Review

A Critical Analysis of Risk Factors and Strategies to Improve Mental Health Issues of Construction Workers

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Abstract: Previous research has enabled construction professionals to consider appropriate mental health interventions for improved mental health outcomes. However, the heterogeneity of such interventions in contemporary studies makes it difficult for practitioners to keep up to date with relevant alternatives. Thus, the aim of this research is to critically analyse mental health risk factors and identify strategies intended to mitigate risks and promote employees' mental health in the construction industry. A Systematic Literature Review (SLR) was employed following PRISMA guidelines, and 58 articles that met the inclusion criteria were selected for data synthesis. In total, 100 risk factors and 76 preventive strategies were extracted and clustered into a taxonomy consisting of an individual level, workgroup level and organisational level. Strategies were further evaluated based on the type of prevention and financial significance. A critical content analysis of selected studies can suggest recommendations for future research, including the gap in mental health studies in the construction industry as well as the need for empirical research emphasis on generic forms of risks and strategies to cover more individual (e.g., age, profession), workgroup (e.g., team, trade, project) and organisational (e.g., culture, policy) factors that appropriately fit into construction workplace settings. The findings herein can broaden the mental health knowledge of industry practitioners, and could assist in mental health-related decision-making by developing best practices for boosting the mental wellbeing of the construction workforce.

Keywords: mental health; mental ill-health; construction; risk factors; interventions

1. Introduction

Workers' mental ill-health has been an issue of concern and has gained substantial attention in recent years. Poor mental health is often associated with psychological factors causing depression, stress disorders, anxiety, and suicidality, and can negatively affect well-being and physical health [1,2]. At an organisational level, these psychological factors impede performance and productivity [3]. Risk factors related to the nature of work and working environments have proven to be reasons for mental health problems in the workplace [4].

Globally, poor mental health remains an economic burden which leads to loss of work hours and substantial financial costs [5]. For instance, the global costs associated with mental health problems are predicted to incur costs of USD 6 trillion by 2030, which is more than double the USD 2.5 trillion estimated in 2010 [5]. In many industries, these costs are associated with lost workplace productivity due to the high prevalence of mental health issues among workers [6]. Labour-intensive industries are predominantly problematic in this regard [6]. The construction industry is one of the largest labour-intensive industries globally [2], and often confronts challenges due to poor mental wellbeing among its workforce.

Construction workers are often vulnerable to mental health issues due to production pressures, complexity, and the nomadic and physically demanding nature of the work [2,6].

In addition, jobs on construction sites are repetitive and strenuous, and workers need to endure different weather conditions [6]. The construction industry accounts for high rates of suicide and mental disorders worldwide due to mental health risk factors prevalent in the construction workplace [7]. For instance, in Australia, one in every six deaths in the construction industry is a suicide [6] and approximately 190 construction workers commit suicide every year [8]. In the USA, suicide deaths among low-skilled construction workers are 4.25 times above the national average [9]. In the UK, this suicide rate is 3.7 times above the national average [10], with 55% of construction workers have suffered from mental health issues during their lifetime [1].

Although existing literature reviews have focused on identifying strategies or interventions to improve mental health [11,12], there are limitations in the analysis of these strategies for different categories that can prevent practitioners from applying them in a construction setting. Not all solutions fit this context, and solutions are required to be unique to the work context [13]. This highlights the need for context-specific strategies [13]. Thus, a research gap exists, and a systematic overview of studies investigating mental health coping processes in construction workplaces in order to analyse strategies is necessary to inform better interventions to address mental health issues among construction workforces. However, the proposition of interventions or strategies should be directed towards main clusters of risk factors, as many risk factors link with each other and do not emerge in isolation [6]. Increased insight into risk factors that cause poor mental health in construction work can contribute to choosing the most apposite strategies or interventions for the workers [10,14]. Therefore, in order to address this existing gap, the objectives of this research are twofold: (1) to critically analyse the mental health risk factors associated with a construction site and (2) to explore workplace strategies that mitigate risks and enhance the mental health of the construction workers.

2. Materials and Methods

This paper employed a systematic literature review (SLR) to expand the existing body of knowledge on mental health risk factors and appropriate strategies. Following a systematic review approach, this study captured articles that better define the research aim covering mental health risk factors and strategies in the context of construction workplaces from 2000 to 2021. The review process comprised four stages: (1) development of review protocol; (2) retrieving and screening articles by adopting the guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) [15]; (3) extracting data from selected studies and analysing data; and (4) identifying risk factors and proposing strategies.

