

1 **A deep dive into worker psychological well-being in the**
2 **construction industry: A systematic review and conceptual**
3 **framework**

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5 **Abstract:** The construction industry is stressful and worker psychological well-being
6 (PWB) concerns are on the rise with high prevalence of mental health problems.
7 However, there is currently no clear framework or system in the mainstream
8 construction literature to guide management practices such as allocating resources,
9 optimising work systems, and supporting worker well-being. In this study, a state-of-
10 the-art review was conducted on PWB constructs and the associated theoretical
11 perspectives. This review of theories and dimensions aims to provide a more complete
12 account of the factors associated with PWB and provide more systemic guidance for
13 organisations. Drawing on the three-dimensional taxonomy of PWB in Inceoglu et al.
14 (2018), this study identified five themes of PWB antecedents in the construction
15 community: motivational, relational, working environment, personal attributes and
16 social cognitive. Findings in this study could contribute to both PWB theory

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17 development and management practices. Theoretically, this review introduced more
18 clarity to PWB theories in the construction literature, linking different dimensions of
19 PWB constructs with their antecedents. This also allows for identifying future research
20 avenues to expand the boundaries of existing body of knowledge. Practically,
21 management practices were offered to support management, policy and decision
22 makers to optimise and improve health and well-being strategies in the construction
23 industry.

24 **Keywords:** Psychological well-being; Construction industry; Systematic review;
25 Taxonomy; Conceptual framework.

26 **Introduction**

27 For decades, sobering statistics have documented poor mental health issues in the
28 construction industry. On average, more than two construction workers took their life
29 by suicide every working day in the past ten years in Australia alone (Jenkin and
30 Atkinson 2021). Higher prevalence of suicide rates, mental illness and psychological
31 disorders in the construction workforce comparing to other occupations are often
32 reported across the global (Alderson 2017; Campbell 2006; Pwc 2014). However, the
33 industry struggled to deal with worker mental health issues because of many inherent
34 challenges, such as high work demands and low autonomy due to the nature of
35 construction work (Lingard et al. 2012; Xie et al. 2022). Worse yet, during the outbreak
36 of Covid-19 pandemic, the construction industry has continued to operate as an
37 essential service in some countries and regions. Pandemic-induced social isolation and

38 remote working policies have intensified the situation with reported anxiety and
39 depression numbers even doubling in some countries (OECD 2021).

40 Collectively, the above challenges have heightened the urgency and imperative to
41 focus on worker psychological well-being (PWB) issues as a whole industry (Altig et
42 al. 2020; Larsen et al. 2020; Smith et al. 2020). However, there is currently no clear
43 framework or system in the mainstream construction literature to guide management
44 practices such as allocating resources, optimising work systems and supporting worker
45 well-being. Although PWB has been studied as a multi-dimensional construct in
46 general organisational psychology domain, current systematic reviews in the
47 construction literature have tended to focus on single dimension of worker PWB in their
48 studies and mostly negative dimensions (e.g., stress, mental-illness, strain). For
49 example, Tijani et al. (2020) reviewed occupational stress of construction workers. Five
50 aspects of predictors of occupational stress were identified: task-related, organisational-
51 related, physical-related, personal-related and gender-related. Chan et al. (2020)
52 examined mental-illness in the construction community. They argued that factors
53 related to job demand and job controls were the foremost risk factors to mental-illness
54 of construction workers. Van den Brande et al. (2016) focused on the strain effect of
55 workplace bullying and highlighted the work-related factors (role conflict, workload,
56 role ambiguity, job insecurity and cognitive demands) that could cause strain. The
57 current lack of integrative frameworks limits the degree to which construction
58 researchers and practitioners can delineate the interplay of different PWB dimensions

59 and the effects of antecedents over time. Moreover, studies of different dimensions also
60 tend to invoke different theoretical mechanisms (e.g. using social exchange theory to
61 explain workplace behaviour; using job demands-resources theory to unpack
62 motivation at work), further compounding the fragmented approach to PWB in the
63 construction industry.

64 In this study we incorporate the multi-dimensional nature of PWB by including
65 various affective aspects of working experience, including not only negative outcomes,
66 but also satisfaction, self-realisation, sense of accomplishment and positive engagement
67 through work (Robertson and Cooper 2010; Ryff and Singer 2008). We also review a
68 variety of theoretical perspectives associated with the different dimensions of PWB.
69 Therefore, our review of theories and dimensions aims to provide a more complete
70 account of the factors associated with PWB and provide more systemic guidance for
71 organisations. Overall, this study contributes to PWB theory development in the
72 construction literature by providing a comprehensive review of different dimensions of
73 PWB constructs and their antecedents.

74 The study is arranged with the following sections. We first conceptualise the
75 concept of PWB and introduce an approach to categorise PWB constructs. We then
76 introduce the methods of conducting this systematic review, followed by detailed steps
77 in performing bibliometric and content analyses. Descriptive results of the reviewed
78 articles, including patterns of publication, journal sources, keyword, theories and
79 research methods are reported. Five themes of antecedents of PWB are identified with

80 thematic analysis, and an integrative framework is then developed to depict the relations
81 of PWB constructs and their antecedents. Based on the findings from the review, both
82 theoretical and practical implications are discussed in the end.

