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Mental Ill-Health Risk Factors in the Construction Industry: Systematic Review

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Abstract

Mental ill health is a significant cause of suicide and disability worldwide. It has particularly affected the construction industry. The construction labor sectors in Australia and the United Kingdom have suicide rates 2 and 3.7 times higher, respectively, than their overall national averages, which has attracted the attention of researchers and the industry. However, few studies have examined the state of construction workers' mental health. This paper systematically reviews the existing body of knowledge on mental health in the construction industry. In total, 16 journal articles met inclusion criteria, and 32 risk factors (RFs) were deduced. The foremost RFs were related to job demand and job control. A conceptual framework and checklist to aid in better understanding these RFs were developed. In assessing mental health, the primary tool used was the Depression Anxiety Stress Scale. The findings of this study help to deepen the understanding of professional mental health assessment scales and relevant RFs and protective factors as used in the construction industry. The study concludes that stronger methodologies are needed for studies into RFs and protective factors in the construction industry.

Keywords

Mental ill health; Risk factor; Systematic review; Construction workers

Introduction

Workers in the construction industry must endure different weather conditions and engage in repetitive and strenuous jobs (Boatman et al. 2012). Many construction projects are nomadic and cyclical, resulting in high unemployment rates (European Agency for Safety and Health at Work 2007). Other characteristics of the industry include high job demand, long working

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Data Availability Statement

Data generated or analyzed during the study are available from the corresponding author on request.

hours, and unrealistic deadlines (Beswick et al. 2007). These characteristics can have major consequences on the physical and mental health of construction workers.

Considerable research shows that physical and mental health problems can arise from stress related to work and the workplace (Wang et al. 2017). It is essential to monitor the impact of psychosocial risk factors (RFs) on the health of workers, to better understand their effects on mental health and wellbeing, thereby helping to reduce workplace injuries, prevent disabilities, and increase productivity (Boschman et al. 2013). Poor mental health and risk of mental illness have taken a toll on the construction industry in several countries, as reflected by a high risk of depression, anxiety, suicidality, and eventual suicide (Burki 2018; Kamardeen and Loosemore 2016; Milner et al. 2015). For example, Jacobsen et al. (2013) surveyed workers at a construction site, where 9 of 10 survey respondents reported having mental health challenges and required medical follow-up.

According to the WHO (2001, p. 1), mental health is “a state of well-being in which the individual realizes his or her abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community.” The definition signifies that good mental health is foundational for well-being and effective functioning (Herrman and Jané-Llopis 2005), while mental ill health (poor mental health) hinders an individual’s ability to realize their potential, work productively, and contribute to their community (Herrman and Jané-Llopis 2012). Common mental health problems in the working population include anxiety and depression (Battams et al. 2014; Grove 2006).

Mental ill health has substantial economic costs to nations, organizations, and individuals, which is prevalent in the heavy labor industries. In the United Kingdom (UK), approximately 400,000 workdays per year are reported lost to mental ill health and, specifically among construction workers, there were 1,419 suicides between 2011 and 2015, amounting to 3.7 times the UK national average (Burki 2018). In Australia, death resulting from suicide among construction workers is 2 times the Australian national average (Mates in Construction 2018; Gullestrup et al. 2011). Mental ill health or poor mental health is also a risk factor for workplace injuries and fatalities (Palmer et al. 2014; Siu et al. 2004). For instance, in the Australian construction industry, for every death lost to fatal workplace accident, six of such cases were intentional suicide (J. Gullestrup, “To study workplace and industry approaches to mental health and suicide prevention globally,” unpublished report, 2019).

Previous studies have revealed that mental ill health and occupational injury have a direct relationship. Park et al. (2001), through a prospective study, explained that workers with depressive symptoms are at three times the risk of workplace injury and fatalities. Park and colleagues found that, among farmers, depressive symptoms and amount of hours worked were associated with increased workplace injuries. Anxiety, depression, and psychological distress are found to cause sleep problems (Bowen et al. 2018; Taylor et al. 2005), which adversely affect well-being and safety. Similarly, in the construction industry, sleep problems are associated with fatigue, which in turn causes workplace injuries and accidents (Powell and Copping 2016, 2010). Additionally, depression is a significant correlate of fatigue (Sadeghniiat-Haghighi and Yazdi 2015).

