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Review

Mental Health Causation in the Construction Industry: A Systematic Review Employing a Psychological Safety Climate Model

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Abstract: The construction industry has a lamentable reputation for having a high prevalence of suicides and mental health (MH) problems. Several government and academic reports have identified that construction workers are at a far higher risk of MH disorders than workers in other industrial sectors. While studies on construction workers' MH have significantly increased in recent years, a systematic review of the potential causes of MH problems in the industry has hitherto eluded construction researchers. This study fills this ominous knowledge gap by conducting a realist systematic review of the literature published since 2003. The review conducted adopts the psychological safety climate model of PSC-12 to create a comprehensive list of MH causation (sourced from a rich literature synthesis) as a precursor to developing a theoretical model that identifies MH causations affecting distinct psychological safety climates within the industry. Emergent findings identify 43 MH causation factors with high job demand as the most significant contributor, followed by interpersonal relationships, low job control, low job support and physical status. In addition, it is found that organisation participation factors have been the major areas of focus, while management commitment and management priority are under-researched areas. Moreover, research gaps within the four dimensions of the PCS-12 model were explored to distinguish new potential research areas to address the knowledge gaps observed. In practical terms, the study collates and presents a comprehensive theoretical model of MH causations, providing a concise source of practical knowledge for practitioners.

Keywords: mental health climate; psychological safety climate; construction health and safety; work stress; systematic review

Citation: Golzad, H.; Teimoory, A.; Mousavi, S.J.; Bayramova, A.; Edwards, D.J. Mental Health Causation in the Construction Industry: A Systematic Review Employing a Psychological Safety Climate Model. *Buildings* **2023**, *13*, 2442. https://doi.org/10.3390/buildings13102442

Academic Editor: Osama Abudayyeh

Received: 2 August 2023
Revised: 19 September 2023
Accepted: 22 September 2023
Published: 26 September 2023

1. Introduction

Every year, numerous construction workers commit suicide due to mental health (MH) disorders [1]. Although global statistics on suicide rates are scant, statistics from individual countries that record these present a disturbingly high (and increasing) rate for construction workers [2]. For instance, labourers in Australia and the United Kingdom, respectively, have suicide rates 2 and 3.7 times higher than their overall national averages for all sectors [3]. Indeed, the Office for National Statistics states that in 2021, 507 construction suicides were recorded, of which 503 were male—an increase upon the previous year's recorded rate [4]. In addition to suicides, the 'Beyond Blue' organisation indicates that Australian construction workers have higher levels of anxiety and depression than

the average workers in other industries [5]. These are sobering figures for an industry that employs around 6–10% of the global workforce [6]. They also indicate that, other than the common drivers of MH problems (such as conditions at home or within wider society), the MH climate of construction workplaces significantly impacts workers [7]. Poor psychological health of workers can impact projects' performance, safety and productivity [8]. More broadly, poor MH at the workplace leads to significant social and economic costs [9]. According to the World Health Organization [10], depression and anxiety disorders cost the global economy $1 trillion (US) each year in lost productivity. Conversely, Beyondblue PricewaterhouseCoopers Australia [11] demonstrate that one dollar of efficient investments in the Australian workplace MH could save $2.30 via a considerable decrease in mental distress, resulting in reduced compensation claims from workers.

The UK's National Health Service (NHS) indicates that various workplace-related factors contribute to poor MH, including: unrealistic deadlines; job insecurity; complicated relationships with colleagues; inadequate managerial support; and harassment or bullying [12]. Bush, Drake, Xie [13] conducted a US study on 223 participants who suffer from long-term mental illness and determined that having stable employment is an essential factor for good MH. Beswick, Rogers, Corbett [14] argue that the construction industry has a project-based nature and is well-known for the characteristics of "part-time jobs" and "hire and fire", which creates job insecurity that can severely contribute to poor MH among workers. Moreover, bullying [15,16] and drug and alcohol consumption [5,17] are identified as critical factors to the poor MH of construction workers. According to Berry, Pidd, Roche [18] and Roche, Pidd, Bywood [19], construction workers have the highest prevalence of drug and alcohol consumption.

Workplace MH-related research in the construction industry is insufficient and hitherto, most construction health and safety research has focused on workers' physical health [20]. However, significant attention has recently been drawn to this aspect of workplace health and safety (WHS) [21]. These studies have focused on particular drivers of MH disorders such as: bullying [22]; alcohol and drug consumption [23]; work overload [24]; and employment conditions [25]. However, there is no single study to develop a comprehensive framework of factors contributing to the MH climate of the construction workplace. For example, although Nwaogu, Chan, Hon [26] conducted a scientometric analysis of existing literature to provide researchers with a holistic picture of existing knowledge and quantitative indicators that describe the current themes, they did not offer an in-depth analysis of the identified root causes of the industry's poor MH climate. Moreover, Chan, Nwaogu and Naslund [3] developed a model of factors contributing to the MH of construction workers, but the study focuses on individuals rather than the MH climate of the industry as a whole. This leads to the formulation of the research question: "What are the key determinants influencing the mental health climate within the construction industry?"

To address these observed deficiencies in past research, this present study provides a systematic review of extant literature (through the lens of an established psychological climate model) to develop an all-inclusive model of factors contributing to the MH climate in the construction workplace. Three concomitant objectives are formulated to: (1) identify the root causes of the MH problems among construction workers; (2) develop a theoretical framework of factors contributing to the MH climate of the construction industry using a psychological climate model; and (3) outline any further research gaps and delineate future research direction.

2. Materials and Methods

To develop a theoretical model for the phenomenon under investigation, an interpretivist philosophical design and inductive reasoning were adopted (cf. [27,28]). This epistemological positioning has been extensively used within construction management science to, for example: develop a conceptual model for construction management curriculum development [29]; investigate the impact of post-occupancy evaluation upon the natural environment [30]; and orchestrate the management of infrastructure development

for a Formula One grand prix event [31]. Given this body of supporting work, the approach prescribed is valid for this type of theory-building research work. Among the various forms of systematic review, the realist approach is the most appropriate for analysing multiple factors contributing to the MH climate of construction workplaces. This is because it is designed to provide a descriptive analysis of what is a causation for a phenomenon, in what respect, and under what conditions [32]. Hence, this approach was adopted.