83 **Conceptualisation of PWB**

84 The notion of PWB can be traced back to Aristotle, whose main tenet was that
85 ultimate fulfilment came from realising one's true potential, instead of subjective
86 feelings of happiness (Miller and Marjorie 1986; Stones and Kozma 1989). Based on
87 this, following scholars worked to deepen the understanding of the complex concept of
88 PWB in different scenarios. Ryff and Singer (2008) categorised PWB into six aspects:
89 self-acceptance, positive relations with others, personal growth, purpose in life,
90 environmental mastery and autonomy. Fisher (2010) classified PWB constructs into
91 four groups: personal (e.g. meaning in life), communal (e.g. trust between individuals),
92 environmental (e.g. connection with nature) and transcendental (e.g. peace with God).
93 Despite the variations in defining and categorising PWB, it is widely accepted that well-
94 being should not simply represent the absence of illness, but also include positive
95 functioning that could empower individuals to achieve their potential (Cowen 1991;
96 Robertson and Flint-Taylor 2008). Therefore, PWB should incorporate both negative
97 (e.g., mental-illness, burnout, stress) and positive experiences (e.g., engagement,
98 satisfaction) (Lucas et al. 1996; Rousseau et al. 2008).

99 Studies on positive experiences of PWB were found based on two principal
100 philosophies and traditions: 'hedonic approach' and 'eudaimonic approach' (Boniwell

101 and Henry 2007; Ryan and Deci 2001; Robertson and Flint-Taylor 2008). The former
102 focuses on positive moods, emotions and overall satisfaction as indicators of well-being.
103 The latter emphasises the meaningfulness and purpose of living a life having value and
104 worth. Robertson and Cooper (2010) further argued that the two approaches were
105 complementary, embracing both positive emotions and sense of purpose as key
106 components of PWB.

107 Integrating the above research traditions, Inceoglu et al. (2018) suggested a three-
108 dimensional taxonomy of PWB to practically conceptualise employee experience in the
109 workplace: hedonic, eudaimonic and negative. Hedonic dimension emphasised the
110 subjective experience of pleasure, contentment and satisfaction at work. Eudaimonic
111 dimension emphasised positive feelings of aliveness and thriving at work through
112 personal growth and learning. Opposed to these two positive PWB, other psychological
113 symptoms and negative PWB constructs, such as stress, work-family conflict, mental
114 health problems formed the third category: negative PWB. This three-dimensional
115 taxonomy is not only the most up-to-date and comprehensive categorisation of PWB,
116 but also validated as applicable to describe employee PWB in the workplace.

117 In this study, we drew on Inceoglu et al.'s (2018) categorisation of employee PWB
118 to inform our conceptualisation of PWB experience of construction workers. Key
119 variables under each category were identified, including satisfaction, pleasure,
120 happiness, well-being and wellness in the hedonic group; psychological health, mental
121 health, engagement in the eudaimonic group; and burnout, emotional exhaustion, stress

122 and strain in the negative group. These keywords informed our research string at the
123 paper selection stage. This study applies the three-dimensional taxonomy of PWB to
124 understand worker experience in the construction community. Therefore, the review
125 scope should include construction workers from different professional backgrounds,
126 including architect, builder, engineer, building surveyor, project manager, quantity
127 surveyor, etc. The methods of conducting this systematic review are detailed in the next
128 section of the paper.

129 **Research Methodology**

130 To synthesise the existing research related to PWB in the construction literature, a
131 systematic literature review was performed to provide a thorough and objective
132 examination (Muller et al. 2019; Randhawa et al. 2016). This systematic review
133 includes three phases: Phase 1: selection of research papers; Phase 2: bibliometric
134 analysis; and Phase 3: thematic analysis. Phase 1 paper selection sets the boundary
135 conditions of the study with inclusion and exclusion criteria clearly identified for the
136 eligible studies for this review (Booth et al. 2016). It creates a firm foundation for
137 analysing the state-of-the-art and uncovering the uncharted areas. Phase 2 bibliometric
138 analysis offers descriptive summary results of the reviewed articles with their journal
139 sources, scholar information, citations, theory used, research methods and keywords.
140 Phase 3 thematic analysis examines deeper theoretical underpinnings and connections
141 of the selected articles and captures salient themes in the body of construction PWB
142 literature, informing the development of an integrative framework.

143 *Paper selection process and criteria*

144 Article selection process is presented in Fig. 1. The Web of Science Core
145 Collection (WOS) was used for initial searching, as WOS includes four major online
146 databases: Science Citation Index Expanded (SCI-EXPANDED), Social Sciences
147 Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI), and Emerging
148 Sources Citation Index (ESCI). Therefore, WOS provides a comprehensive basis for
149 articles selection in broad fields including arts and humanities; business; engineering,
150 computing and technology; social and behavioral sciences, etc. (Xu et al. 2019).