Many studies have linked work stress to poor mental health and suicide; however, concerns have been raised about the scarcity of research addressing other factors that can interplay with work-related factors to cause mental health issues and suicide (Sunindijo and Kamardeen 2017). Mental health prevention programs have demonstrated effectiveness and reduction in costs for health management (Sandler et al. 2014; Knapp et al. 2011). However, successful prevention of mental health problems and its burden can only be realized after identifying the attributes and exposures, known as risk factors, that can threaten mental health (Furber et al. 2017). Increased insight into risk factors for mental ill health among the construction workforce is necessary to inform the selection of appropriate interventions (Boschman et al. 2013) for achieving a psychologically healthy and safe workplace.

Based on the preceding, the purpose of this study was to systematically review the body of knowledge regarding mental health in the construction industry and, specifically, to evaluate the different risk factors for mental ill health and how mental health has been assessed in the construction industry. Given that few studies to date have used validated scales for assessing mental health in the construction industry (Love et al. 2010), this review addressed the followings questions: (1) what validated mental health diagnosis tools have been used to identify or screen for the state of mental health among construction workers? and (2) what are the risk factors for mental ill health and protective factors for mental health among construction workers?

The overall objective of the study was to provide a guide on how best to evaluate the mental health of construction workers and identify the most appropriate mental health interventions for this population. Further, this review will help researchers focus on specific risk factors for adequate mental illness prevention in the construction industry, which can also inform prevention efforts in other heavy labor industries facing elevated risks of mental ill health and suicide.

Methods

Search Strategy

The databases of PubMed, Scopus, and Web of Science (WoS) core collection were searched. These databases were selected because PubMed contains the largest concentration of health-related journals (Harris et al. 2014; Fiordelli et al. 2013), while Scopus and WoS provide a comprehensive collection of journals in the field of science and are most frequently visited (Aghaei Chadegani et al. 2013). More important, according to Harris et al. (2014), using one database to retrieve journals during a systematic review is insufficient. For that reason, these various databases were visited.

Several search strings were used; the terms with the highest output related to the domains of “mental health*” “construction industry*”; “psychological health*”; and “construction industry.” Google Scholar was searched with specific studies identified from citations and reference lists of articles retrieved from the initial database searches.

Inclusion and Exclusion Criteria

To ensure that studies were eligible for this review, inclusion and exclusion criteria were set. Studies were included if they satisfied all the following criteria:

1. Assessed the mental health status of construction workers using a validated scale or at least four questions (items) extracted directly from a validated scale or previous study. In the case of items retrieved from an earlier study, the reference study should have derived the items from a validated mental health scale.
2. Studied common mental health problems such as depression, anxiety, and posttraumatic stress disorder. Studies that considered psychological (mental) distress or strain were included if they fulfilled condition (1).
3. Considered stressors of mental health, referred to as risk factors for mental ill health;
4. Represented a main empirical study and not a pilot study. A pilot study, in this case, was defined as a preliminary study, primarily conducted to test the feasibility of proposed empirical research. According to Fraser et al. (2018), a pilot study is a precursor to the main research, carried out basically to determine the feasibility of using a designed questionnaire and inform on changes needed to improve on subsequent data collection. Pilot studies were considered only in cases where the pilot was not followed by a main empirical study.
5. Used a target sample consisting of construction workers; in this study, construction workers are persons engaged in the construction industry as
    a. professionals, supervisors, construction project managers involved in planning, coordinating, and controlling construction projects, and
    b. frontline workers involved in the manual aspects of construction work.
6. Were written in English.

Studies reported in conference presentations, book chapters, reviews, perspective articles, and editorial documents were excluded. Therefore, only empirical studies published in journal articles were included. The reason for this selection criterion is that journal articles undergo peer review, whereas other types of publications, such as conferences papers or grey literature, do not undergo the same rigorous review before publication (Olawumi and Chan 2018). Also, unlike other sources, journal articles generally provide comprehensive and reputable sources of information in a field of study (Zheng et al. 2016; Yi and Chan 2014; Ramos-Rodríguez and Ruíz-Navarro 2004).

Data Extraction and Synthesis

The data extraction process began with reading the abstracts of identified articles. The following characteristics were noted: target population, methodology, mental health assessment instrument, and research outcome. In cases where the abstracts were not well detailed, the method or data collection section was read to assess eligibility. Only those articles that met eligibility criteria were subjected to further scrutiny. The documents were read thoroughly and the study process and outcomes were recorded. To avoid bias, the

reasons for exclusion and findings from the studies were reviewed. After that, the selected studies were independently reviewed and confirmed for correctness of extracted data.