As an iterative waterfall process was adopted [33,34], this research first defines the research scope, then searches for pertinent studies prior to analysing the search outcomes and categorising the results based on a psychological climate model developed by Hall, Dollard and Coward [9] (cf. Figure 1). Finally, this study develops a theoretical model demonstrating the factors contributing to the MH climate of the industry. The keywords for the present study were generated by combining all the keywords used by Nwaogu, Chan, Hon [26] and Chan, Nwaogu and Naslund [3], thus producing the following two categories of keywords:

- "mental health", "construction industry*"; "psychological health" OR "psychosocial risk factors" OR "biopsychosocial risk" OR "work stress" OR "job stress" OR "workplace stress" OR "job burnout" OR "occupational stress" OR "occupational stressors" OR "job stressors" OR "organisational stressors" OR "burnout" OR "mental health" OR "mental illness" OR "psychological distress" OR "depression" OR "psychosocial working environment"
- AND "construction industry" OR "construction workers" OR "construction site" OR "construction project" OR "building industry".

This study searched the Web of Science and Scopus using a two-step search on *title*, *abstract*, and *keyword* from January 2003 to December 2022 to encompass the last two decades of knowledge in this area. Initially, a total of 2115 references were detected. Then, only peer-reviewed journal articles, the articles written in the English language, and articles that were available online were selected, excluding edited or authored books, conference proceedings, journal editorials, articles written in languages other than English, government and industry reports, and non-academic research. After this filtration, the number of records was reduced to 1477 references. In addition, the source title was limited to the building, construction, project management, and health and safety journals as the mental health research in the areas of psychology, medicine, public health, biochemistry, and social science are not within the scope of this research. This limitation reduced the reference number to 305.

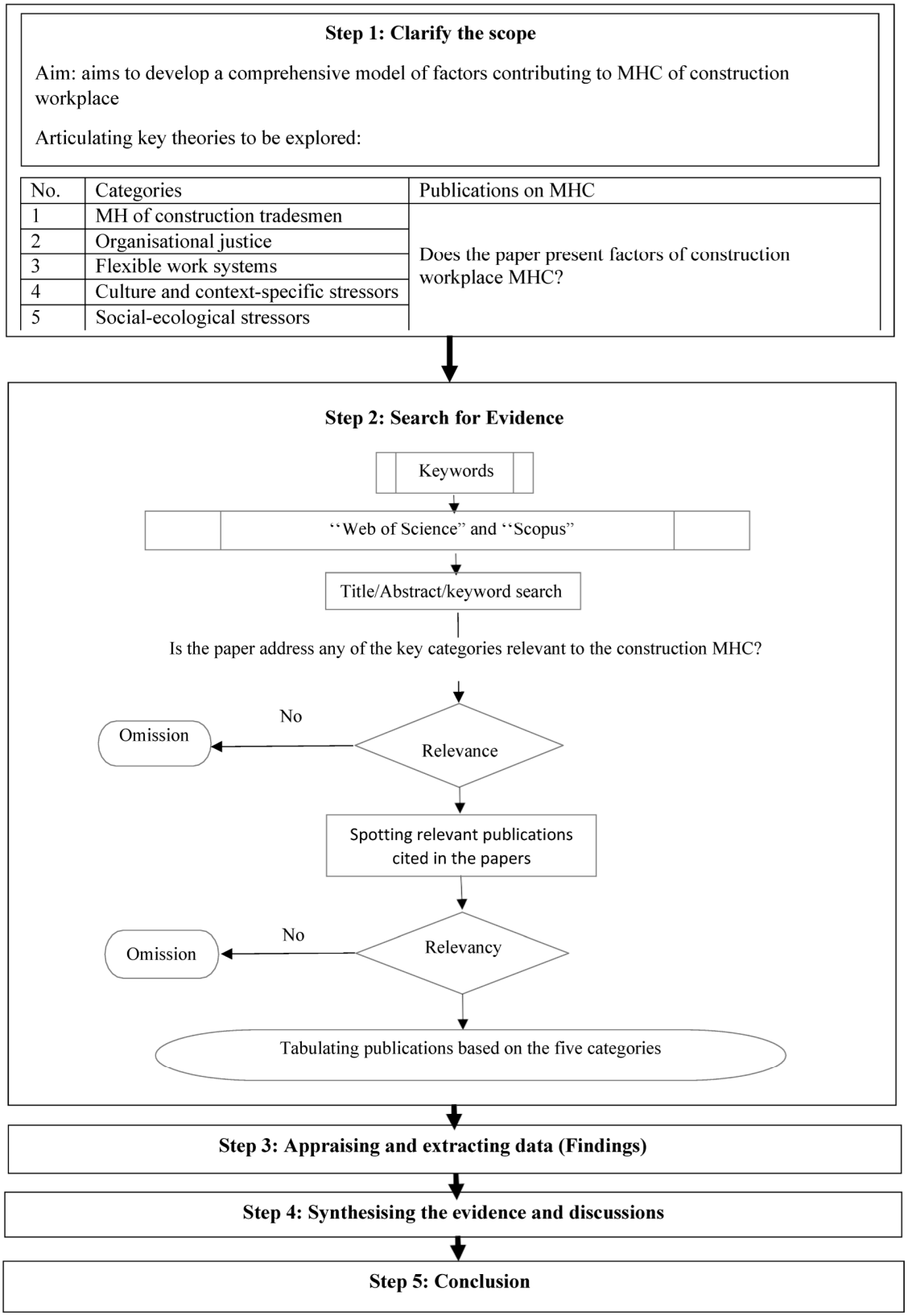

Figure 1. Research method (adopted from [35]).

Psychological safety climate (PSC) is characterised as a shared perception of policies, practices and procedures to maintain workers' psychological health in the workplace [36].