151 The process of article searching was conducted based on the preferred reporting
152 items for systematic review and meta-analyses (PRISMA) protocol guidelines
153 (Ayodele et al. 2020; Shamseer et al. 2015). The initial research string was defined
154 using boolean operators “AND” and “OR”. String 1 was constructed with the related
155 PWB keywords as suggested in Inceoglu et al. (2018): “well-being” OR “wellness” OR
156 “satisfaction” OR “engagement” “psychological health” OR “mental health” OR
157 “pleasure” OR “happiness” OR “burnout” OR “emotional exhaustion” OR “stress” OR
158 “strain”. String 2 further constrained our scope within construction community:
159 “construction industry”. When combining the Strings 1 and 2, 849 publications were
160 listed.

161 Paper screening process was conducted with the 849 publications by reading their
162 abstracts. In this stage, two selection criteria were applied: 1) only peer-reviewed
163 journal articles were kept for further analysis to ensure the quality of the articles

164 (Olawumi and Chan 2018; Song et al. 2020); 2) only articles with PWB related
165 keywords mentioned within the scope of construction industry were kept. As a result,
166 351 papers were selected for further review. To serve the purpose of this study, the
167 paper selection process focused on articles in which empirical studies were conducted
168 and PWB constructs were measured as outcome variables. After applying these
169 selection criteria, 75 of the 351 articles were kept. Examples of excluded paper are
170 those: (1) subject matters are not construction practitioners, such as Moore and
171 Loosemore (2014) examined the burnout of university students in construction
172 management major, not real construction workers; Zalejska-Jonsson (2014)
173 investigated occupants' satisfaction towards green and conventional residential
174 buildings; (2) PWB variables were mentioned in the study, but not measured as an
175 outcome variable, for example in Hengel et al.'s (2012) study, instead of being an
176 outcome variable, emotional exhaustion was tested as one of the predictors of ability
177 and willingness to continue working for elder construction workers; and (3) non-
178 empirical studies and non-peer reviewed journal articles.

179 To avoid omissions of eligible papers, the authors conducted an additional wave of
180 full text search within leading construction publications, including Journal of
181 Management in Engineering; Journal of Construction Engineering and Management;
182 International Journal of Project Management; Construction Management and
183 Economics; Engineering, Construction and Architectural Management, etc. As a result,
184 30 additional articles were identified. Therefore, a total number of 105 articles were

185 kept for further bibliometric and thematic analyses. As shown in Fig. 2, the number of
186 PWB construction publications presented an exponential growth, indicating that more
187 and more attention has been paid on well-being issues in construction industry
188 especially in recent years.

189 *Bibliometric analysis and thematic analysis*

190 To obtain a static and systematic flow, bibliometric analysis was performed to map
191 and visualise the bibliographic information of the 105 articles selected (Oraee et al.
192 2017; Sharma et al. 2020). Bibliometric analysis has been widely used in systematic
193 review studies to analyse chronological patterns of publication, journal sources, citation
194 network, key theories and methods of the reviewed articles (e.g. Hasan et al. 2021; Lee
195 et al. 2018; Li et al. 2019). VOSviewer was used in this study for bibliometric analysis.
196 It provides a map where the relatedness of items can be explained by the distance
197 between them. Shorter the distance between the items, the more related they are (Van
198 Eck and Waltman 2010).

199 Theoretical underpinnings and connectedness of the 105 articles were further
200 investigated with thematic analysis. Excel software was used to create the initial coding
201 sheet to facilitate the qualitative and quantitative analyses. A coding protocol was
202 developed based on a structured Excel sheet, where both demographic information of
203 each article (including authors, article title, journal, keywords and publication year) and
204 attributes of each article (including whether there is empirical study involved, whether
205 PWB construct was being measured as an outcome variables, the predictors of PWB

206 constructs, theories underpinning of the outcome of PWB constructs, data analysis
207 method as well as data source and sample size) were noted. The first three authors of
208 this paper were involved in the coding process. Experimental coding session was
209 conducted to ensure the same coding methods and standards were practiced. Manual
210 coding of the remaining papers was conducted independently by the coders afterwards.
211 Cross examination was performed among the coders to ensure the accuracy and mutual
212 agreement.

213 **Results**

214 *Descriptive results*

215 *Journal sources.* Citation analysis of the journal sources was conducted using
216 VOSviewer. Setting the minimum number of articles as two, 12 out of a total of 38
217 journals met the thresholds. Table 1 indicates the number of publications from a given
218 journal, as well as total citation and average citation. Accordingly, Journal of
219 Construction Engineering and Management published the most related articles ($N = 17$),
220 followed by Engineering Construction and Architectural Management ($N = 14$), Journal
221 of Management in Engineering ($N = 13$), Construction Management and Economics (N
222 $= 7$), International Journal of Project management ($N = 5$), International Journal of
223 Construction Management ($N = 4$), International Journal of Environmental Research
224 and Public Health ($N = 4$), Accident Analysis and Prevention ($N = 3$), Safety Science
225 ($N = 3$), Construction Economics and Building ($N = 2$), Journal of Engineering Design
226 and Technology ($N = 2$) and Journal of Civil Engineering and Management ($N = 2$).