Final Article Selection

The initial database search yielded 107 articles (PubMed = 21; Scopus = 50; and WoS = 36). After removing duplicates, 50 articles were subjected to scrutiny using the inclusion criteria. Thereafter, only 13 articles fell within the inclusion criteria. On reading the 13 articles, additional articles were identified from the citations and reference lists; these articles were viewed in Google Scholar, resulting in three additional journal articles that met the inclusion criteria. Ultimately, 16 articles were included in the review. These articles are deemed adequate based on a similar study of risk factors in male-dominated industries that used 18 articles (Roche et al. 2015). Also, Joyce et al. (2010) selected 10 articles in a well-being-related review after allowing for inclusion and exclusion criteria.

Fig. 1 illustrates the search strategy, exclusion, and inclusion of the final eligible studies. Table 1 provides the details of the included studies and their findings. The following sections summarize the mental health assessment tools employed in the construction industry and the various mental ill-health risk factors and protective factors in the literature, and offer a conceptual framework for mental ill-health risk factors in the construction industry.

Mental Health Assessment Tools Used in the Included Studies—Eleven mental health assessment tools were identified in the included studies (Fig. 2). These scales were used in 13 studies; in the 3 remaining studies, mental health was probed by using questions extracted from previous studies. Five studies used depression-specific screening tools, particularly the Whooley Depression Screen questions, Center for Epidemiological Studies–Depression (CES–D) Scale, and Hamilton Depression Scale (HAM-D) (Table 1). Thus, these studies screened for depression and its causal factors among construction workers. One study employed an anxiety-specific tool, namely the State-Trait Anxiety Index (STAI-T).

Two studies assessed posttraumatic stress disorder (PTSD) using two PTSD-specific scales, the Impact of Event Scale (IES) and ICD-10 Classification of Mental and Behavioral Disorder. In one study, the ICD-10 was used to classify construction workers into PTSD and non-PTSD groups, after which the severity of depression was assessed in each category using HAM-D (Hu et al. 2013). Eight studies employed multivariant mental health assessment questionnaires, including the Depression Anxiety Stress Scales (DASS), Hopkins Symptom Checklist (HSCL), General Health Questionnaire (GHQ), and Crown-Crisp Experiential Index (CCEI) (Table 1). All the scales use cut-off points to report the degree of the mental health problem.

DASS was used in five studies (Kamardeen and Sunindijo 2017; Langdon and Sawang 2018; Sunindijo and Kamardeen 2017; Al-Maskari et al. 2011; Haynes and Love 2004). This questionnaire measures depression, anxiety, and stress (Nieuwenhuijsen et al. 2003), although the included studies primarily focused on depression and anxiety. The CCEI measures types of anxiety, depression, and hysteria (Joukamaa 2009), and was used in one study to diagnose for depression and anxiety (Sutherland and Davidson 1993). GHQ-28

measures somatic, anxiety, and social dysfunction and severe depression (Okubo et al. 2011), and was used in one of the studies (Love et al. 2010).

One study screened for depression and anxiety using HSCL-25 (Jacobsen et al. 2013). This study revealed that HSCL-25 was employed in the construction industry to determine mental health status following pain and injuries, which are quite typical in the construction workplace (Jacobsen et al. 2013). Generally, the studies revealed a high prevalence of depression and anxiety among construction workers. Fig. 3 shows the scales used for the types of mental ill-health diagnosis and the respective studies.

Three studies evaluated the effect of occupational stress on the mental health of construction workers by using four to eight questions extracted from previous studies or scales (Bowen et al. 2018, 2014; Lingard et al. 2007). Two studies (Jacobsen et al. 2013; Al-Maskari et al. 2011) reported suicide ideation among construction workers; one of the studies did not employ a professional tool, but the other used the Mini International Psychiatric Interview (MINI). MINI is a multivariant assessment tool for diagnosing depression, anxiety, and suicidality (Li et al. 2017), and was employed in one study for suicide risk assessment (Jacobsen et al. 2013).

Validated Mental Health Assessment Scales Used in the Studies

DASS—DASS is a psychometric test that can be administered to determine the severity of depression, anxiety, and stress experienced over a past week (Ibrahim et al. 2014). It is available in variants of DASS 42 or DASS 21, with each having three subscales. The numbers signify the amount of questions in the test. In DASS 21, there are seven questions per subscale, while DASS 42 contains 14 each. DASS has excellent psychometric properties and is adequate for evaluating mental ill health in employees and general populations (Nieuwenhuijsen et al. 2003). DASS is easy to use and effective in detecting change after clinical diagnosis of mental ill health; however, recently, it has been used without a prior diagnosis (Ng et al. 2007). Interestingly, DASS is freely available for use.