The PSC-12 is a 12-item tool comprising four domains (cf. Hall, Dollard and Coward [9] viz.: (1) *management commitment* to stress prevention and support; (2) *management priority* for employee psychological health as compared to productivity; (3) *organisation communication* systems and their effectiveness; and (4) *organisation participation* and consultation at all levels of the organisation regarding psychological safety [37]—refer to Figure 2. *Management commitment* pertains to the endorsement and dedication of senior management towards fostering psychological well-being, as demonstrated by their active involvement and steady commitment [38]. This aspect becomes apparent when senior management promptly and decisively respond to rectify any issues that may negatively impact psychological health [39]. *Management priority* involves the emphasis that management places on the psychological health and safety of employees in comparison to productivity objectives [9]. To illustrate, job demands, such as work pressure, can be adjusted to attain a more manageable level, and management possesses the option to provide a range of resources (such as work flexibility, autonomy, and social support), which can act as protective measures against excessive demands and mitigate work-related stress. This approach aims to safeguard both employee psychological well-being and productivity. *Organisational communication* [9], which encompasses the manner in which the organisation effectively communicates with employees regarding matters related to psychological health and safety, ensures that these issues are properly acknowledged and brought to the attention of employees. The final aspect, *organisation participation*, focuses on the active engagement and consultation of all organisational levels in the stress prevention process, incorporating diverse stakeholders such as employees, supervisors, project managers, and health and safety officers in the occupational (psychological) health and safety processes [39]. The current study uses all four domains of the PSC-12.

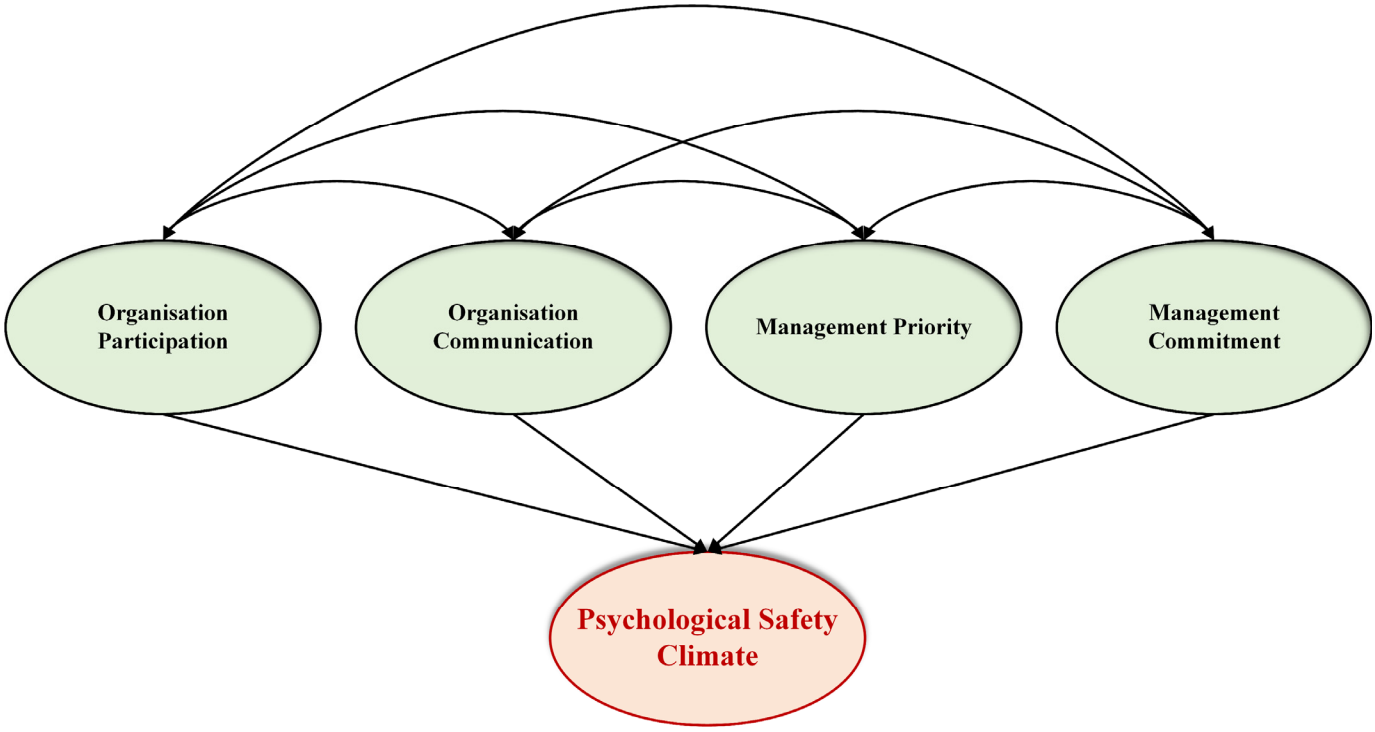

Figure 2. PSC-12 dimensions adopted from Hall, Dollard, and Coward [9].

Content analysis was conducted on the title, abstract, and keywords of each collected paper (where each paper constituted a unit of analysis cf. [40,41]) to ensure that it covered at least one of the MH causes. Subsequently, 65 papers were found to be relevant for this study. To ensure that all relevant articles are included in a data set, Watson and Webster [42] recommend considering the reference lists of the collected papers—a so called snowballing

approach [43]. Adopting this approach, six additional relevant articles were identified, bringing the total number of sample papers for analysis to 71. After finalising the search, the selected papers were read by all members of the research team to check for content relevance (as part of a final literature cleansing process). The review process included three research students and two academic staff members, according to the definitions of the PSC-12 provided above, to ensure the quality control of the research process. The text of the papers was then coded, using the terms of the PSC-12 model developed by Hall, Dollard and Coward [9].

3. Results

3.1. Demographics

Eighteen journal titles appear in the list of collected papers (Table 1). The Journal of Construction Engineering and Management, which appeared with a frequency of (f) = 21 (or 29.16%) articles published, is on the top of the list, comprising a proportionally large number of papers compared to other journals. All the other journals have <10 publications in our data set. Automation in Construction is the second most published journal, with nine papers, followed closely by Construction Management and Economics and the Journal of Management in Engineering.

Table 1. List of journals.

Source Title	No. of Articles (f)	Percentage (%)
Journal of Construction Engineering and Management	21	29.58
Automation in Construction	9	12.68
Construction Management and Economics	8	11.27
Journal of Management in Engineering	9	12.68
Engineering, Construction and Architectural Management	6	8.45
International Journal of Project Management	6	8.45
Safety Science	4	5.63
International Journal of Construction Management	3	4.23
Building and Environment	3	4.23
Safety Research	1	1.41
Applied Economics	1	1.41
Canadian Journal of Civil Engineering	1	1.41
Human Factors and Ergonomics in Manufacturing	1	1.41
International Journal of Construction Education and Research	1	1.41
Journal of Computing in Civil Engineering	1	1.41
Journal of Financial Management of Property and Construction	1	1.41
Journal of Management Development	1	1.41
Buildings	1	1.41

The number of publications has increased over the most recent few years sampled (refer to Figure 3). The first ten years were steady, but the number of publications increased in the second decade of the selected time frame. In 2020, the number of publications increased to fifteen, the most published year. In 2022, there are seven records on our data set, which shows the trend has slightly decreased in this year. Overall, these data demonstrate that the trend of the number of publications in the field of MH climate in construction is increasing.

