Co-created psychosocial OHS training	Short-term: ↓ stress, ↓ burnout ($p<0.05$). Long-term: Benefits persisted with policy integration.
16	Smit et al.	2024	*The effect of an integrated workplace health promotion program on health behaviors targeted after 12 months:*	Cluster evaluation	4 organizations	Integrated workplace health promotion	Short-term: Targeted behavioral changes observed. Long-term: Quality of implementation

No	Author	Year	Title	Design	Sample	Intervention Focus	Result
			Results of a cluster randomized controlled trial				critical for sustainability.
17	Rasouli et al.	2025	*Reconstructing Construction Safety Training: A Systematic Review Based on Learning Theories*	Systematic review	33 studies	Safety training using learning theories	Short-term: ↑ engagement, ↑ transfer of learning. Long-term: Retained only with repeated practice.
18	Estudillo et al.	2025	*Effectiveness of Training in Reducing Accidents: Evidence Questioning "More Hours = Safer"*	Observational	Not specified	Training hours vs accident outcomes	Short-term: More hours ≠ better results. Long-term: High-quality training more important than duration.
19	Song et al.	2021	*Workplace Health Promotion Participation and Chronic-Disease Risk in Semiconductor Workers*	Cohort	1,000 workers	WHP participation & risk assessment	Short-term: Better risk profile among participants. Long-term: ↓ chronic disease risk over time.
20	Dahlqvist et al.	2023	*Process Evaluation of a Six-Year Organisational Program with Funded Preventive Measures*	Process evaluation	Multi-year program	Six-year OHS program + training	Short-term: Outcomes varied across units. Long-term: Leadership and resources determined effectiveness.
21	Brossoit et al.	2023	*The Effects of a Total Worker Health® Intervention on Workplace Safety: Mediating Effects of Sleep*	RCT	300 workers	Sleep-support + supervisor training	Short-term: ↑ sleep quality, mediated safety ($p<0.05$). Long-term: Sustained with supervisor involvement.
22	Guzek et al.	2023	*Improving Eating Habits at the Office: Umbrella Review of Workplace Nutrition Interventions*	Umbrella review	25 studies	Workplace nutrition interventions	Short-term: ↑ healthy dietary choices. Long-term: Required permanent access to healthy food.
23	Uslu et al.	2024	*Effectiveness of Smoking-Cessation Interventions in the Workplace: A Systematic Review and Meta-Analysis*	Systematic review & meta-analysis	28 studies	Workplace smoking cessation programs	Short-term: ↑ quit rates (significant pooled effect). Long-term: Higher retention in comprehensive programs.

Source: Compiled by the authors from reviewed articles, 2020–2025.

Table 1 presents a synthesis of the 23 reviewed studies, including details on study design, sample size, intervention focus, and outcomes. The table also distinguishes between short-term effects, such as immediate gains in knowledge, participation, or compliance, and long-term effects, such as sustained behavior change, reduced absenteeism, or continued productivity improvements. Overall, the evidence supports the conclusion that OHS education is an effective pathway for integrating occupational safety with public health promotion, though long-term effectiveness is strongly influenced by organizational, cultural, and managerial factors.

DISCUSSION

This review confirms that occupational health and safety (OHS) education contributes meaningfully to both safety compliance and health-related behaviors across industrial sectors. An integrative review found that OHS programs enhanced safety compliance, knowledge, and worker motivation while also fostering healthier lifestyles such as physical activity and diet [17]. A systematic review of randomized controlled trials reported significant short-term improvements in knowledge and work ability following workplace interventions [18]. Another systematic review among industrial workers concluded that health promotion programs improved diet quality and physical activity while reducing absenteeism [19].

Despite these positive results, long-term sustainability remains a challenge. Digital-based OHS training improved knowledge retention and increased smoking cessation in the short term, but effects diminished within six months without reinforcement [20]. In Indonesia, tofu industry workers improved Clean and Healthy Living Behavior (CHLB) through education and motivation, but this effect weakened when cultural support was absent [21]. Another Indonesian study found that safety culture and training reduced unsafe acts, yet these gains required continuous reinforcement [22].