GHQ—GHQ is a widely used psychological health screening tool developed by D. Goldberg (Montazeri et al. 2003; Donath 2001). It is used to evaluate emotional distress and psychiatric disorders (Sterling 2011). GHQ assesses somatic symptoms, anxiety, social dysfunction, and depression (Okubo et al. 2011). The tool measures mental health based on the preceding weeks. The tool is available in variants of 60, 30, 28, and 12 item questions as GHQ-60, GHQ-30, GHQ-28, GHQ-12, respectively, and is copyrighted.

HSCL-25—HSCL-25 is used to screen for anxiety and depression. HSCL-25 contains 10 items on an anxiety subscale and 15 items on a depression subscale (Ventevogel et al. 2007). Initially, it was designed for use among refugees; in recent times, it is used in screening for mental health among postconflict populations and traumatized refugees. This study revealed that HSCL-25 was used in the construction industry to determine mental health following pain and injuries, which are quite typical in a construction workplace (Jacobsen et al. 2013).

CCEI—CCEI is a self-rating mental health assessment tool used to screen for anxiety, depression, and hysteria (Joukamaa 2009). CCEI has six subscales containing eight

questions each for assessing free-floating anxiety, phobic anxiety, obsessionality, somatic anxiety, depression, and hysteria.

CES–D Scale—CES–D, developed by the National Institute of Mental Health, is ideal for assessing depression symptoms in the general population (Radloff 1977). It contains 20 questions scored from 0 to 3; a higher score is directly proportional to higher severity of depression. However, scores ≥16 indicate the presence of depression (Dyrbye et al. 2006). CES–D is available in variants of 10 and 20 and is not copyrighted.

Whooley Depression Screen—The Whooley Depression Screen is a two-item questionnaire used to assess depression. The questions are designed to elicit a “yes” or “no” answer. For example, one of the questions is, “During the past month, have you often been bothered by little interest or pleasure in doing things?” If the respondents answer “yes” to either of the two questions, they are given another assessment tool called the “help question” (Suija et al. 2012). According to Howard et al. (2018), the Whooley questions are useful in identifying mental health problems but do not adequately indicate the presence of depression.

HAM-D—HAM-D, developed by A. S. Zigmond and R. P. Snaith, is a 17-item assessment tool used to measure the frequency and state of depression (Akdemir et al. 2001). According to Licht et al. (2005), HAM-D reliability had been questioned; however, in recent times, it has seen wide application.

STAI-T—STAI-T is a 40-item anxiety assessment tool available in two versions (Julian 2011). According to Balsamo et al. (2013), the tool assesses state and trait anxiety. To effectively evaluate anxiety, STAI-T has two subscales: state anxiety (S-anxiety) and trait anxiety (T-anxiety) subscales. The S subscale assesses the intensity of feelings and the T subscale evaluates the frequency of anxiety. STAI-T is widely used for assessing anxiety, especially in cases that involve musculoskeletal pain (White et al. 2002). Like other assessment tools, it uses cut-off points, and a higher subtest score indicates greater anxiety.

ICD-10—ICD-10 outlines reliable criteria specifically for conducting research on and classification of mental ill health. It helps to ensure the selection and grouping of individuals with the same symptoms using clearly defined characteristics. It was used in one of the selected studies to identify construction workers with PTSD and those without PTSD. Each group of respondents was assessed for depression using HAM-D (Hu et al. 2013). According to ICD-10, for proper identification of PTSD, the features to look out for include flashbacks, detachment from people, sense of numbness, emotional blunting, hyperarousal, and emotional responses following a traumatic event. A psychiatrist or trained social worker usually administers the ICD-10.

Impact of Event Scale—The Impact of Event Scale (IES) is a good instrument for assessing posttraumatic stress and identifying individuals who require medical attention (Sundin and Horowitz 2002). The IES has two subscales used to measure two types of stress reaction. It has been proven highly valid in detecting PTSD (Rothbaum et al. 1992). The scale elicits information on frequency at which PTSD symptoms were experienced over a

preceding week using a scoring system of 0, 1, 3, and 5, respectively. Initially, the IES did not measure the hyperarousal symptom of PTSD as outlined by the Diagnostic Symptom Measure IV (DSM IV). To correct this deficiency, a revised IES with six additional questions and modified response to a 5-point scale with equal intervals 0–4 was developed (Creamer et al. 2003).