2.1. Review Protocol

A review protocol was developed to extract articles related to mental health in the construction industry. Accordingly, articles were retrieved from two databases, Scopus and Web of Science (WoS), as both databases contain comprehensive collections of peer-reviewed journals in the science field and are the most commonly used databases in previous systematic reviews of mental health in the construction industry [6,10]. In addition, Google Scholar was searched to add any missing articles identified from the backward screening and forward screening of articles retrieved during the main search. Keywords for searches were developed in relation to the main research domain: (1) "mental health" and (2) "construction industry". Therefore, a wide range of retrieval codes covering the main domains (mental health and construction industry) were used, employing different combinations. The review protocol included inclusion and exclusion criteria to determine the eligibility of articles for the review. Inclusion criteria included: (1) peer-reviewed journal articles published between 2000 to 2021 with a focus on mental health aspects in the construction industry, with this time frame chosen as there was an increased recognition of improving mental health in construction after 2000; (2) articles that discussed risk factors or/and strategies; and (3) articles published in English. Papers presented in conferences,

book chapters, editorial documents, and theses were excluded from the review, as it can be difficult to ensure the quality and reliability of findings in these articles.

2.2. Retrieving and Screening Records to Select Eligible Studies

The initial search of databases resulted in 718 total articles (Scopus = 401, WoS = 317). Subsequently, 24 articles were added to the initial list through forward screening and backward screening. The articles were imported into EndNote X9. Thereafter, documents were scanned to identify any duplications, reducing the total number to 440 articles. The material retrieval process underwent three steps: titled screening, abstract screening, and full-text screening. First, the initial filtration of title screening removed articles that were not specific to the study domain. Accordingly, 143 articles were removed through title screening, as they were not related to mental health in the construction industry. Second, an in-depth analysis of the article abstracts was carried out based on the research aim, methodology, and keywords applied. This resulted in the removal of a further 119 articles. Third and finally, full-text screening enabled the extraction of those articles that best matched the inclusion criteria set out in the review protocol. This process removed 120 articles, and the remaining 58 articles were carried forward for review. Figure 1 presents the article retrieval and screening process for the SLR in accordance with the PRISMA flowchart.
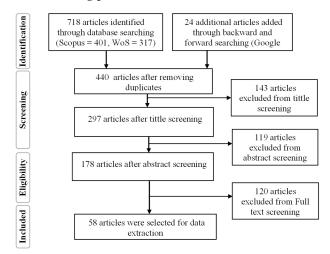

Figure 1. The screening process according to PRISMA.

2.3. Data Extraction and Analysis

Publication information such as year, country, research method, and authors were collected in order to analyse the study sample (58 articles). Thereafter, a full-text review of articles, risk factors, and strategies to improve mental health was conducted. Initially, the factors were manually coded as they appeared in the original article. Identifying codes with similar meanings helps to develop themes that can provide a broader understanding of a topic [16]. Therefore, primary codes extracted from the original articles were subjected to in-depth content analysis to make sense of the identified factors in terms of their meaning and representation in the context of the construction industry. After several reviews, codings with similar meanings were merged and then grouped under broader themes identified for better interpretation. Depending on similarities and differences identified in primary codings (e.g., risk factors and strategies), it was found that these factors could be categorised into three main themes, namely, individual, workgroup and organisational factors, to better interpret the construction context. Adapting an approach similar to the study of Shea, De Cieri [17], two authors independently checked the codings related to risk factors and then grouped them into the three themes of individual factors, group factors, and organisational factors. Similarly, after extracting key strategies, two authors independently examined each code related to strategies and grouped them under the same category as risk factors. In addition, after two rounds of this coding process, strategies
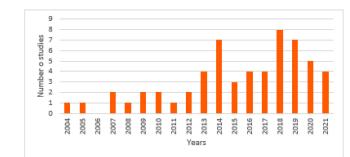
were classified according to their financial perspective and type of prevention in order to synthesise the results.
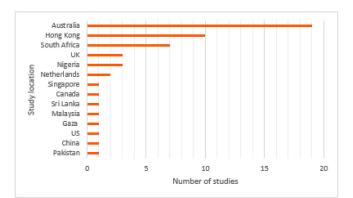
3. Results

3.1. Descriptive Analysis

The distribution of the selected articles was analysed based on publishing time, study location, study method, and targeted participants in the construction industry (Figure 2). The publishing time frame shows that articles on the topic increased significantly after 2013, with a peak in 2018. A majority of studies were conducted in Australia (32%) followed by Hong Kong (17%) and South Africa (12%). In terms of the research methods used in eligible articles, five articles (9%) were theoretical studies and 53 articles (91%) were field studies. Across these 53 field studies, 36 were conducted based on the quantitative research method, 6 were based on the qualitative method, and the remaining 11 studies used a mixed method. Based on the analysis of targeted participants, the three main groups that emerge are articles focused on construction professionals (47%), construction workers (34%), and construction sites in general (19%). Overall, there is room for the development of further research on mental health in the construction industry, especially in terms of qualitative studies focusing on construction workers.
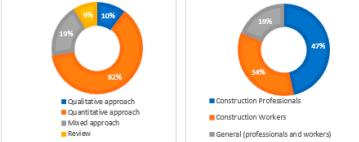
Figure 2. Descriptive analysis of articles.