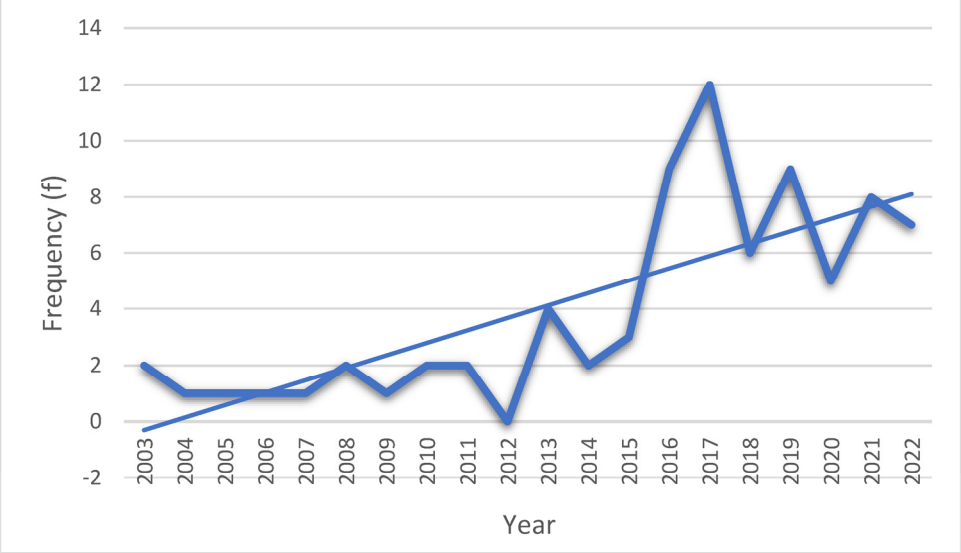

Figure 3. Publication quantity trend by year.

3.2. Psychological Safety Climate Domains

After coding the papers, 43 factors are identified that contribute to the categories of the PSC-12. Overall, the factors of organisation participation (f = 14 factors or 33%) have the highest frequency, followed by management priority (f = 12 factors or 28%), organisation communication (f = 9 factors or 21%), and management commitment (f = 8 factors or 18%). The MH research within the construction domain exhibits a considerable focus on organisational participation. Additionally, investigations into the management aspects of the MH climate (both management priority and management commitment) comprise a considerable portion, accounting for approximately one-third of the published papers. However, an evident observation is the scarcity of research concerning organisation communication and management commitment in the context of MH in this specific industry. This inadequacy implies the necessity for increased scholarly attention to these areas.

3.2.1. Organisation Participation

Organisation participation reflects the MH conditions of the individuals in the organisation (Hall, Dollard and Coward [9]). In this category, this study investigates the papers that conducted experiments, interviews, questionnaires, or practices employed for assessing a worker's psychological situation. Specifically, these publications have either conducted or proposed an organisational participation level in psychological health assessment or intervention approach(es). Several studies used wearable devices such as electroencephalogram (EEG), biosensors, and eye-tracking devices to investigate construction workers' psychological conduction, e.g., stress, emotional exhaustion, burnout, and mental fatigue [44–47]. The results revealed that EEG is a useful tool to understand workers' mental situations when considering physical fatigue [45] and that heavy physical activity develops mental fatigue [47]. Jebelli, Choi and Lee [48] stated that early recognition of stress is a vital stage of stress management and Jebelli, Hwang and Lee [45] confirmed that EEG could be useful to screen workers' stress levels. Li, Li, Wang [49] used wearable eye-tracking technology to examine the impact of mental fatigue on excavator operators' abilities of hazard detection. Similarly, Powell and Copping [50] used actigraphy (wearing an actimetry sensor) to assess the impact of sleep deprivation on workers' mental situation, resulting in on-site accidents. The investigation results indicate that mental fatigue is a primary factor of construction site accidents. In total, the dominant roots of MH issues examined by EEG are physical fatigue and an unhealthy lifestyle, i.e., smoking, alcohol consumption, and insufficient sleep. Also, the main contribution of these articles is using wearable devices (as part of the global movement towards Industry 4.0 connectivity and

adoption (cf. [51,52])) to understand workers' psychological conditions, such as stress and mental fatigue. In addition to fatigue, a noisy and stressful workplace is found as a major contributor to the risk perception of the workers [53]. Table 2 illustrates the articles that focus on participating organisations assessing workers' MH, how organisation participation can be conducted, the roots of MH problems, and possible contributors in this matter. As an alternative to wearable devices, the remaining articles assess the workers' MH using primary perception data sourced from interview, survey, and questionnaire methods. In addition, Johari and Jha [54] used observation to assess the workers' performances and identified that mental aptitude has less impact than psychical aptitude on workers' performance. Mubarak, Khan and Khan [55] suggest that employees' resilience and mindfulness act as buffers against the negative impact of psychological distress on project success. Kurtzer, Blackmore, Farrugia [56] conducted interviews that identified that the male stereotype of independent and strong-minded individuals predominates. The authors (ibid.) are concerned that addressing MH is difficult due to the stereotyping associated with these illnesses. Cumulatively, the primary recommendations of these papers are intervention, stress management programs, education, and awareness. Gullestrup, Lequertier and Martin [57] revealed that intervention programs, such as MATES in Australia, that provided training, stress management programs, after working hour support, and suicide hotlines, significantly improved the MH of construction workers. These practices are endorsed by [58–60], who implemented surveys to study the MH of construction workers.

Table 2. Organisation participation in mental health evaluation.