MINI—MINI is a multivariant assessment tool used to diagnose for depression, anxiety, and suicidality (Li et al. 2017). It can be employed independently or as a second-phase mental ill-health assessment tool. Most often, MINI is used as a second-stage or further diagnostic tool to probe certain concerns raised in a previous assessment (Li et al. 2017), in which case, respondents with severe depression are further examined using MINI module B. MINI module B helps to assess effectively for suicidality. Diagnoses of anxiety and depression, which are the most common mental health problems, can be difficult, and these conditions can be easily overdiagnosed or underdiagnosed.

According to Pettersson et al. (2018), to mitigate over- or underdiagnoses, a structured interview is deemed important as part of the assessment process. The study further explained that MINI helps to mitigate over- or underdiagnoses by providing a better understanding of a mental ill-health condition and identification of psychiatric and stigmatization disorders. MINI asks for a “yes” or “no” answer.

Risk Factors for Mental Ill Health

A total of 32 stressors of mental health were reported in the included studies (Table 2). The stressors were categorized under eight headings following the studies of Okechukwu et al. (2014), Love et al. (2010), Campbell (2006), Michie (2002), and Sutherland and Davidson (1993). As presented in Table 2, the numbers 1–16 across the column headings correspond, respectively, to the articles listed in Table 1. The checkmark indicates the frequency of a risk factor identified in the articles. The most-identified risk factors were hours worked per day (excess of 60 h per week), work overload, low opportunity/ability to participate in decision making, and occupational climate (authority, tax autonomy, office politics). However, few studies considered work–life as a stressor.

Classification of Risk Factors for Mental Ill Health in the Construction Industry

It was deduced from the selected studies that most (97%) of the identified stressors for mental ill health in the construction industry constitute psychosocial factors. These risk factors can be grouped according to two principles: (1) previous studies that outlined some of these stressors (Love et al. 2010; Sutherland and Davidson 1993; Michie 2002); and (2) definitions of the stressors. The risk factors were grouped as pertaining to the following: job control, work support, job demand, coping strategy, work hazards, family, workplace injustice, welfare, and socioeconomic factors. Fig. 4 illustrates this as a conceptual framework.

From the studies considered, it was determined that construction workers use specific negative coping strategies to help relieve the day’s job stress (Lingard et al. 2007). These coping strategies impact negatively on mental health (Jacobsen et al. 2013). After

classification, the mean scores for the risk factors' variables were determined (Table 3). The mean score was determined by calculating the total number of studies that identified the different measures that form a variable and dividing the total by the number of measures in the variable. For instance, work hazard risk factor was calculated using

$$\sum\left(\frac{WH_i}{N}\right) = \text{mean score}$$
$$= \frac{WH1 + WH2 + WH3 + WH4 + WH5}{N}$$
$$= \frac{3+2+1+1+2}{5} = 1.80$$
N = total number of measures per variable
$i = 1, 2, 3, \ldots \ldots, \ldots \ldots \ldots n$

Based on the equation, the mean score of the risk factor was determined and ranked. The result showed that job demand risk factors pose a significant threat to mental health and as such, reforming job design for better quality health and well-being should be enforced.

Protective Factors in the Construction Industry

Although risk factors in the construction industry are about 97% based on psychosocial working conditions, studies on protective factors for mental health in the industry are scarce. Protective factors elicited from the studies can be classified into 10 broad categories: marital status; increased job control; increased job support; reduced job demand; reduced workplace discrimination; family-friendly job opportunities; workplace justice; better welfare; positive socioeconomic measures; and positive (adaptive) coping strategies. A study by Lingard et al. (2007) considered compressed workweek intervention to improve work–family/life balance in the construction industry. The studies revealed some positive coping strategies adopted by construction workers, such as wishful thinking and emotion-focused coping strategies (Lim et al. 2018; Langdon and Sawang 2018), which are protective factors. Appropriate mental health promotion and interventions were highlighted by the studies and included adopting a compressed workweek, problem-solving; stress management; workplace feedback mechanism; caring, appreciation, encouraging building teamwork, and communication skills; job security; creating a sense of involvement among employees; improving workplace safety, good quality of environment; encouraging quality relationships among colleagues; and promotion as a reward mechanism. These interventions can enhance protective factors against mental ill health in the construction workplace.

Kamardeen and Sunindijo (2017) considered a combination of personal factors and psychosocial workplace factors. This study deduced that marital status acted as a risk factor and moderator. As a moderator, marital status provided a social support network that could be lacking in the workplace. Kamardeen and Sunindijo (2017) also proposed that interventions should be designed around scheduled casual gatherings such as coffee-break chats and ensuring a more comfortable workplace to cushion the effect of marital status, especially among professionals who are not married.