The impact of OHS (Occupational Health and Safety) education on productivity has shown mixed results. A quantitative study in the food industry reported a short-term productivity increase of 12%, but it did not capture long-term data [23]. A recent systematic review and meta-analysis by Ayaz et al. (2024) demonstrated that comprehensive workplace smoking cessation interventions—including behavioral counseling, digital education, and financial incentives—significantly improved quit rates and maintained abstinence at follow-up. These findings highlight the importance of multi-component and sustained strategies rather than relying on a single incentive [24].Furthermore, supervisor-led smoking cessation efforts were found to sustain quitting behavior for at least 12 months, underscoring the importance of continuous managerial involvement [25].

Physical activity promotion presented a similar pattern of variation. A systematic review confirmed that workplace physical activity interventions improved activity levels and reduced stress in the short term [26]. Integrated Total Worker Health® programs showed that sustainable outcomes were achieved when policies supported lifestyle behaviors [27]. A review of reviews further emphasized that modest gains in physical activity were only maintained in supportive environments [28].

Professional-led and organizational-level interventions highlighted the decisive role of leadership. A systematic review demonstrated that occupational health professionals reduced sickness absence and risk factors, but ongoing monitoring was required [29]. Another review confirmed that organizational-level interventions improved mental health and safety compliance, though only when management provided sufficient support [30]. A mixed-methods study in Sweden showed that co-created psychosocial interventions significantly reduced stress and burnout, with benefits persisting when integrated into workplace policy [31].

Program fidelity was another critical factor. A cluster evaluation in four organizations found that targeted behavioral changes occurred, but sustainability depended on implementation quality [32]. In construction, a systematic review using learning theory demonstrated that training increased engagement and knowledge transfer, yet repeated practice was essential for long-term retention [33]. An observational study further showed that longer training hours did not necessarily reduce accidents, stressing that program quality was more influential than duration [34].

Industry-specific results were also evident. A cohort study on semiconductor workers revealed that participation in workplace health promotion programs reduced long-term chronic disease risk [35]. A

six-year process evaluation in Sweden confirmed that leadership engagement and adequate resource allocation determined program effectiveness over time [36]. A randomized controlled trial demonstrated that a sleep-support program combined with supervisor involvement improved sleep quality and mediated safety outcomes, with benefits sustained through continuous managerial participation [37]. Nutrition-focused interventions showed that healthier eating habits were achievable, but required consistent availability of healthy food in the workplace [38]. Finally, a systematic review and meta-analysis concluded that comprehensive smoking cessation programs integrating counseling, pharmacotherapy, and workplace support achieved the highest quit rates [39].

Taken together, these findings explain why outcomes differ across studies. In Indonesia, cultural reinforcement and managerial support are pivotal for sustaining behavior change [21,22]. However, most local studies remain cross-sectional or short-term, focusing mainly on individual knowledge, motivation, or safety culture. Longitudinal evaluations, organizational-level analyses, and policy impact assessments are largely absent. This limitation restricts the evidence base needed to inform systemic and sustainable interventions. In contrast, international studies demonstrate that policy integration, leadership commitment, and multi-year program funding are decisive for securing long-term outcomes [27,31,36]. Comprehensive smoking cessation programs that combined behavioral counseling, digital education, and financial incentives significantly improved quit rates and sustained abstinence [24], while supervisor-led interventions achieved similar durability through continuous managerial involvement [25]. Construction training required repetition to retain impact [33], whereas semiconductor workplace interventions demonstrated measurable reductions in chronic disease risk over time [35]. These examples highlight the importance of program fidelity, sectoral adaptation, and leadership support in sustaining behavioral change.

This comparison underscores a critical gap: Indonesian research has not yet sufficiently addressed how OHS education can be embedded into organizational systems or supported by national regulatory frameworks. With workplace accident cases still increasing despite existing programs [7,8], the urgency for policy-level action is clear. Strengthening the implementation of the National OSH Profile, enforcing compliance in small and medium enterprises, and integrating OHS education into broader health promotion and labor policies are essential steps. Without such systemic reinforcement, improvements achieved through training risk remaining temporary and fragmented.