3.2. Three Levels of Risk Factors

Table 1 presents the risk factors shown to cause mental ill-health as extracted from the studies included in this review. Factors recorded in the studies are mentioned in Table 1 under each category. According to Sommerville and Langford [18], the sources of mental stressors can be classified into different groups, including organisation, work environment, an individual's role, and their relationships within the organisation. As explained in the methodology section, the thematic analysis of risk factors enables risk factors to be classified into three broader levels based on their origin. Accordingly, the three levels are the individual level, workgroup level, and organisational level. This enables a more comprehensive level of analysis, rather than focusing on just one level.

The first cluster, the individual level, mainly focuses on factors that are subject to individual beliefs, personal attitudes, behaviour, and lifestyle [19] This covers those factors that reflect an individual's unique response to their situations that can contribute to mental disorders, for instance, perfectionism [20] or personal beliefs that conflict with those of the company [21]. The second cluster focuses on workgroup factors. Adapting a meso-perspective, Martin, Karanika-Murray [22] suggest that because individuals are nested in workgroups, variations in the workgroup are as important as individuals variability in predicting workers' mental health. This cluster encompasses factors that arise due to the collaborative functioning of workgroups during construction projects, such as the level of communication and cooperation with group members and superiors [23] and the leader–member exchange relationship. The third cluster, the organisational level, highlights the organisation's role in positively changing psychosocial working conditions. Therefore, the organisational level includes risk factors related to overall work conditions, work systems and policies, and procedures associated with the organisation that impede employees' mental health. Overall, these different levels of risk factors interact with each other to create a more or less stressful workplace for employees working on construction projects. For example, individual factors related to beliefs and attitudes, such as fear of failure, contribute to group-level factors such as competitive teamwork and organisational factors such as inadequate breaks. Similarly, organizational factors related to organisational culture, such as lack of training and learning opportunities or future career development opportunities, contribute to individual-level stressors such as career dissatisfaction. Several of these risk factors are inherent in the nature of the construction industry, while others are due to organisational culture and employees' beliefs and behaviour. These relevant multi-level risk factors are useful in developing an analytical risk assessment for workplace mental health. A total of 100 risk factors representing the individual level (32), workgroup level (32), and organisational level (35) were reported in the selected articles.

Table 1. Risk factors resulting in poor mental health.

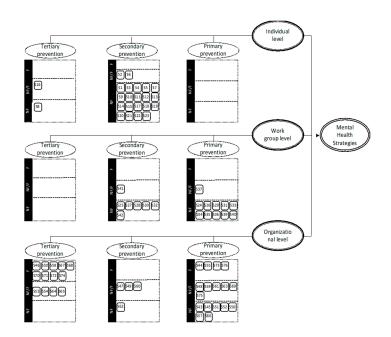| Individual	Workgroup	Organisational
I1. Maintaining individual performance [23]	W1. Lack of respect from subordinates [6]	O1. The company strategy (competitive/dynamic/go-getting image) [24]
I2. Servicing/satisfying the work as an individual [23]	W2. Competitive teamwork [2]	O2. Pressures to reduce costs on a project [4,23]
I3. Tedious work activities [23]	W3. Different views from superiors [25]	O3. Cash flow/payment uncertainty [23]
I4. Sink or swim mentality (harmful stigma) [23]	W4. Untimely requests by others [23]	O4. High-level meetings required [4,21]
I5. Dishonesty [23]	W5. Lack of power and influence [21]	O5. Forced relocation and shiftwork [4]
I6. Conflicts between work and family roles [2,4,6,21,24–31]	W6. Poor communication/ level of cooperation from other project stakeholders, work colleagues and superiors [2,4,21,23–25,28,30]	O7. Pressures to reduce timescales on projects/ critical time constraints. [2,4,20,23–25,28,30,32–38]
I7. Personal traits of the locals [2]	W7. Workplace harassment/bullying [2,6,28,37,39]	O8. High level reporting and paperwork demands [4,21,24,28]
I8. High mental demands [6,14,40]	W8. Poor workgroup relationship [31,41]	O9. Lack of training and learning opportunities [6,21,25,28,42]
I9. Negative future perspective [14]	W9. The balance of assertiveness when engaging others [23]	O10. Forced termination/ impending redundancy [4,21]
I10 Need to work harder than others to prove oneself [4,20,28,32–34]	W10. Conflicts with co-workers or colleagues/poor relationship with co-worker [2,25,30,38]	O11. Inflexibility of working hours [23,25,30,32–36]
I11. Use of mobile phones while working [36]	W11. Relying on others to complete work before you can continue [23]	O12. No appreciation or praise [23,25,40]