Discussion

As illustrated in Fig. 4, the studies included in this systematic review identified several key risk factors for mental ill health in the construction industry. These risk factors included lack of job control, welfare concerns, workplace hazards, job demand, workplace injustice, family, and lack of support.

Lack of Job Control

Lack of job control emerged as a major risk factor, and reflected, specifically, limited opportunities for decision making, inability to speak about happenings in the workplace, imbalanced work distribution, authoritarian culture, and strict rules for scheduled work routine (Lim et al. 2018; Boschman et al. 2013). According to Love et al. (2010), the impact of lack of job control as a risk factor varied by type of firm and appeared to be present primarily in contracting firms, resulting in higher rates of depression (Boschman et al. 2013). In one study, these factors were described under occupational climate, which includes issues relating to job autonomy, office politics, communication lines, line of authority, and inconsistency in communication flow (Sutherland and Davidson 1993).

Welfare Concerns

Welfare-related risk factors were job insecurity, low income/ financial insecurity, inability to further learning, and low socioeconomic status. Job insecurity was associated with a high level of anxiety among all grade levels (middle and lower levels) of construction sector workers (Sutherland and Davidson 1993). Low income was associated with a high level of depression and suicide ideation (Al-Maskari et al. 2011). Financial insecurity stemmed from family concerns (Langdon and Sawang 2018). Also, job insecurity was found to be higher among married employees (Lim et al. 2018). The burden of financial and job insecurity was related to the ability to care for a family in case of unemployment. Job insecurity is associated with age and project value; Haynes and Love (2004) found that older employees feared job insecurity because of emerging technologies that younger employees are more familiar with.

Project duration and value acted as moderators of the job insecurity risk factor (Haynes and Love 2004). Consequently, concerns about job insecurity were reduced in the case of projects with higher cost and longer schedule durations. Thus, employees working on high-value projects may be more emotionally and psychologically stable because their jobs are likely to be secure for an extended period. Generally, fear of job insecurity was related to length of time of employment. Income appeared to be a moderator among the studies; for instance, higher income was related to improved coping styles, lower anxiety, and lower rates of alcohol abuse.

Fear of failure stemmed from age and overpromotion (i.e., placing employees at a job level greater than their technical ability) (Haynes and Love 2004; Sutherland and Davidson 1993). Fear of failure is also related to fear of job insecurity, because underperformance can lead to unemployment. For instance, it was found that age, overpromotion, length of time in employment, and fear of failure appeared to cause construction employees to attempt to

prove themselves, which in turn caused increased strain and led to burnout and eventually psychological or mental distress, such as anxiety and depression (Kamardeen and Sunindijo 2017; Bowen et al. 2014; Haynes and Love 2004).

Work Hazards

Work hazard-related risk factors include physical illness, occupational injury/hazard, posttraumatic stress, and musculoskeletal pain. Occupational injury/hazard contributed to PTSD, which also influenced depression and anxiety (Hu et al. 2013). According to Al-Maskari et al. (2011), physical illness was associated with depression and suicidal ideation. Similarly, mental distress, which is a warning sign for mental illness, was directly associated with pain in the back and other body sites (Jacobsen et al. 2013). This was consistent with the findings of French (2009), which attributed psychological distress to musculoskeletal disorders. However, a more recent study revealed that preexisting anxiety and depression raise the risk of developing a musculoskeletal disorder (Del Campo et al. 2017).

Job Demand

Job demand-related risk factors include the nature of work, hours worked per week, work overload, fatigue and need for recovery, and increased work speed. Working for more than 60 h per week was common for contractors and foremen, causing them to feel more stress (Love et al. 2010). Similarly, the risk for mental ill health among construction supervisors and bricklayers increased as a result of fatigue (Boschman et al. 2013). Al-Maskari et al. (2011) reported that depression and suicidal ideation were associated with job demand-related risk factors, especially the nature of work and hours worked.

Workplace Injustice

Workplace injustice-related risk factors were gender discrimination, harassment, bullying, age discrimination, and lack of respect from subordinates. Gender discrimination toward females was reported in the construction industry (Kamardeen and Sunindijo 2017; Bowen et al. 2014). Kamardeen and Sunindijo (2017) noted that female professionals were often paid a lower salary than their male counterparts. Also, female professionals suffered several forms of harassment ranging from sexual, verbal, and physical abuse and physical contact. The studies also revealed that, most often, male subordinates would not accept work orders from a female superior; as such, the female professional felt low job control and less support for her role.