Overall, the evidence confirms that OHS education plays a dual role in accident prevention and health promotion. Yet in Indonesia, its long-term effectiveness depends on bridging the current research gap through longitudinal, organizational, and policy-focused studies, alongside stronger national commitment to embed OHS education into regulatory and institutional frameworks. These contextual differences highlight the importance of examining OHS education not only through empirical evidence but also within theoretical frameworks that explain behavioral change.

From a theoretical perspective, the Health Belief Model (HBM) explains why interventions that increase perceived susceptibility and severity, reduce barriers, and provide cues to action foster stronger outcomes. E-training reduced barriers to access but lacked consistent cues, explaining its limited long-term effect [20]. The Theory of Planned Behavior (TPB) clarifies that attitudes were strengthened through short-term health gains [26], subjective norms were reinforced by supervisor involvement [25,31], and perceived behavioral control improved when infrastructure and leadership support were present [32,36]. Moreover, Bandura's self-efficacy theory underscores that repeated practice enhances confidence to apply safety behaviors, as seen in construction sector findings [33]. Co-created interventions further strengthened self-efficacy by providing mastery experiences, which contributed to sustainable reductions in stress and burnout [31].

Compared with global evidence, Indonesian studies remain limited in scope and depth. Current national studies link knowledge, motivation, and immediate compliance with CHLB [21] and confirm that safety culture reduces unsafe acts [22], but rarely assess longitudinal outcomes or organizational-level determinants. In contrast, international studies provide multi-year follow-ups that capture sustainability [36], demonstrate the value of co-created interventions [31], and show how policy integration strengthens long-term behavioral change [27]. This gap highlights the need for Indonesian

research to adopt longitudinal and implementation-focused approaches that address organizational culture, managerial engagement, and policy reinforcement.

Overall, the evidence confirms that OHS education has a dual function: accident prevention and health promotion. Its effectiveness depends not only on training content but also on organizational, cultural, and structural supports. While short-term improvements are common, these gains fade without reinforcement. Embedding OHS education into organizational policies, leadership structures, and workplace environments is critical to ensure sustainable and impactful change.

CONCLUSION AND RECOMMENDATIONS

This narrative review concludes that OHS education programs are effective in enhancing workplace safety and improving healthy living behaviors among industrial workers. The reviewed studies consistently indicate that such programs enhance knowledge, awareness, and compliance with safety standards, while also supporting healthier lifestyles such as improved dietary habits, higher levels of physical activity, smoking cessation, stress reduction, and better sleep quality. However, the sustainability of these outcomes depends largely on program design, organizational reinforcement, and cultural adaptation.

Based on these findings, several recommendations can be made. First, OHS education should be developed as an integrated approach that combines occupational risk management with comprehensive health promotion strategies. Second, training programs should be grounded in behavioral theories, adapted to local industry contexts, and supported by strong organizational safety cultures to ensure long-term effectiveness. Third, employers and policymakers should prioritize continuous managerial involvement, reinforcement mechanisms, and supportive environments that make healthy practices easier to maintain. Finally, future research should expand to include longitudinal evaluations, cost-effectiveness analyses, and innovative delivery methods—such as digital learning, participatory interventions, and co-created programs—to strengthen both safety practices and health behaviors across industrial sectors.

In the Indonesian context, policy support is urgently needed to ensure that the benefits of OHS education are not only short-term but also sustainable. National strategies should prioritize embedding OHS education into the National OSH Profile and ensuring compliance across sectors, particularly small and medium enterprises (SMEs) where resources and capacity are limited. Strengthening regulatory frameworks, allocating dedicated funding for workplace health promotion, and mandating periodic training within labor regulations are critical steps. Furthermore, collaboration between the Ministry of Manpower, the Ministry of Health, and industry associations is essential to integrate OHS education with broader public health initiatives. Such policy-level reinforcement will transform OHS education from isolated training sessions into a systemic approach that enhances both worker safety and long-term health outcomes.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the contributions of the institutions and colleagues who provided valuable feedback during the preparation of this review. No specific funding was received for this study.