Author	Assessment Method	Major Causative Factor	Intervention
[44]	EEG	Inappropriate task allocation	EEG can be useful in estimating task mental workload
[45]	EEG	-	EEG can be useful in understanding workers' psychosocial conditions
[46]	EEG	Stress	Learning algorithms can be used to recognise workers' stress from EEG output
[49]	EEG	Pre-service fatigue	Screening targets can be identified by pre-service EEG test
[47]	EEG	Physical fatigue	Stress management programme
[49]	Eye-tracking	Physical fatigue	Eye-tracking is effective in quantifying machine operator mental fatigue
[50]	Wearable sensor	Sleep deprivation	Actimetry sensor can be used in investigating sleep and mental efficiency
[48]	Wearable biosensor	Inherent stressful job	Early detection of occupational stressors can enhance performance and safety
[57]	Questionnaire	-	Early intervention program/training/suicide hotline
[61]	Questionnaire	Economic and social issues/unhealthy lifestyle	Organisational and personal stress-management intervention
[62]	Intervention Assessment Surveys	-	Personal growth-orientated programmes contribute to MH
[63]	Survey	Lack of proper equipment/working quickly	On-job training/stress-reduction programs decrease accidents
[64]	Questionnaire	Lack of proper equipment and difficult working conditions	Artificial oxygen supply for tunnel workers increases physical performance but causes anxiety
[56]	Interviews	Prevalent unhealthy lifestyle	Awareness programs, particularly for ageing workforce
[65]	Questionnaire	Marital status/gender	Family friendly employment policy could moderate stress, resulting in cost saving
[66]	Questionnaire	Emotional intelligence	Emotional intelligence could be used to increase project performance
[60]	Intervention Assessment	Self-stigma	Online anti-stigma program

Table 2. *Cont.*

Author	Assessment Method	Major Causative Factor	Intervention
[59]	Intervention Assessment	Stigma in unemployed workers	Contacting and connecting programs
[58]	Interview	Unhealthy lifestyle	Health promotion programme
[66]	Questionnaire	High job demand	Self and work support
[67]	Questionnaire	Long working hours, high demand	Regularly apprised about health and safety, proper PPE and equipment
[68]	Questionnaire	Long working hours, stress, home/work conflict, organisation's priority of productivity versus workers' well-being	Over time, working and family conflict has a negative impact on work and family commitment
[69]	Questionnaire	Lack of recovery after work, depression, post-traumatic stress, low participation in decision making, low social support	Psychosocial work factors should be assessed job-specifically
[70]	Questionnaire	Common mental disorders result in low work ability	The use of job-specific questions on work ability to identify preventive actions
[71]	Questionnaire	Lack of personal/family time, cost of living, self-stigma	Education on self-stigma, and replacement with positive strategies
[55]	Questionnaire	Employees' lack of resilience and mindfulness	Theoretical directions to minimise psychological distress among project employees
[53]	Questionnaire	Stressful/unhealthy work environment	The noise sensitivity of the workers has a major impact on their risk perception

Abhijith, Deepika, Mirfath [68] and Chakraborty, Das, Pathak [67] indicate that long working hours, high demand, and conflicts have a negative impact on the psychological climate of an organisation. In addition to those factors, Boschman, Van der Molen, Sluiter [69] emphasise post-traumatic stress, lack of recovery, and social support as destructive factors. Langdon and Sawang [71] state that lack of personal/family time, cost of living, and self-stigma are triggers of MH issues. These studies recommend: intervention programs (e.g., suicide prevention, education, training, connect, and contact); safety and working hour regulation [67,72]; well-being screening and monitoring [70]; and after work recovery [69].

In summary, the articles assess participants' MH using wearable devices, interviews, questionnaires, and online surveys. The primary problematic MH factors are physical and mental fatigue, unhealthy lifestyle, and the difficult nature of working conditions in the sector. However, the results of these studies revealed that MH conduction, education, awareness, health promotion, intervention, and psychological support significantly contribute to the MH of construction workers.

3.2.2. Organisation Communication

Cox, Griffiths, Barlowe [73] indicated that proper communication about psychological safety contributes to an organisation's MH climate. Moreover, managers who communicate with workers about workplace psychological well-being and have an open-door policy about psychological health issues contribute to better MH climates (ibid.). Workers might prefer different ways of communication but, generally, providing an atmosphere where colleagues can communicate about psychological health comfortably is the primary objective of this domain of the psychological health climate [74].

Liu, Habibnezhad and Jebelli [75] and Adeyemi and Aigbavboa [76] stated that poor communication has a negative impact on the MH climate—refer to Table 3. Lingard, Zhang, LaBond [77] emphasised supervisor–apprentice communication and the effectiveness of context based discussion. Pousette and Törner [78] investigated the effect of work preparation meetings (as a communication method) on the prevailing psychological climate.

The results revealed that contrary to the expectation, they did not contribute to mental well-being and analysis indicated that education and support could contribute to mental well-being. Leung, Bowen, Liang [63] proffer that social gatherings serve as a potential communication method to enhance the MH climate within construction organisations. Conversely, high job demand, low job control, and inadequate job support are identified as detrimental factors affecting the MH climate. The authors (ibid.) recommended social gathering, job reallocation, and fair compensation policies as means of augmenting MH within the workplace. Social processes, joint activities, and team support are also endorsed by Zika-Viktorsson, Hovmark and Nordqvist [79], who also recommended altering leadership and organisational structure. Leadership organisational changes are also suggested as contributors to this matter by Hampton, Chinyio and Riva [80]. This study indicated that physical and emotional well-being are MH conditions and psychological services are beneficial. Sobeih, Salem, Daraiseh [72] recommend a series of constructive approaches aimed at enhancing the MH climate. These recommendations include the implementation of suicide prevention programmes, education, training, connect and contact, safety, and working hour regulation.

Table 3. Organisation communication articles.

Author	Assessment Method	Major Causative Factor	Intervention
[78]	Questionnaire	Workers' perceptions of influence at work, of workload and of cooperation	Education, support
[80]	EEG	Physical status, interpersonal relationships, emotional well-being	Job training, psychological services, leadership organisational changes
[79]	Questionnaire	Organisation/leadership structures, objects/outcomes nature	Exchange of ideas, social processes, joint activities, team support
[75]	EEG	Poor communication	Human-robot collaboration framework
[63]	Questionnaire	High job demand Low job control and job support	Social gathering, job reallocation fair compensation policies
[72]	Systematic review	Psychosocial and physical disorders e.g., musculoskeletal disorders	Education, training, connect and contact, and regulation
[77]	Interview	Supervisor-apprentice communication	Context-based communications are more effective than classroom-based training
[76]	Questionnaire	Poor communication	Construction professionals should collaborate with one another in order to solidify their relationship and enhance their performance within their professional bodies.