Table 1. *Cont.*

Individual	Workgroup	Organisational
I12. Disruption to meal patterns [4]	W12. Workflow/changing nature of the amount of work needing to be completed [4,23]	O13. Poor working conditions/environment (inadequate ventilation, problems with office accommodation, lack of privacy, poor lighting, inadequate temperature control, noise levels, poor site conditions, safety/security measures on site) [2,6,20,25,27,28,31,41,42]
I13. Disruption to leisure activities [4,39]	W13. Staff competence, team size and composition [4,23,24]	O14. Lack of information processing [4,23]
I14. Disruption to sport/exercise activities [4]	W14. Job nature renders too much contact with people [25]	O15. Job role conflicts [4,20,25,28,29,31,43–45]
I15. Physical illness [6,10]	W15. Social support [2,21,30,31]	O16. Inadequate recess [25,28,32,36]
I16. Financial insecurity and remuneration level relative to others [6,10,20,21,25,27,28,30,37,39,44,45]	W16. Low social support from direct supervisor and managers/superiors [6,14,21,28,30,32–35,37,45,46]	O17. Role Ambiguity [2,20,21,25,28–31,41,43–45]
I17. Low socioeconomic status [6]	W17. Leadership skills needed [4]	O18. The feasibility of projects [23]
I18. Occupational injury/hazards [2,6]	W18. Criticism [6]	O19. Level of professional skills, knowledge, and experience required [2,4,20,25,28]
I19. Fear of failure [6,20]	W19. Responsibilities over another person [20]	O20. Unfair reward and treatment [2,29–31,40–42]
I20. Substance abuse, alcohol consumption [2,6,39]	W20. Staff shortages [2,21,24,28]	O21. Inappropriate safety equipment [2,28,37,41,42,46]
I21. Type A behaviour, optimism [2,31,41]	W21. Relying on others to provide information [23]	O22. Inadequate room for innovation [25]
I22. Perfectionism [20]	W22. Inability to delegate work [21]	O23. Inadequacy of resources [4,21,36,45]
I23. Interpersonal stressors/ conflicts [6,28,43]	W23. Managing or supervising the work of other people [21]	O24. Lack of feedback mechanism in place [2,6,21,25,28,29,42]
I24. The tasks perform do not match with skills (overuse/underuse) [21,25,28,30]	W24. Low participation in decision making and problem solving [6,14,21,25,28–30]	O25. Lack of career-developing environment [2,21,25,28,30,43]
I25. Lack of job promotion [2,21,25,28,32,40,45]	W25. Low social support from colleagues [6,14,29,32–35,37,40,46]	O26. High work speed and quantity [2,6,14,20,21,24–26,29–31,36,40,41,43–45]
I26. Public misconception and family attitude towards the profession [21,28]	W26. Leader–member exchange relationship/ problem with superior [2,29]	O27. Characteristics with organisation structure [2,21,43]
I27. Absence of emotional and practical support from outside work [21,29]	W27. Lack of control over pace of work [14,33–36,44,45]	O28. Lack of job security and opportunities [2,6,10,27,28,32,38,39,45,46]
I28. Personal beliefs conflicting with those of the company [21]	W28. Dealing with ambiguous situations [21]	O29. Poor medical services [2]
I29. Emotional exhaustion [45]	W29. Being accountable for risks associated with the project success [23]	O30. Gender discrimination [2,6,10,28,30,37]
I30. Self-efficacy [29]	W30. Untimely requests by others [23]	O31. Poor organisational support [2,26]
I31. Physical comfort [29]	W31. Negotiations [23]	O32. Fickleness of client (changes) [23]
I32. Working outside working hours [2,4,6,21,23,24,28,30,32–37,39,44,45]	W32. Low task autonomy [2,6,14,20,25,26,30,32,33,35,41,45]	O33. Inadequate welfare and sanitary facilities [37]
		O34. Unpredictable nature of projects [23,30]
		O35. Inadequate compensation [37]

3.3. Three Levels of Strategies

One of the objectives of this study is to identify strategies that can help to sustain improved mental health among construction workforces. Table 2 presents a comprehensive list of strategies extracted from selected articles. Strategies were categorised into the same multi-level categorisation (individual, workgroup, organisational) used to identify the risk factors.