227 *Scholar analyses.* Analysis of the scholars was conducted using VOSviewer.
228 Setting the minimum number of articles as two, 32 out of a total of 276 scholars met
229 the thresholds. As shown in Fig. 3, the size of a node gives a visual representation of
230 the number of publications by a given author, with a larger node indicating more
231 publications. The thickness of the connecting lines indicates the relatedness among
232 scholars in terms of mutual citations. It seems that Bowen P. is at the core of the network,
233 relating closely with many other scholars.

234 *Keyword analyses.* Keywords represent the core contents of existing studies and
235 describe research topics within a given domain. Co-occurrence of keywords
236 demonstrates the inter-closeness among them. By using “Keywords” and “Fractional
237 counting” in VOSviewer (Van Eck and Waltman 2017) and by setting the minimum
238 occurrence of a keyword at 2, 78 out of a total of 489 keywords were selected initially.
239 Before this analysis, work was performed to remove general keywords such as
240 “construction” and “engineering.” Fig. 4 shows the final visualisation of co-occurring
241 keywords generated from VOSviewer. The size of a node gives a visual representation
242 of the occurrence of a given keyword, with a larger node indicating higher occurrence.
243 Obviously, the occurrence of the keyword “job satisfaction” and “stress” were the
244 highest, indicating high focus on these two constructs.

245 *Use of theory.* Among the 105 reviewed papers, 51 lacked a theory to explain the
246 linkages between PWB and its antecedents (see Fig. 5). Conversation of resource (COR)
247 theory (Hobfoll 1989) is prevailed in the current literature ($N = 8$), which was employed

248 to explain the relationships among predictors (e.g. work interference with family,
249 family role overload, job demand and job autonomy) and PWB (e.g. job burnout, job-
250 related psychological strain and emotional exhaustion) (Cao et al. 2020; Cheung et al.
251 2018; Chih et al. 2016; Johnson et al. 2019; Lu et al. 2019). Job demands-resources
252 theory (Bakker and Demerouti 2007) was used by seven articles to explain how job
253 burnout and psychosocial health relate to role stress, job demands, job resources, work
254 pressure, job autonomy, supervisor support and coworker support (Bowen and Zhang
255 2020; Coetzer et al. 2017; Mostert et al. 2011; Sommovigo et al. 2019; Wu et al. 2019).
256 Job demands-control-support theory was used by four articles to delineate the influence
257 of job demands, job control and support, work-to family conflict, work overload on
258 workplace stress, burnout and psychological distress (Bowen et al. 2014a; Bowen et al.
259 2014c; Janssen et al. 2001; Liang et al. 2021). Social exchange theory (Blau 1964) was
260 used by three articles, examining the predictive power of career fit, fair human resource
261 practices, supportive leadership, work-life policies and experience of inclusion on job
262 satisfaction, work-life balance and turnover intent (Chew et al. 2020; Francis and
263 Michielsens 2021; Oyewobi et al. 2020).

264 *Research methods.* Fig. 6 represents the research method in the reviewed papers.
265 Structural equation model ($N = 39$) was used most frequently to analyse the
266 relationships between PWB constructs and their antecedents, followed by hierarchical
267 regression analysis ($N = 23$) and correlation analysis ($N = 12$).

268 *Empirical samples.* Fig. 7 shows the distribution of the countries or regions, where
269 empirical data were collected in the reviewed papers. The size of each node represents
270 the number of samples from a given country or region, with a larger node indicating
271 more samples. The number of samples from China ($N = 21$) ranked the first, followed
272 by Australia ($N = 17$), Hong Kong ($N = 15$), United Kingdom ($N = 10$) and South Africa
273 ($N = 10$), and United States ($N = 8$). Only three articles used samples from different
274 countries to test the construction professionals' PWB (Chan and Chan 2005; Cheung et
275 al. 2018; Leung et al. 2015).

276 ***Thematic results***

277 Thematic analysis was conducted based on the initial coding agreement and results
278 from descriptive analysis. The first and second authors independently reviewed these
279 initial codes of PWB antecedents from each paper to identify similar concepts and their
280 underlying meanings, so as to develop overriding groups that could represent the
281 substantive themes of all the antecedents. The themes identified by the first and second
282 author aligned closely for all antecedents in these 105 papers. After further discussion
283 and agreement with all the authors, five themes were developed based on substantive
284 focus under each theme, they are social cognitive, motivational, relational, working
285 environment and personal attributes. Based on the thematic analysis, an integrative
286 framework is developed and presented in Fig. 8. It captures the relations between
287 different PWB constructs and their antecedents.

288 **Discussion**

289 Through a systematic review, this study classified PWB constructs in the
290 construction literature based on pre-defined categories. Antecedents of these PWB
291 constructs were identified into five themes (see Table 2). Discussions on each of the
292 themes are as follows.