Consequently, females suffered more anxiety and depression than their male colleagues. Age discrimination took the form of higher work demand on younger employees accompanied by low job control and less support (Bowen et al. 2014). The age discrimination led to psychological strain. More studies are needed on age discrimination and mental health in the construction industry.

Family

Family-related risk factors included marital status and work-family/life conflict. Work demand was found to impact negatively on family life and the ability to keep up with family responsibility for both male and female professionals; however, it was more commonly

found for the latter. Marital status, on the other hand, was reported as an extrinsic risk factor and a moderator (Kamardeen and Sunindijo 2017). Marital status of separated, divorced, widowed, or being single caused personal stress that led to some anxiety and depression. However, when combined with work stress, the severity of the mental health problem in such professionals increased. Marital status among married professionals appeared to act as a moderator to work stress (Kamardeen and Sunindijo 2017).

Lack of Work Support

Love et al. (2010) reported that the absence of work support resulted in construction workers compensating through self-support mechanisms. This points to the need for work support measures to maintain good mental health in the construction industry.

Coping

High job demand, low work support, and job control have resulted in construction workers turning to several coping strategies. These coping strategies can broadly be categorized as positive (adaptive) or negative (maladaptive). For instance, alcohol, drug, and substance abuse (ADSA) is used as a diversion for dealing with the effects of strenuous work (Frone 2006). The studies also reported construction workers turning to ADSA (Sutherland and Davidson 1993), with substance abuse found to be associated with anxiety (Langdon and Sawang 2018).

Mushi and Manege (2018) attributed the ADSA coping strategy to the risky or tough nature of each construction trade. Coping through alcohol abuse may also be linked to the strong drinking culture in the construction industry (Roche et al. 2015). However, ADSA as a coping strategy is negative because prolonged ADSA has been linked to increased risk of job safety (Minchin et al. 2006). Additionally, ADSA leads to physical illness, mental illness, and suicidality (Schulte and Hser 2013). For positive coping strategies, Love et al. (2010) revealed that wishful thinking and problemsolving were used by construction workers.

Directions for Further Studies—This systematic review revealed several important risk factors, highlighting many potential pathways to mental ill health among workers in the construction industry. With growing complexity in the workplace and rising daily demands placed on employees, the number of cases of mental ill health is increasing (Kuhn 2013). For instance, psychological distress was related to workplace injuries, and there was a high prevalence of injuries among workers with substantial psychological distress (Jacobsen et al. 2013). To address this serious public health concern, researchers should also examine factors beyond the workplace. For example, the construction industry should consider the effects of a range of psychosocial factors spanning both the workplace and the personal lives of construction workers. The goal is to better understand the interactions among all the risk factors for mental ill health that an employee can experience in his or her daily life, thereby informing the design of intelligent interventions.

The importance of maintaining mental health across all types of construction firms is high. For instance, one study found that employees of contractors are subjected to more mental ill-health risk factors than their counterparts working in consultant firms (Love et al. 2010).

Also, many studies have emphasized the mental health of supervisors and people in supervisory positions, whereas fewer studies have mapped out risk factors for construction trades or laborer positions such as bricklaying (Boschman et al. 2013). There is limited research on risk factors and mental ill health by trade. Given the different responsibilities across trades, and the variation in treatment of and working conditions for employees, further investigation of these trends may help provide solutions across the various construction sector trades that can be stressors to mental health. Better understanding of the conditions across trades will inform interventions that will meet the specific needs of each trade.

The construction industry has focused mainly on the impact of work stress on mental health. As such, only psychosocial factors arising from working condition and workplace are considered. Less emphasis has been placed on other psychosocial factors such as marital status, family friction, loneliness, and bereavement. For instance, a study asserted that PTSD is high among construction frontline workers because of workplace hazards (Stocks et al. 2010). Another study demonstrated that other life events among construction workers could also result in PTSD (Boschman et al. 2013). Overall, there is a need for much more research within the industry into specific factors that can increase the risk of mental ill health, which could assist in building more robust interventions in the workplace. For instance, if experiences outside the workplace appear to be the primary source of stress, workplace interventions such as the Employee Assistance Program (Soeker et al. 2016; Nakao et al. 2007) could incorporate solutions such as making necessary counseling or therapy resources available to employees in need.