The strategies were further evaluated based on their financial perspective (Table 2) and type of prevention in order to synthesise the results identified through the thematic analysis (Figure 3). Therefore, financial and non-financial mental health interventions and strategies were initially categorised, as this can provide useful information for decision-makers when selecting the best alternatives among different investment options. There are strategies, such as engaging in hobbies (S2) and sporting activities (S6), that can be financial or non-financial depending on the level of benefits provided to individuals and the nature of the workplace. Second, this study further classified the multi-level strategies into primary, secondary, and tertiary prevention for the purpose of better interpretation and understanding of different strategies. Three types of prevention were adopted from the study of Hargrove, Quick [47], who introduced the Theory of Preventive Stress Management (TPSM) along with three types of stress prevention. In TPSM, primary prevention focuses on reducing and/or removing the risk factors that contribute to poor mental health, such as flexibility in work schedules (S37) and job redesign (S59). Secondary prevention moderates individuals' stress response by utilising coping methods to deal with risk factors, such as by holding regular health and well-being workshops (S60). Tertiary prevention focuses on rehabilitating

employees who already encounter stressful or traumatic events in the organisation, such as through first aid and postvention support (S58) [47].

Figure 3. Type of prevention of mental health strategies.

Table 2. Strategies to improve mental health in construction workplaces.

Levels	Financial or Non-Financial	Strategies
Individual Level	NF	S1. Taking physical exercise [28,35,48,49]
	NF/F	S2. Engaging in hobbies [28,35,48–50]
	NF	S3. Socialising with family and friends [21,28,35,48,49,51–53]
	NF	S4. Engaging in various forms of entertainment [28,35,48,54]
	NF	S5. Seeking social instrumental support (e.g., from supervisors, co-workers, and others) [19,21,24,28,39,52,55,56]
	NF/F	S6. Competitive sporting activity and non-competitive sporting activity [28,50]
	NF	S7. Adopting problem-solving routines or behaviours [19,30,38,43,49,50,52,54,57]
	NF	S8. Leaving the organisation for another [21,28]
	NF	S9. Increasing self-efficacy [10,58]
	NF	S10. Increasing life skills in handling difficult situations and supporting others/offering helping behaviour [13,58–60]
	NF	S11. Escapism/putting the problem aside/avoidance [21,24,28,30,38,53,54,57]
	NF	S12. Accepting the different culture and imperfections of local colleagues [54,55]
	NF	S13. Positive thinking/reappraisal [30,53,54,57]
	NF	S14. Religious support [30,54]
	NF	S15. Confrontive and active coping [24,30,53,57]
	NF/F	S16. Seeking counselling [28]
	NF	S17. Accepting responsibility [24,28,30,56,57,61]
	NF	S18. Emotional discharge /emotion-focused coping [28,38,43,49,53,57]
	NF	S19. Acting calmly when under pressure [21]
	NF	S20. Restraint coping (waiting for an appropriate opportunity to present itself, holding oneself back) [30]
	NF	S21. Prioritising future workloads/organising work in a more systematic way [21,28]
	NF	S22. Focusing on smaller manageable tasks [21,23,50]
	NF	S23. Self-control [24,53]
Workgroup level	NF	S24. Improving team design, communication, team-bonding [13,23,51,62]
	NF	S25. Fairness of criticism from others and recognition from others [4]
	NF	S26. Giving individuals tasks which require them to use only their strengths /better planning of work tasks and shifts [13,23,55]
	NF	S27. Providing inductions and toolbox talks [51]
	NF	S28. Group problem-solving methods such as brainstorming solutions and small group discussion [52]
	NF	S29. Clear work descriptions [36]
	NF	S30. Ensuring that people work in teams [23]
	NF	S31. Proper communication opportunities to meet superiors on any work-related matters [36,52,56]
	NF	S32. Appropriate appreciation and acknowledgement of workers' efforts [13,28,55]
	NF	S33. Communication of clear goals and objectives [21]
	NF	S34. Reducing work overtime [21,28]
	NF	S35. Providing manageable workloads and realistic targets [13,21,36,51]
	NF	S36. Clear leadership and expectations [55]
	NF/F	S37. Flexibility in work schedules [13,36]
	NF/F	S38. Setting a realistic timescale [21,23,36]
	NF	S39. Control over the type, flow, and volume of work [4,13]
	NF	S40. Opportunities to participate in decision making [36,55]
	F/NF	S41. Supporting building of resilience and coping skills [10,13,63]
	NF	S42. Empathy from peers [23]
Organisational Level	NF	S43. Reducing harmful stigma in the workplace [13,23,51,59,64–66]
	F	S44. Acquiring minor work warranties through third parties [23]