293 ***Motivational theme***

294 Motivational factors refer to conditions in the workplace that have motivating
295 potential in nature to shape construction worker PWB. The job demands-resources
296 theory is the underpinning mechanism explaining how these working conditions affect
297 employees' motivation, in turn their PWB (Hakanen et al. 2006; Schaufeli and Bakker
298 2004). Based on the job demands-resources theory, work conditions at various
299 occupational settings can be broadly classified into two categories: job demands and
300 job resources (Bakker et al. 2003; Demerouti et al. 2001). Job resources describe
301 conditions and characteristics that could support employees to achieve high
302 performance (Arnold et al. 2007; Hackman and Oldham 1980). Adequate job resources
303 (e.g. job autonomy) were found improving employees' perception of support and
304 control at work, thereby enhancing their satisfaction and engagement (Hsu and Liao
305 2015; Park and Jang 2017; Zaniboni et al. 2016). Job demands describe the physical,
306 cognitive and emotional efforts that are required to complete tasks (Demerouti et al.
307 2001). High job demands were reported associated with strain, health impairment, job

308 stress and burnout, which could trigger chronic exhaustion and reduced engagement
309 (Arnold et al. 2007; Leiter 1993; Steiner 2018).

310 As shown in Table 3, job demands factors of construction worker PWB have been
311 mentioned 49 times in the reviewed papers. Workload (26 out of 49) has been identified
312 as the most salient job demands perceived by construction workers, which in turn,
313 resulted in stress, burnout, lower satisfaction and other negative PWB outcomes. This
314 could be explained by the inherent challenges of construction work to deal with
315 inaccurate project estimates (Long et al. 2004), poor site management (Sambasivan and
316 Soon 2007), unforeseen risks and changes (El-Sayegh 2008) to ensure on-time project
317 delivery (Holden and Sunindijo 2018; Pheng and Chuan 2006). Table 3 also presented
318 that role conflict (8 out of 49) and task stressors (6 out of 49) were reported as important
319 causes of negative PWB constructs. These might be explained by the complexity of
320 large-scale construction projects, which requires good collaboration of multiple
321 stakeholders. Differences in the professional and even cultural backgrounds of
322 stakeholders could add difficulties in achieving efficient project coordination. Lack of
323 good communications and clarity in task arrangements could create potential pitfalls
324 for worker mental health.

325 Providing adequate job resources for workers is prudent in boosting their PWB
326 (Bakker et al. 2003). High levels of autonomy over tasks (20 out of 67), job security (7
327 out of 67), compensation and rewards (8 out of 67) and career development
328 opportunities (6 out of 67) were reported as important job resources. Thus, in the highly

329 demanding construction workplace, granting more job control and creating supportive
330 rewards and development opportunities are significant initiatives to enhance their
331 positive PWB outcomes, such as job satisfaction, engagement and reduce negative
332 PWB outcomes, such as burnout and stress (Phua 2012; Sommovigo et al. 2021; Yuan
333 et al. 2018).

334 ***Relational theme***

335 Relational theme, in this study covers the interpersonal relationship dimension in
336 the workplace. Based on the reviewed articles, antecedents under relational theme were
337 sorted into three types: interpersonal relationship, toxic workplace behaviour and
338 leadership behaviour. Table 4 shows the antecedents under relational theme.

339 Interpersonal relationship has been mentioned 17 times in the reviewed articles,
340 indicating the importance of good workgroup relationship and supportive working
341 partners in the construction domain. Interpersonal relationship captures the general
342 workplace relationship (9 out of 17), such as workplace cohesion, trust; and social
343 support (8 out of 17), including support from colleagues and supervisors. Healthy
344 interpersonal relations were found instrumental in boosting employees' psychological
345 health (Chan et al. 2016), job satisfaction (Malone and Issa 2013; Sutherland and
346 Davidson 1993) as well as reducing job stress (Enshassi et al. 2015; Leung and Chan
347 2012), burnout (Janssen et al. 2001; Zacher et al. 2014) and other psychological
348 symptoms (Abbe et al. 2011; Boschman et al. 2013). In the project-based construction
349 work, workers may spend a lot of time working on site far away from home and family,

350 moreover, the ability to meet project objectives may sometimes be compromised by
351 unforeseen circumstances. The above could collectively result in high pressure and
352 loneliness (Lingard et al. 2010). Thus, social connections on site are especially critical
353 in protecting workers' PWB.

354 Toxic workplace behaviours, including harassment and discrimination (Abbe et al.
355 2011; Bowen et al. 2013), workplace bullying (Pidd et al. 2017) and mobbing behaviour
356 (Meliá and Becerril 2007) have been reported. These behaviours were found impairing
357 construction workers' psychological health and escalating work stress, burnout and
358 other undesirable psychological symptoms. In the male-dominated construction
359 industry, female construction workers and professionals are the "historically
360 disadvantaged individuals" (Bowen et al. 2013). Gender-based harassment,
361 discrimination and bullying were not uncommon and these were found linking to not
362 only psychological symptoms, but also physical symptoms, such as insomnia, stomach
363 disorder and headaches (Abbe et al. 2011; Bowen et al. 2013), especially to young
364 construction workers (Pidd et al. 2017). These findings highlighted the urgency to stop
365 toxic workplace behaviours and provide additional support for vulnerable groups.