3.2.3. Management Priority

Kazaz and Ulubeyli [81] studied the effect of psychological factors and economic factors on workers' performance. The study (ibid.) suggests that monetary factors are more effective than psychological factors in enhancing construction workers' productivity in developing countries. Tijani, Osei-Kyei and Feng [82] systematically reviewed studies of work–life balance to evaluate its effect on construction workers' MH—refer to Table 4. Emergent results revealed that at different stages of construction projects, working hours can vary and turn from standard daytime working hours to night shifts, working on weekends, or long working hours—such fluidity in working times negatively affects the worker's MH and could reduce their performance. The study (ibid.) suggested adopting work–life balance intervention programmes, for example, changing working hour rosters. Similarly, Zika-Viktorsson, Sundström and Engwall [83] stated that high levels of project overload are associated with high levels of psychological stress. McCabe, Loughlin, Munteanu [84] reported that construction supervisors experienced psychological symptoms under high working pressure, and that a high workload increases accident rates. Johari and Jha [54] studied the psychological aptitudes of construction workers and indicated that although psychological aptitude affects performance, physical aptitude has the primary impact on this matter. Hence, managers should prioritise physical aptitude to psychological aptitude

in the process of construction worker recruitment. Generally, both psychological and physical aptitudes affect workers' performance. In summary, the articles which fall into this category study the relationship between the psychological factors and performance and productivity. Some managers impose a high workload on workers or require them to work overtime with the intention of expediting project timelines or achieving specific milestones. However, Johari and Jha [54] and Ahmad, Nauman and Malik [85] indicate that such an approach not only exerts a detrimental influence on the psychological climate experienced by workers but also negatively impacts their overall performance.

Table 4. Management priority articles.

Author	Assessment Method	Major Causative Factor	Intervention
[81]	Questionnaire	Socio-psychological factors	Monetary factors have more effects than psychological on performance
[82]	Systematic review	Physical status, interpersonal relationships, emotional well-being	Job training, psychological services, leadership organisational changes
[54]	General aptitude battery test and observation	Workers' physical and mental aptitudes	Physical aptitude has more impact than mental aptitude on performance
[83]	Questionnaire	Lack of recuperation opportunities, inadequate routines, scarce time resources, large number of simultaneous projects	-
[84]	Questionnaire	Work pressure/leadership strategy	-
[80]	Ethnographic observation	High job demand Low job control and job support	Social gathering, job reallocation, fair compensation policies
[85]	Questionnaire	Unappreciative management	Workers' personalities under tyrannical leadership induce work withdrawal behaviours.

3.2.4. Management Commitment

Table 5 demonstrates root factors of MH issues and methods that can improve the MH climate with the focus of commitment of the management and supervisors. Breaching psychological contracts, organisational injustice, and unfair treatment between managers or supervisors and workers are the outstanding issues in this regard. Newaz, Davis, Jefferies [86] and Chih, Kiazad, Zhou [87] stated that these issues can be moderated by practices that strengthen workers' perceptions of management commitment to psychological safety climate. For example, Bowen, Edwards, Lingard [61] recommend acknowledging discrimination in the workplace and addressing it with appropriate training of supervisors and line managers within the organisational level. According to Ju, Zhao, Wu [88], abusive supervision can instigate work-to-family conflicts through various mechanisms. These conflicts include heightened work pressure experienced by employees, the transference of individual stress from the workplace to the family domain, a decline in employee well-being, and a subsequent reduction in construction project performance. In summary, management commitment to maintaining a psychologically healthy climate is important to construction workers' MH and it could be achieved by practices that convince managers that workers' MH is important. Li and Griffin [89] studied management commitment during the COVID-19 pandemic and identified that there is a direct link between management commitment, higher psychological uncertainty, and safety compliance. Liang, Baral, Shahandashti [90] determined that one of the major challenges for workers during the pandemic was uncertainty in decision making and emphasised the significant role of management in providing support for them.

Table 5. Management commitment articles.

Article	Assessment Method	Major Causative Factor	Intervention
[61]	Questionnaire	Harassment/discrimination	Acknowledged and addressed by professional associations
[88]	Questionnaire	Abusive management	Family support
[91]	Questionnaires	Breaching psychological contract	Manage employees' psychological contract expectations
[87]	Questionnaires	Organisational injustice	Management practices that enhance fairness perception of workers
[86]	Questionnaires	Breaching psychological contract	Managers' commitment to psychological safety contract
[92]	Questionnaires	Intra-organisational injustice	Organisational policies to reduce injustice in the construction industry
[93]	Questionnaires	Psychological contract	Worker and supervisor good relationship
[89]	Questionnaires	Job satisfaction and employment uncertainty during the pandemic	There is a direct link between the management commitment, higher psychological uncertainty, and safety compliance.
[90]	Questionnaires	Decision-making uncertainty during the pandemic	Providing information on other options against the option with the easiest recalled instances has been proven effective

4. Discussion

4.1. Conceptual Model and Research Agenda

Based on the synthesis and analysis of extant literature, Figure 4 presents a theoretical framework that represents causative factors for psychological climate problems in construction organisations. Considering that the four categories of psychological climate are inextricably interconnected, all four categories collectively contributed to the PSC of construction organisations. That also means that each of the categories is significant and having poor performance in one of them would lead to failure of an organisation's PSC.

In total, 36 causation factors are identified. This study has determined that some causative factors contribute to more than one of the PSC dimensions. As an example, high job demand (as identified by the previous studies [63,66,84]) contributes to three of the four psychological climate areas, viz., organisation participation, organisation communication, and management priority. Also, the four factors of emotional well-being, namely, interpersonal relationships, low job control, low job support, and physical status contribute to two domains of the psychological climate (i.e., organisation communication and management priority). The construction industry is highly restricted by the timeframes agreed to in contracts and so professionals involved in the process frequently work on the weekends or overtime to deliver projects on-time [88]. In an analysis of the Australian work–life index by industry, the second highest industry with imbalance in work–life was the construction industry, only after public administration and safety [94]. Lingard and Francis [95] found that, among the different professions working in construction organisations, site-based construction professionals worked longer hours and experienced a higher burnout level than their colleagues working in the head office. Similarly, Haynes and Love [96] discovered that the three significant stressors that Australian construction project managers experienced are workload, long hours, and insufficient time with family.