Table 2. *Cont.*

Levels	Financial or Non-Financial	Strategies
	NF	S45. Better recruitment capabilities [21,23]
	F	S46. Providing aid for stressors such as financial challenges and retirement planning [13,49]
	NF/F	S47. Having more regular meetings [13,23,36]
	NF/F	S48. Providing a safe and comfortable work environment [36,51,55]
	NF/F	S49. Opportunities for social interactions among workers [36]
	F	S50. Providing occupational health services through health checks [36,51]
	NF	S51. Regular sufficient breaks [13,21,28,36,51,56]
	NF	S52. Zero tolerance for bullying and harassment culture [13,28,36,51]
	NF/F	S53. Offering assistance with non-work stressors such as marital or family issues [13]
	NF/F	S54. Improving risk and stress management procedures [13,23]
	F	S55. Safety equipment and proper instructions [36]
	NF	S56. Access to information required to perform the work [36]
	NF	S57. Effective feedback systems [13,36,52]
	F	S58. First aid and postvention support provided in the event of a suicide [67]
	NF/F	S59. Job redesign [45]
	F/NF	S60. Holding regular health and well-being workshops to inform and persuade workers [13,36,51,68,69]
	NF/F	S61. Promoting help-seeking [49,51,54,58–60,62,63,65,67]
	NF	S62. Increasing awareness and knowledge about mental health risk factors [13,51,58–61,63,66,67,70]
	F/NF	S63. Providing an ergonomic workplace where workers feel a sense of personal space and territory [36,51]
	NF/F	S64. Counselling programs [36]
	NF/F	S65. Providing access to 24-h telephone crisis support/suicide prevention hotline [67]
	NF	S66. Compression of the work week/alternative rostering [21,71,72]
	F	S67. Providing exercise and activity space within the workplace, yoga/stretching sessions, and discounted gym memberships [51,68,69]
	F	S68. Promoting or providing mobile/computer applications to help manage physical or mental health matters [51]
	NF/F	S69. Setting realistic budgets [23]
	F	S70. Use of behaviour tracking [52]
	F	S71. Survey/assessment system to monitor and evaluate the mental and physical wellbeing of workers [13,51]
	F	S72. Healthy options menu in the site canteen [68,69]
	F	S73. Adding contingency, especially for unforeseen costs [23]
	F	S74. Improving capacity for early identification/enhanced symptom identification by implementing a volunteer gatekeeper program [63,67]
	NF/F	S75. Appropriate career path potential/increasing opportunities for career development [4,13,28,36,49,55]
	F	S76. Adequate payment and compensation [4,36]

For better interpretation of different strategies, Figure 3 illustrates the taxonomy of preventive strategies based on the basic categorization (individual, workgroup, and organizational), level of prevention (primary, secondary, and tertiary prevention), and financial perspective (financial or non-financial). The classification of strategies into three levels of prevention revealed that there is a lack of attention regarding primary and tertiary prevention strategies at the individual level, tertiary prevention strategies at the workgroup level, and secondary prevention strategies at the organisational level; see Figure 3. Interestingly, most primary and secondary prevention strategies are non-financial (NF), and most tertiary prevention strategies are financial (F). Therefore, it is financially beneficial for construction organisations to pay more attention to implementing primary and secondary prevention to eliminate/reduce mental health risk factors in the workplace rather than rehabilitating employees who suffer from mental health issues. However, tertiary prevention strategies should not be totally eliminated, as they significantly contribute to improving the mental wellbeing of employees.

4. Discussion

4.1. Multi-Level Risk Factors

This level involves the factors that reflect an individual's unique behaviour and personal factors associated with their work tasks that can contribute to mental disorders. Among individual level risk factors, 'conflicts between work and family roles', 'working outside working hours', and 'financial insecurity' were the most cited risk factors. At the workgroup level, many studies showed repeated factors such as 'communication and cooperation with group members and superiors', 'low task autonomy', 'low support from direct supervisor, managers and superiors', and 'low social support from colleagues'. In addition, 'poor communication and cooperation with group members' had a high number of citations at the workgroup level, implying that rigorous communication channels should be established. Studies that focus on employee mental health often highlight the organisation's role in changing psychosocial working conditions in a positive way. 'Pressures to reduce timescales on projects/critical time constraints', 'job role conflicts' and 'role ambiguity' are key sources of risk embedded at organisational level. These risk factors

highlighted at the organisational level can interact with each other to create a more stressful organisational environment.