366 According to leader-member exchange theory, leadership plays an important role
367 in building a cohesive team and improving employees' satisfaction and productivity at
368 work (Arnold 2017; Bartels and Jackson 2021; Robertson and Barling 2014). However,
369 there are only a handful of empirical studies looking into the impact of leadership
370 behaviours on PWB in the construction industry context. Among our reviewed studies,

371 10 out of 105 articles studied the impact of leadership behaviours on worker PWB.
372 Moreover, few of them investigated the underpinning mechanisms of leadership
373 influence. This study supported the argument in Inceoglua et al. (2018) that there was
374 an unbalanced stronger focus of leadership research on employee performance,
375 comparing to PWB.

376 ***Working environment***

377 Working environment theme comprises both physical working environment and
378 workplace climate, which could be influenced by organisation attributes and
379 organisational culture. The antecedents under working environment theme are listed in
380 Table 5.

381 Working environment factors have been mentioned 37 times in the reviewed
382 articles. Many construction projects were conducted at extreme working conditions,
383 such as inadequate temperature (Enshassi et al. 2015), exposure to potential hazards
384 (Fung et al. 2016), occupational risks at site (Kwon and Kim 2013), lack of proper
385 equipment (Dedobbeleer and Beland 1998), noise and poor light (Enshassi et al. 2015),
386 etc. These poor working conditions were reported predicting worker mental health
387 problems and physical health conditions (Adhikary et al. 2018; Leung and Chan 2012).
388 Other physical-related demands, such as carrying heavy loads, using vibrating
389 construction equipment (Janssen et al. 2001) were found associated with workplace
390 stress and burnout. The impact of poor physical working conditions on worker

391 psychological health highlighted the necessity in improving construction working
392 environment.

393 Workplace climate, shaped by organisational attributes, culture and value
394 proposition, is also an important component of working environment. Poor
395 organisational structure, such as lack of standardised work procedures and unclear
396 departmental function could lead to employee stress (Christina et al. 2020; Leung and
397 Chan 2012). Similarly, Lingard et al. (2015) suggested that organisation size should
398 also be considered in work-life balance research and policy development, as workers in
399 small and medium-sized construction firms were found having poor work-life balance
400 comparing to those in small or large firms. In addition, culture and value of an
401 organisation have been found affecting employees' perceptions of managerial support,
402 in turn their job engagement and satisfaction at work (Chew et al. 2020; Lim and Ling
403 2012; Shan et al. 2017). Good practice in creating a positive organisational culture
404 includes acknowledging employees' contributions (Sutherland and Davidson 1993;
405 Toor and Ofori 2009; Turner et al. 2009), providing facilitating supports and policies
406 (Holden and Sunindijo 2018; Oyewobi et al. 2020), improving management safety
407 commitment (Enshassi et al. 2015; Shan et al. 2017), promoting the use of new
408 technologies (Sweis et al. 2011), etc.

409 *Personal attributes*

410 The theme of personal attributes covers three aspects: (1) demographic
411 characteristics, (2) personal characteristics and (3) non-work-related factors. The
412 antecedents under personal attributes theme are listed in Table 6.

413 Demographic characteristics, including age, gender, marital status, profession and
414 job experience, have been identified affecting construction worker PWB (18 out of 48).
415 Senior workers were reported more likely to experience higher levels of strain and
416 lower levels of PWB due to their perceived work-life conflict and work responsibilities
417 (Kamardeen and Sunindijo 2017; Lian and Ling 2018; Panahi et al. 2016). Moreover,
418 construction professionals with a marital status of separated, divorced, or widowed
419 were more risky in developing anxiety, depression and stress symptoms under work
420 stress (Kamardeen and Sunindijo 2017). Notably, Greed (2000) reported that female
421 professionals were especially vulnerable in the male-dominated construction industry,
422 as they suffered from unequal pay and less career progression opportunities. As a result,
423 they experienced higher levels of stress (Bowen et al. 2014c) than their male peers, as
424 well as lower levels of job satisfaction and worse work-life balance (Sang et al. 2007).

425 Personal characteristics refer to attributes of workers, including personality traits,
426 qualities and working habits. Construction workers with type A personalities were
427 found better at mastering challenges, resulting in a reduced stress perception
428 (Kamardeen and Sunindijo 2017; Leung et al. 2008), higher job satisfaction (Çelik and
429 Oral 2021) and mental health (Sutherland and Davidson 1993). Besides, worker

430 frustrations (Dong 2018), smoking habits (Sutherland and Davidson 1993), bad sleep
431 status (Dong 2018) and bad physical health (Holden and Sunindijo 2018; Shan et al.
432 2017), could have exacerbated mental illness problems. In addition, as many field
433 construction workers are migrants from foreign countries, they might struggle with
434 language barriers (Leung and Chan 2012). All the above personal characteristics of
435 construction workers have been found impairing their PWB (18 out of 48). It is worth
436 noting that, mindfulness attention has been found enabling construction workers to
437 focus on their work and reduce the distraction from their coworkers, loud noises on the
438 construction site, and their fear of unemployment (Boschman et al. 2013; Lau et al.
439 2006). Therefore, mindfulness techniques could be effective to manage stress and
440 sustain worker mental health (Carmody and Baer 2008; Feldman et al. 2010; Leung et
441 al. 2016).