Emotional well-being, or emotional exhaustion, is considered an individual's experience of their emotions and moods [97] and it has been identified as a causation in the two categories of organisation communication and management priority. Maslach and Jackson [98] describe poor emotional well-being as a psychological state of emotional and physical depletion, created by work-related reasons. Considering the physically demanding and long working hours of on-site construction workers, they are more likely to be exposed to emotional exhaustion than workers in less demanding industries. Golizadeh, Hon, Drogemuller [99] and Hwang, Jebelli, Choi [100] argue that during construction activities, the workers' emotional and mental states can closely affect their cognitive processes and

decision-making ability. Research also uncovered that positive emotional well-being can control the effects of job stress [101].

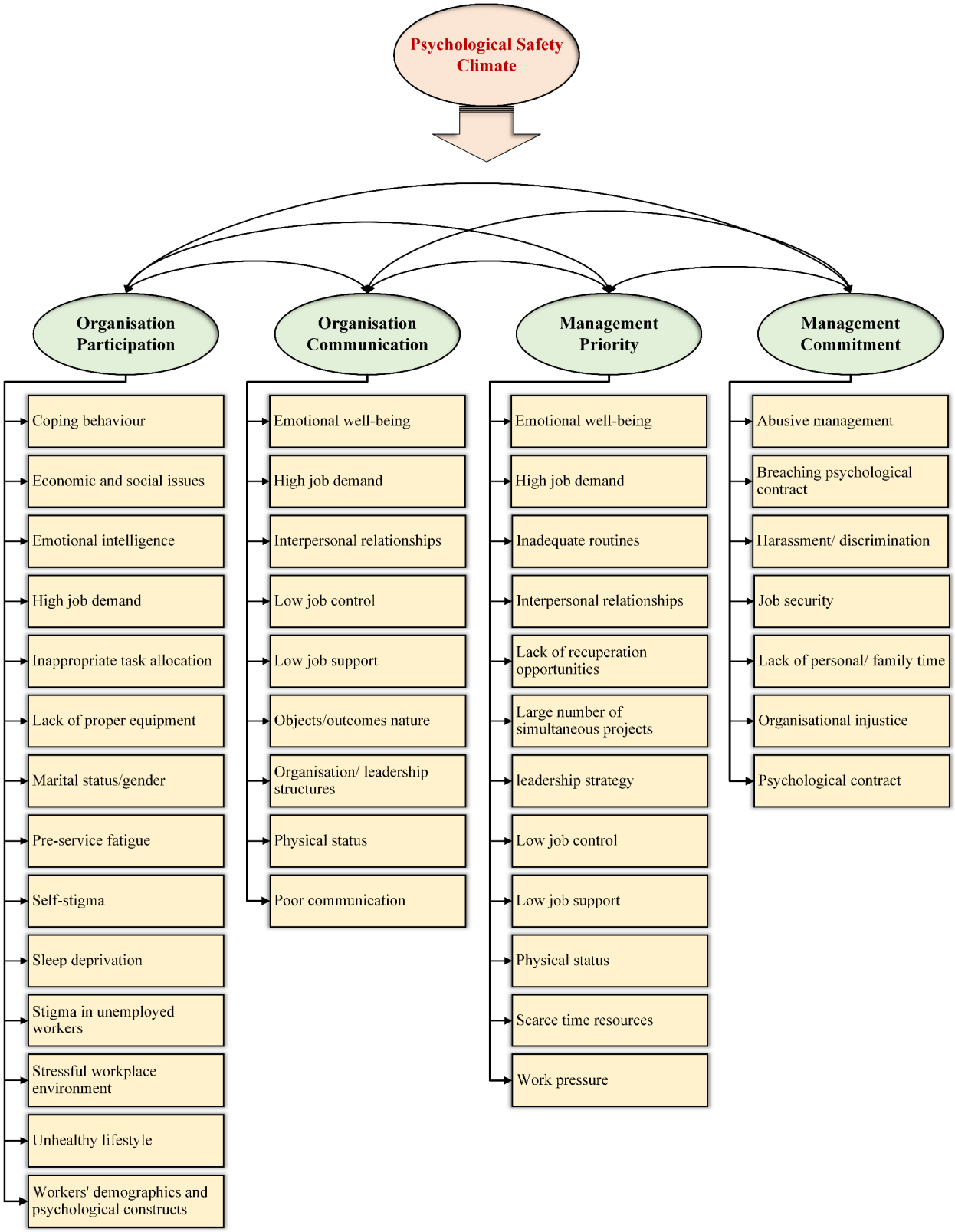

Figure 4. Causation of psychological climate problems in construction industry.

Interpersonal relationships are another identified trigger of the PSC problems in the construction industry and are categorised under organisation communication and management priority. Conflicts in interpersonal relationships in the construction workplace can range from momentary disagreements and disrespectful behaviours from co-workers or supervisors to heated arguments [102]. In addition to the workers having interpersonal relationships with their own teams, they also require interpersonal relationships with different subcontractors working on sites at the same time [103]. The management of interpersonal relationships in an environment where each team has different deliverables is complicated, given the need to balance overarching project priorities such as time and budget [104].

Job control and job support are significantly important in protecting construction workers from stress [105]. However, tasks (like many on-site works) that are characterised by low levels of autonomy and authority diminish workers' perceptions of their influence over the work, therefore producing mental problems [106]. In addition, low levels of decision authority are identified as a major predictor of early retirement in physically stressful occupations like construction work [35]. On the other hand, studies like [107] identified that construction workers with high job control and in a highly supportive environment are less likely to encounter an increased risk of developing MH problems. According to the Job Demand-Control-Support (JDC-S, [108]) model, occupations that are simultaneously high in demands, and low in support and control are perceived as the most stressful occupations and could lead to the most damaging health outcomes [109].

Physically demanding activities are typical on construction sites and often lead to physical and mental fatigue of workers. According to Adane, Gelaye, Beyera [110], overexertion in construction tasks has become one of the key causes of occupational accidents in the sector because it results in diminished cognitive performance (e.g., the occurrence of change blindness, lapses in vigilance, and inattentiveness) [47]. Having said that, the physical demands of the job must be adjusted for the physical status of the workers, especially for the older workforce. Peng and Chan [111] argue for the requirement of proper design of job demands and the provision of resources to satisfy individuals' health and physical statuses, which eventually leads to a reduction of occupational accidents in construction sites.