4.2. Multi-Level Strategies

The individual-oriented category only refers to secondary and tertiary prevention measures that cover the broad aspects of skills, routines, and individual characteristics necessary to cope with stressors in construction workplaces. Trending secondary prevention strategies at this level include seeking social instrumental support (S5), socialising with family and friends (S3), adopting problem-solving routine behaviours (S7) and escapism (S11). As one of the most cited factors, 'instrumental support' refers to consultation, assistance, or information received from experienced senior colleagues and supervisors to cope with workplace difficulties [49]. Family and friends provide emotional support that can help relieve mental stressors. In contrast with support received from colleagues, which helps to address the source of risk, emotional support only regulates negative feelings that emerge through stressors [53]. However, both kinds of support are highly important in order for individuals to maintain a good work-life balance.

Strategies at the workgroup level emphasise the workgroup's characteristics and the network necessary to deal with mental health risk factors. Table 1 demonstrates that construction projects often lack collaboration between project job roles and understanding of individuals' capacity to perform tasks, which often leads to workgroup-oriented stressors. Table 2 exemplifies primary and secondary prevention measures that are viable at the workgroup level. Many of the strategies at this group level are non-financial measures that the project team can easily apply without exceeding budget limits. Two highlighted primary prevention strategies at the workgroup level are improving team bonding, team design, and communication (S24) and allocating manageable workloads (S34). Allocating a manageable workload to project team members can eliminate a number of sources of stress at construction sites, such as frequent changes in the amount of work that needs to be completed, working outside working hours, and demand for high work speed and quantity. Furthermore, secondary prevention measures such as appropriate appreciation (S32) and supporting building of resilience and coping skills (S41) are two prominent strategies that can be repeated at the workgroup level.

At the organisational level, a few highlighted primary prevention strategies that appear frequently are promoting a help-seeking culture (S61), career development opportunities (S75), and reducing harmful stigma (S43). Increasing suicide rates have been an issue of concern in construction industries all over the world. In recent studies, it has been found that embedding help-seeking and help-offering behaviour within the organisational culture is one effective way of preventing suicide [59]. In terms of secondary prevention, strategies such as offering health and wellbeing workshops (S60) and increasing awareness of mental health risk factors (S62) are frequently repeated. In particular, intervention programs such as MATES in Construction [67] and Life Care Skills program [58] have proven the effectiveness of mental health awareness programs for reducing poor mental health in the construction industry. Interestingly, this study has identified a number of tertiary prevention measures at the organisational level.

Overall, this suggests that mental health strategies act together in a broader context and are most effective when established at different levels simultaneously throughout the organisation. The three prevention types, primary, secondary and, tertiary, can provide a more holistic understanding of viable strategies for eliminating, reducing, or coping with risk factors identified at all three levels. Primary measures are only suggested at the workgroup level and organisational level. This is because elimination or reduction of sources of risk factors at the workplace is a responsibility that lies with the organisation and workgroup. Furthermore, there is a lack of tertiary prevention measures explored at the individual and workgroup levels, which needs further attention in future studies to promote individual and workgroup-oriented support strategies for quick rehabilitation for employees who suffer from poor mental health. In particular, financial evaluation of

strategies shows that most of the suggested strategies at all three levels are non-financial measures that can be implemented without cost.

4.3. Research Gaps and Future Research Direction

Table 3 explains the areas that remain unanswered and where further research should be directed in order to attain a better understanding of the mental health aspects of the construction workplace. In particular, our review revealed that there is a paucity of research investigating mental health risk factors concerning the age of individuals. For example, even though research has found that older construction workers are more prone to health risks [73], research on older construction workers' mental health aspects has often been ignored. Similarly, future research needs to consider diversity within the industry by paying attention to specific trades, professions, teams, and organisations and their cultures, systems, and policies when exploring mental health risk factors and appropriate strategies. Compared to the research focusing on mental health risk factors, coping strategies for mitigating poor mental health in the construction industry are less well researched. Table 3 reveals that coping strategies need further attention in future research at all three levels. Thus, a means to intensify research on such strategies could be through the development of primary, secondary, and tertiary prevention measures at all three levels (individual, workgroup, organisational) to cover broad aspects of mental health.

Table 3. Future research directions.