442 Non-work-related personal attributes include work family interference (Dainty
443 and Lingard 2006; Zhang and Bowen 2021), poor home environment (Naoum et al.
444 2018) and support from family and friends (Dong 2018; Pidd et al. 2017). This work-
445 family and work-social life conflict were found causing worker burnout (Dong 2018;
446 Lingard and Francis 2007). Due to the long working hours and heavy workload, it might
447 be difficult for construction workers to achieve balanced allocation of limited time and
448 energy to accommodate family and community responsibilities. When workers were
449 struggling with inadequate resources to fulfil family and community obligations, their

450 dissatisfaction with work could be intensified (Lu et al. 2019), and psychological
451 symptoms could be induced (Bowen and Zhang 2020).

452 *Social cognitive*

453 Social cognition underlies employees' perceptions of their colleagues,
454 organisations, and how organisation culture and business strategy fit with their personal
455 goals (Biggs et al. 2014; Ellen et al. 2006; Kohles et al. 2012). The theme of social
456 cognitive in this study covers three aspects: (1) perceptions toward job, (2) perceptions
457 toward organisation and (3) social influence. The antecedents under social cognitive
458 theme are listed in Table 7.

459 Perceptions toward job include perceptions towards coworkers and career fit (4
460 out of 12). As many construction firms have extended their business to foreign countries
461 and regions, construction workers might have to relocate to a foreign environment (Di
462 Marco et al. 2010; Konanahalli and Oyedele 2016). Expatriate construction workers
463 who perceived negative personal traits of local coworkers were less likely to cooperate
464 and thus became stressful (Leung and Chan 2012) and less satisfied (Wang et al. 2020).
465 Also, when workers perceived that their subordinates were short of professional skills
466 to complete their tasks, their stress level could be heightened (Leung and Chan 2012).
467 Besides, perceived career fit is an important component of perception towards job,
468 which has been highlighted as critical in cultivating construction worker PWB,
469 especially for female construction workers (Chew et al. 2020).

470 Workers' perceptions towards organisation include their emotional relations with
471 the organisation. Leung et al. (2005) found that a high level of distrust between workers
472 and their organisation could intensify workers' stress. Chih et al. (2016) argued that
473 psychological contract breach, the feeling when employee considered his/her
474 organisation had failed to fulfill previous promises, could result in workers' turnover
475 intentions. Besides, a bad organisational relationship where workers had poor feelings
476 and less psychological attachment was found reducing worker job satisfaction (Idrees
477 et al. 2017). In addition, workers' perception towards their organisation could also be
478 reflected in the differences between personal and organisational values. A high level of
479 conflict between personal and organisational values explained the decreased job
480 satisfaction of employees (Panahi et al. 2016; Wang et al. 2020).

481 Social influence from colleagues, families and communities were included in
482 social cognitive theme (2 out of 12). These explained how construction workers'
483 psychological climate were affected by the external environment (Fung et al. 2016).
484 Drawing upon social cognitive theory (Bandura 1997) and social cognitive career
485 theory (Lent 2004), people's perceptions and understanding could be impacted by their
486 knowledge of community expectation (Ventakesh 1999; Venkatesh and Davis 2000).
487 Construction workers' mental health and happiness at work can be affected by the
488 attitudes of their communities toward occupational health and safety risks (Fung et al.
489 2016). Kotera et al. (2020) found that construction workers who were surrounded by

490 communities with a shame-based attitude toward mental health problems, were more
491 likely to suffer mental health issues.

492 **Implications: Theoretical and Practical**

493 This study provided a state-of-the-art review on PWB constructs in the construction
494 literature and identified five themes of PWB antecedents. The findings in this review
495 could contribute to both theory development and management practices as manifested
496 in Table 8. With regard to each theme of PWB antecedents, theoretical implications
497 were suggested and pointed to future research avenues. Practically, management
498 implications were offered to support management, policy and decision makers to
499 optimise and improve health and well-being strategies. Theoretical and practical
500 implications of this review were discussed in this section.

501 *Theoretical implications and future research avenues*

502 This paper should be seen as a stepping stone towards generating more rigorous
503 PWB theories in the construction literature. As can be seen from Fig. 8, negative PWB
504 constructs were studied by 64 articles out of the 105 articles reviewed, however, only
505 18 (out of 105) covered eudainomic PWB. Eudainomic PWB constructs being under-
506 researched might have limited the usefulness of current PWB theories in guiding
507 management and policymakers to improve construction worker job engagement, work-
508 life balance and positive working experience. More studies are needed to understand
509 eudainomic PWB constructs with building and construction industry specifics, such as

510 complex workplace relationships with multiple stakeholders, low flexibility and
511 autonomy onsite, the dominating “macho” culture, etc.