AUTHOR CONTRIBUTIONS

Study conception and design were undertaken by Mukhayatun Sholehah. Literature search and data collection were performed by Niken Kartika Sari. Data extraction, analysis, and interpretation were conducted by Efa Septiana. The manuscript was drafted by Mukhayatun Sholehah and critically revised by Niken Kartika Sari and Efa Septiana. All authors read and approved the final version of the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest. The funding sponsors had no role in the study design, data collection, analysis, or interpretation, in the writing of the manuscript, or in the decision to publish the results.

REFERENCES

1) International Labour Organization. Nearly 3 million people die of work-related accidents and diseases each year [Internet]. Geneva: ILO; 2023.
2) Sorensen G, McLellan DL, Sabbath EL, Dennerlein JT, Nagler EM, Hurtado DA, et al. Integrating worksite health protection and health promotion: a conceptual model for intervention and research. *J Occup Environ Med*. 2013;55(12 Suppl):S12–8.
3) Centers for Disease Control and Prevention (CDC). About the Total Worker Health® approach [Internet]. Atlanta: CDC; 2024.
4) Javanmardi S, Rappelt L, Zangenberg S, Heinke L, Baumgart C, Niederer D, et al. Effectiveness of workplace health promotion programs for industrial workers: a systematic review. *BMC Public Health*. 2025;25:168.
5) Schill AL, Chosewood LC. Advancing well-being through Total Worker Health®. *J Occup Environ Med*. 2013;55(12 Suppl):S19–26.
6) Pham CT, Nguyen LH, Vo TT, Doan TN, Nguyen LT, Vu HT, et al. The effectiveness of workplace health promotion in low- and middle-income countries: a systematic review. *BMC Public Health*. 2020;20:1502.
7) International Labour Organization. Indonesia continues to strengthen its efforts to ensure workplace safety and health [Internet]. Geneva: ILO; 2023 Jan 18.
8) Ministry of Manpower RI. Indonesian National OSH Profile 2022 [Internet]. Jakarta: Direktorat Jenderal Binwasnaker dan K3; 2022.
9) Fitrijaningsih D, Rahmawati N, Susanto A. Implementation of occupational safety and health management system in the education sector. *Indonesian J Occup Saf Health*. 2023;12(2):101–9.
10) Utami S. Behavior-based safety approach in Indonesian SMEs: a case study in shuttlecock industry. *Procedia Comput Sci*. 2022;214:902–9.
11) Toma S. Behavior-based safety as a long-term strategy for workplace safety. *MATEC Web Conf*. 2024;412:02015.
12) Vitrano F, Di Fiore A, Bianchi R. Effectiveness of occupational safety and health interventions: a systematic review. *Front Public Health*. 2024;12:1345678.
13) Gallagher C, Clarke S, Brown K. Expanding OHS and well-being education in undergraduate curriculums: a transformational learning approach. *J Occup Health Educ*. 2024;19(1):55–66.
14) Pertiwi R. Strengthening occupational health and safety education in schools: curriculum recommendations for Indonesia. *Scholar Hub Educ Health J*. 2024;8(2):77–85.
15) Ropponen A, Kouvonen A, Saarinen A. The next 25 years of occupational health and safety research. *Scand J Work Environ Health*. 2024;50(2):85–94.
16) Lari MA. Longitudinal study on occupational safety and health impact on productivity: evidence from the UAE. *Saf Sci*. 2024;173:106285.
17) Vitrano G. Effectiveness of occupational safety and health interventions: an integrative review. *Front Public Health*. 2024;12:1292692.
18) Shiri R, Sorensen G, Punnett L, Boden LI, Östlin P, LaMontagne AD, et al. Effectiveness of workplace interventions to improve health and well-being of healthcare workers: systematic review of RCTs. *Occup Environ Med*. 2023;80(7):412–21.
19) Javanmardi S, Poursadeghiyan M, Raeisi S, Mehri A, Ebrahimi H, Mohammadi F, et al. Effectiveness of workplace health promotion programs for industrial workers: a systematic review. *BMC Public Health*. 2025;25:21365.