4.2. The Research Gaps

Although there has been a significant increase in the past five years in studies on the topic of construction workers' MH, many fertile areas of research remain unexplored. Most of the papers reviewed are focused on the causes of MH issues and potential approaches to mitigate such causes. Furthermore, studies in most cases have a reactive rather than proactive approach to preventing workers' MH issues. However, there is a notable lack of research on preventing the causations, and proactive approaches for reducing the probabilities of the causations to happen. Accordingly, a proposed research agenda to address the current gaps of MH causation is listed below and the candidate areas for future research include the following.

- Existing literature highlights the significant influence of WHS conditions on the MH of construction workers. The construction industry's historically poor WHS reputation contributes to a pervasive sense of fear among workers, regarding the existing risk of accidents and injuries [112], thereby acting as a stressor. However, there is a research gap in comprehensively understanding the intricate interrelation between WHS conditions and the MH of construction workers. Further research is required to delve into this connection, exploring how specific aspects of workplace safety impact workers' mental well-being and how targeted interventions can effectively alleviate stress and improve MH outcomes in this industry. While several recent research studies have explored the implications of EEG in MH assessment, their analyses have predominantly focused on mental fatigue. However, with the construction industry witnessing rapid advances in information and communications technology (ICT) and digitalisation, there exists a research gap concerning the development of a robust data

management system capable of supporting the decision-making process through the integration of machine learning algorithms [113]. Such a data management system could effectively leverage EEG data, along with other relevant factors, to enhance MH assessment methodologies in the construction sector, thereby contributing to improved worker well-being and overall project performance. Thus, further research in this area is essential to develop and validate the effectiveness of such a data-driven approach in MH evaluation and support within the construction industry.

- A research gap lies in the lack of investigations concerning the adoption process of ICT for identifying workers with MH issues within the construction industry. While ICT shows potential for enhancing mental health support, particularly in its capacity for identification, current research has not adequately explored the challenges and factors that influence the adoption of these technologies. The project-based nature of the construction industry, along with the prevalence of several small and medium-sized enterprises (SMEs) within it, further compounds this research gap, as the resistance of the construction sector to embracing new technologies, particularly among SMEs, remains a pertinent area of inquiry [114]. Thus, understanding and addressing the limitations faced by SMEs in the adoption process is crucial to effectively integrating ICT for MH-issue identification and support within the construction domain.
- Another research gap exists in the current literature concerning MH management, with a predominant focus on the personal level of MH management while comparatively less attention is given to exploring organisational approaches and solutions. Established WHS models, such as the Swiss Cheese model or the ConAC, highlight the chain of events leading to accidents, whereas the personal level represents the final link [99]. However, in the context of burnouts within construction organisations, which can be considered as MH accidents, there is no comprehensive model that identifies critical layers and factors within construction organisations to effectively mitigate the likelihood of burnouts. Further research is required to develop and validate such a burnout model specific to construction settings, which could facilitate targeted interventions and strategies for promoting mental well-being and reducing the incidence of burnouts among construction workers.
- The very latest research, published in highly rated scientific journals, underpins the importance of leading indicator development to proactively predict and mitigate deleterious circumstances that could lead to an accident or incident on site [40,41]. Such work could also tentatively be used as a basis for developing MH leading indicators, as the processes and theories underpinning health, safety and well-being are aligned.

5. Conclusions

This study presents the results of a realist systematic review and analysis of pertinent literature, since 2003, on the MH causations related to the construction industry. It creates a comprehensive list of MH causations using a well-established model, in response to the study's first objective. Linking the listed MH causations to the four categories of the PSC model, this study presents a theoretical framework based on the identified causations in the current literature to fulfil the study's second objective. Finally, the current state of the body of knowledge on the topic is evaluated, and gaps are diagnosed from a holistic perspective, thus addressing the study's third objective. This study stands out from other similar published studies in several ways. First, in terms of objectives—the study identifies the root causes of MH problems in the construction industry based on the established PSC -12 model, rather than identifying and analysing the themes existing in the literature. The study uncovered 43 causation factors within the current body of knowledge related to MH in the construction industry. Furthermore, it is noted that while there is a substantial amount of research in the areas of organisation participation and management priority, there is an obvious shortage of research addressing organisational communication and management commitment within the context of mental health in the construction industry.

Given the interconnected nature of these top-layer factors, it is imperative that each area is given the appropriate level of consideration. Second, the study systematically covers and establishes the research concerns and the corresponding gap modes in the literature on construction workplace MH. Specifically, four endemic and fundamental research gaps were uncovered and one opportunity to transfer knowledge was promoted. These call into question the current trends within the body of knowledge and the success of investigators in identifying and controlling the potential causations of MH in the construction industry. Nevertheless, several recommendations to address these gaps and to provide direction for future research are also proposed.

Despite the above contributions, the present study is no exception in terms of limitations that could affect the findings. The analysis covers English literature only, using a certain set of keywords for searching, and a certain time frame. Interpretivism is also used as the underpinning philosophical approach adopted and this could induce researchers' bias—however, this is reduced by using the robust PSC-12 model. Furthermore, the analysis is based on the data set of journal articles indexed in major research repositories; hence, it is affected by their limitations in terms of coverage. Therefore, the findings may not fully reflect the entire available corpus of the literature on workers' MH as it pertains to issues in the construction sector. These limitations, however, create fertile ground from which investigations can be targeted in future research. What is clear from the culmination of research presented is that MH has a severely deleterious impact upon people, organisations, and supply chains within the construction industry and further work undertaken could augment sector productivity and performance as well as enhance the lives of workers.

Author Contributions: Conceptualisation, H.G. and D.J.E.; methodology, H.G., S.J.M. and A.T.; validation, H.G. and A.B.; formal analysis, S.J.M. and A.T.; investigation, D.J.E. and A.B.; resources, H.G.; data curation, S.J.M. and A.T.; writing—original draft preparation, all authors; writing—review and editing, H.G. and D.J.E.; visualization, H.G. and A.T.; supervision, D.J.E.; project administration, H.G.; funding acquisition, H.G. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by University of Canberra, under the ECARD 2021 program.

Data Availability Statement: No new data were created or analysed in this study. Data sharing is not applicable to this article.

Conflicts of Interest: The authors declare no conflict of interest.

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