512 Theoretical implications and future research suggestions based on each theme of
513 PWB antecedents are presented in Table 8. Take motivational dimension as an example,
514 workload and autonomy attracted the most attention (see Table 4) and were mentioned
515 26 times and 20 times respectively. However, some important work design factors for
516 employee motivation, such as feedback and role clarity appeared to be under-researched.
517 This unbalanced representation of work design constructs could prohibit a holistic view
518 of how job resources and demands could explain construction worker PWB outcomes.
519 This could also limit the range of available approaches to optimise current work systems
520 to support construction workers. Therefore, further investigations on more work design
521 factors and their impact on construction community were recommended.

522 In addition, future studies on motivational theme should expand job demands-
523 resources theory to explore the influence of building and construction project work
524 characteristics on worker experience. For example, as emerging new technologies and
525 collaborative platforms promote seamless collaborations (resources) among different
526 stakeholders in building and construction projects, they can also bring forth the risks of
527 prolonged working hours and blurred work-life boundaries (demands) (Alwis and
528 Hernvall 2021; van Zoonen et al. 2020). Yet, there is a lack of framework to explain
529 how the use of disruptive technologies as a feature of building and construction projects
530 could alter job resources and demands simultaneously. Neither is there guidance for the

531 construction community to deploy new resources to solve the industry inherent
532 challenges while boost worker well-being in the uncertain contexts.

533 Notably, this systematic review pointed out that construction worker PWB could
534 be affected by factors at multiple levels: individual level (e.g. personal attributes theme
535 and social cognitive theme), team level (e.g. relational theme and motivational theme)
536 and organisational level (e.g. working environment theme). However, few studies and
537 multi-level theories could explain how PWB antecedents operate and interact within
538 and across levels. In addition, the dynamic interplay and trade-off effects among
539 different PWB outcomes were rarely studied, limiting the explanation of PWB
540 outcomes in complex and unpredictable situations. For example, the increase of job
541 engagement (eudaimonic PWB) might lead to prolonged working hours and, in turn,
542 intensified burnout (negative PWB) of the workers in the longer term (Inceoglu et al.
543 2018). Therefore, our review highlights the need to understand the collective impact of
544 different PWB challenges in the construction industry.

545 ***Practical implications***

546 This review not only improved the awareness of PWB issues, but also provided
547 management implications in developing health and well-being strategies in the
548 construction community. Practical implications in light of each theme of PWB
549 antecedents are presented in Table 8.

550 Management and decision makers could use the suggestions in Table 8 as a
551 checklist to promote worker well-being and prevent negative outcomes in the

552 construction community. For example, optimising employees' work design by clearly
553 defining role responsibilities and promoting transparency at work could increase role
554 clarity, and ultimately job satisfaction and engagement. Building supportive workplace
555 dynamics and positive leadership could enhance social support at work, which in turn
556 provides important resources for workers to cope with stress and strains. Through
557 cultivating a compassionate organisational culture and prioritising worker health and
558 safety, the psychological link between workers and organisations will be strengthened
559 and thus lead to increased organisational commitment. This could also improve workers'
560 understanding of organisational value and create a sense of identity and belonging. In
561 addition, organisations could support workers in developing healthy working habits by
562 providing training and education opportunities. In general, it is important that
563 organisations and management put worker mental health at the core of organisations'
564 value and implement health and well-being strategies with a whole-of-organisation
565 approach, where all levels are encouraged to work together in their commitment to well-
566 being.

567 Besides the direct effects, intervention strategies were also suggested that could
568 moderate the negative impact of antecedents on construction worker PWB. For example,
569 workers being rational in problem solving and proactively seeking support could be
570 helpful in buffering the deleterious effects of role overload on burnout (Yip et al. 2008).
571 Identifying and improving the understanding of career calling could help mitigate the
572 impact of role ambiguity on employees' exhaustion (Wu et al. 2019). Management

573 providing more job control and social support could weaken the negative effects of
574 physical job demands on employee mental health (Janssen et al. 2001). These
575 moderating effects shed light on the development of management intervention
576 measures to reduce the intensity of negative PWB outcomes.

577 **Conclusion**

578 A high prevalence of mental health problems has heightened the urgency and
579 necessity to focus on worker PWB issues in the construction industry. However, there
580 is currently no clear framework or system in the mainstream construction literature to
581 guide management practices such as allocating resources, optimising work systems, and
582 supporting worker well-being. Therefore, in this study, we incorporated the multi-
583 dimensional nature of PWB for a state-of-the-art review of PWB constructs and the
584 associated theoretical perspectives. Five themes of PWB antecedents were identified:
585 motivational, relational, working environment, personal attributes and social cognitive.
586 This review could contribute to both PWB theory development and management
587 practices in the construction community. Theoretically, this review introduced more
588 clarity to PWB theories in the construction literature, linking different dimensions of
589 PWB constructs with their antecedents. This also pointed to future research avenues to
590 expand the boundaries of existing PWB theories in the construction domain. Practically,
591 this study offered a checklist of management practices for policy and decision makers
592 to improve health and well-being strategies in the construction community.

593 **Data Availability Statement**

594 All data, models, or code generated or used during the study are available from the
595 corresponding author by request.

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