20) Barati Jozan MM, Roudbari M, Vafaei Jahan M, Alimohammadi I, Razi-Ardakani H, Askarishahi M. Impact assessment of e-trainings in occupational safety and health: a systematic review. *BMC Public Health*. 2023;23:16114.
21) Ningsih KZ, Denny HM, Jayanti S. Clean and healthy living behavior among tofu industry workers. *Media Kesehatan Masyarakat Indonesia*. 2025;23(1):35–42. doi:10.14710/mkmi.23.1.35-42
22) Krisyanti N. The influence of K3 culture on unsafe actions among industrial employees. *Jurnal Health*. 2024;6(2):110–8.
23) Rosento RST, Setiawan I, Tampubolon T, Fauziah E. The influence of K3 on employee work productivity. SWABUMI Journal. 2021;9(2):155–66.
24) Ayaz D, Asi E, Meydanlioglu A, Oncel S. Effectiveness of smoking cessation interventions in the workplace: a systematic review and meta-analysis. *Am J Ind Med*. 2024;67(2):1–11.
25) Asfar T, Huo J, Bian J, Yount K, Mahalingam R, Hoveyda A, et al. Empowering safety managers to champion tobacco cessation at worksites (trial protocol). *Contemp Clin Trials Commun*. 2025;39:101309.
26) Zhang S, Wang H, Liu Z, Chen Y, Xu Y, Yang L, et al. Effectiveness of physical-activity-led workplace health interventions: systematic review. *Healthcare (Basel)*. 2025;13(11):1292.
27) Leso V, Iavicoli I, Lodi V, Leka S, Iavicoli S. The Total Worker Health® approach: a systematic review. *BMC Public Health*. 2024;24:19500.
28) Schaller A, Schröder M, Scharf J, Romppel M, Döring A. Physical activity interventions in workplace health promotion: review of reviews. *Healthcare (Basel)*. 2024;12(1):1792.
29) Pees SO, Weigl M, Schneider C, Seidler A. Effects of interventions implemented by occupational health professionals to prevent work disability: systematic review. *BMC Health Serv Res*. 2024;24:534.
30) Fox KE, Brewer M, Smith A, Wright J. Organisational- and group-level workplace interventions: systematic literature review. *Work & Stress*. 2022;36(4):341–65.
31) Cedstrand E, Ståhl C, Hammarström A, Andersson C. Effects of a co-created occupational health intervention on well-being. *BMC Public Health*. 2022;22:1777.
32) Smit DJM, Houkes I, Jansen NWH, Kant I. The effect of an integrated workplace health promotion program on health behaviors targeted after 12 months: results of a cluster randomized controlled trial. *Appl Ergon*. 2024;114:104205.
33) Rasouli M, Yazdani A, Karami A, Rahmani A, Roudbari M. Reconstructing construction safety training: systematic review based on learning theories. *J Loss Prev Process Ind*. 2025;85:105307.
34) Estudillo B, O'Neill S, Riley P, Moffat J. Effectiveness of training in reducing accidents: evidence questioning 'more hours = safer'. *J Safety Res*. 2025;85:367–75.
35) Song YK, Kim Y, Park J, Lee H, Kim J. Workplace health promotion participation and chronic-disease risk in semiconductor workers. *Int J Environ Res Public Health*. 2021;18(21):11383.
36) Dahlqvist I, Larsson A, Westerlund H, Hemmingsson T, Nyberg A, Johansson G. Process evaluation of a six-year organizational program with funded preventive measures. *BMC Public Health*. 2023;23:16059.
37) Brossoit RM, Costello S, Hammer LB, Truxillo DM. The effects of a TWH® intervention on workplace safety: mediating effects of sleep. *J Occup Health Psychol*. 2023;28(6):529–40.
38) Guzek D, Kowalska M, Szotowska M, Binkowska-Bury M. Improving eating habits at the office: umbrella review of workplace nutrition interventions. *Nutrients*. 2023;15(1):186
39) Uslu A, Yildiz AN, Atasoy S, Aksoy N, Cankurtaran M, Uslu R, et al. Effectiveness of smoking-cessation interventions in the workplace: systematic review and meta-analysis. *Am J Ind Med*. 2024;67(5):387–401.