Level	Research Gap	Future Research Directions
Individual Level	Lacking areas in relation to individual-level risk factors	Exploring women's construction work stressors [37]
		Designing scales to measure the stressors (e.g., frustration, fatigue, anger) of females and males separately [50]
		Exploring factors in construction professionals' burnout [29]
		Exploring stressors of mental health based on profession (e.g., project managers, architects, and engineers) [31]
		Investigating the impact of construction work environment (noise, light, sound) on stress levels of construction front-line workers [2]
		Exploring the factors affecting mental health beyond the workplace (e.g., personal lives) [6]
	Lacking areas in relation to individual-level strategies	Developing coping strategies from the perspective of on-site construction workers [13]
		Investigating viable intervention programs that reduce suicidality among male construction workers [62]
		Investigating the readiness of construction undergraduates to cope with construction workplace stressors [43]
		Investigating the barriers for effective implementation of help-offering and help-seeking behaviour in different age categories [66]
		Investigating the impact of mental health interventions by varying age [10]
		Investigating the relationship between individuals' personality and the way they respond to stressors [31]
		Examining the long-term effects of mental health intervention on individual's attitudes and beliefs [59]
		Designing new scales to measure the effectiveness of coping strategies in dealing with strain effects [50]
Workgroup level	Lacking areas in relation to workgroup-level risk factors	Assessing the impact of construction project task stressors on occupational stress [2]
		Exploring stressors from the perspective of construction production and risk management [2]
	Lacking areas in relation to workgroup-level coping strategies	Investigating coping strategies for mental ill-health based on various trades in the construction sector [6]
		Developing a psychological self-reporting scale specific to construction trades [10]
		Exploring strategies such as resilience and optimism for different construction workforces [6]
		Investigating the impact of flexible work systems for different cultures and workgroup contexts [10]
		Assessing the relationship between psychological stressors and project performance [40]
Organisational Level	Lacking areas in relation to Organisational-level risk factors	Investigating stressors associated with the tendering process, supply chain, and business strategies [2]
	Lacking areas in relation to Organisational-level coping strategies	Incorporating mental health coping strategies with occupational health management systems (e.g., ISO 45001) [2]
		Investigating role of organisations in stimulating wellbeing among construction professionals [50]
		Exploring the benefits from job redesign and interventions on employee engagement and morale [13]
		Benchmarking mental health interventions and policies at construction workplaces [6]
		Developing mental health interventions that incorporate organisational justice and flexible working systems [10]
		Assessing the relationships between protective factors, risk factors, and poor mental health [10,31]

4.4. Limitations of the Study

Similar to other systematic literature reviews, the main limitation of this study lies in its reliance on theoretical findings gathered from published articles as opposed to validating findings empirically. The number of papers utilised to retrieve the data and further analysis was limited by the inclusion criteria set out in the methodology section. Furthermore, no critical appraisal using an established protocol was presented. However, this review only used peer-review journal articles, ensuring the reliability of the results. Another limitation is that the grouping of risk factors and strategies into a taxonomy is highly subjective; as such, future studies are encouraged to carry out a confirmatory factor analysis to confirm the factor structure used in this paper.

5. Conclusions

To enhance construction workplace mental health, an essential prerequisite is understanding the stressors and strategies involved in overcoming mental health challenges. Therefore, this study aimed to identify and critically analyse mental health risk factors and strategies in order to mitigate the risk of poor mental health in the construction industry by conducting a systematic review. Analysis of risk factors at three levels, namely, individual, workgroup, and organisational, reveals that certain factors are inherent to the nature of the construction industry, which means that eliminating them is not always possible without compromising performance. Having identified the importance of various types of prevention measures, we used a thematic analysis of strategies to develop a taxonomy of three prevention measures, namely, primary, secondary, and tertiary prevention, which denote elimination, coping, and rehabilitation, respectively. Therefore, the taxonomy of strategies presented in this study provides a coherent way of applying prevention in a construction work setting in order to manage mental health risk factors.

This review reveals future research directions related to the identified levels of mental health risk factors and strategies. Despite substantial studies that have focused on generic construction workplace mental health stressors, there is a significant demand for studies related to age, project, profession, and trade-specific stressors, which provides ample further opportunities for researchers. Additionally, there is a need for far more research on mental health intervention and strategies in the context of the construction industry; co-occurrence networks in relation to high-frequency keywords could help to explore further areas for research. The findings of this study provide implications for decision-makers and industrial practitioners. A multi-level risk framework is suggested in order to make practitioners aware that poor mental health results from consolidation of number of risk factors. The evaluation of three prevention levels represents an interesting avenue by which to choose the correct prevention mechanism before, during, and in the aftermath of a stress event. Furthermore, potential strategies that extenuate risk factors at each level could help policymakers and project managers to design interventions and programmes that foster construction workers' wellbeing.

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