There is a need for intensified research on factors that promote health in addition to research on risk factors only. Research into specific protective factors for mental health in the industry is limited, with protective factors primarily informed by the reversal of risk factors. When protective factors are just a reversal of risk factors, interventions are likely to be shallow and ineffective (Franklin et al. 2017). According to Mrazek and Haggerty (1994), protective factors can be found within the individual, family, community, and other affiliations. Although the methodologies used in research into protective factors in the industry are weak, protective factors such as optimism, resilience, and self-esteem are given little attention. Studies need to consider a combination of protective factors to better inform on protective factors that best suit different construction workforces.

To effectively identify risk and protective factors, focus group approaches could be used. In conducting the focus group, mental health assessment tools can be used to separate the respondents into the control group (comprising those with no mental ill health) and the target group (those with mental ill health) (Rodgers 2011). Characteristics found more in people without mental ill health but absent in the target group may also constitute protective factors. The results can form the basis for classification of risk factors and protective factors, and for designing follow-up interventions for the construction industry.

Currently, it is unknown whether the rate of mental ill health reported in the construction industry of developed countries, where modern techniques of construction are employed, is consistent with that of lower-income countries. More research into risk factors in emerging

and developing economies is essential to determine context and cultural factors that pose a risk for mental ill health. Such research will provide information on the impact of laws and policies for worker protection and safety within construction industries across different regions. This is especially important because expatriate companies execute many construction projects in lower-income countries under different procurement options.

Certainly, assessing risk factors is essential to evaluate the level of risk to health; however, it is important to note that risk factors do not emerge in isolation but, instead, are clustered together. Interventions aimed at promoting mental health should be directed toward clusters of risk factors. The goal is to focus research on protective factors for mental health. For example, to reduce the risk of job demand and fatigue, real-time monitoring technology could be adopted by construction organizations. Alternatively, primary job stress and mental health interventions are needed to ensure improved and sustainable job design policies across the construction sectors of various economies. Following the boom in technology, increased studies into flexible work arrangements (Rudolph and Baltes 2017) within the construction industry are needed. On the secondary intervention aspect, technological interventions to maintain mental fitness through building resilience and stress management should form policy making within the industry.

Furthermore, there is a need for studies on benchmarking job designs, mental health policies, and interventions in the construction workplace. This will help ensure that construction firms uphold psychological health management as a core duty to ensure the well-being of their employees. Studies in the construction industry should assess depression and anxiety at the same time, to determine which mental health problem is most prevalent in the industry and make it possible to identify specific stressors responsible for each.

Last, only two studies assessed suicidality, highlighting the need for more significant examination of the risk of suicide within the construction industry using reliable assessment measures. Greater knowledge of the prevalence of mental illness symptoms is needed, and can inform the selection and implementation of appropriate workplace interventions for mental health promotion and mental ill-health prevention, as well as specific treatment programs. This will, in turn, help to achieve a psychologically healthy and safe workplace.

Limitations

A limitation of this study is the relatively small number of articles selected for review. However, the authors had to ensure that studies reviewed contained information from persons diagnosed as having mental ill health. This was necessary because many studies in the construction industry that related work stress to poor mental health may have equated depression with sadness or anxiety with fear. Another limitation is that the studies included in this review offer fundamental insights regarding the risk factors for mental ill health in the construction industry but, given the small number of studies with limited representation globally, these results cannot generalize across geographic regions or economic contexts.

For instance, most of the studies were carried out in higher-income countries, suggesting the need for more research into the conditions and mental health of construction workers in lower-resource settings. Due to different work settings, variations in the use of sophisticated

technology, and differences in cultural and religious beliefs, thorough empirical investigations are needed in different geographical regions and cultures and among different organizational sizes and structures.

Conclusion

There is growing urgency to address the prevalence of mental ill health facing the construction industry. This review contributes a greater understanding of risk factors for mental ill health and protective factors to assist occupational health researchers, construction regulatory bodies, and workforce organizations in developing better-tailored strategies to tackle specific risk factors.

This systematic review revealed that, although several studies have examined the stressors faced by construction workers for many years, only a few have employed reliable mental health assessment tools. Going forward, studies in the industry will need to use a full validated mental health assessment scale to affirm the impact of workplace stress on psychological health.

In total, 32 risk factors were identified from 16 studies spanning eight main categories as detailed in the conceptual framework. This framework and the checklist serve as a coordinated reference guide to risk factors for future use, although future studies are needed to expand on this framework by considering additional risk factors. Other factors could include poor health, lifestyle, poor relationship with family, custody issues, work-family/life balance, and many other psychosocial, contextual, and cultural factors. The workplaces of varied construction trades and professions need mental ill-health and suicidality interventions tailored to the various types of work.

There is a need for intensified research into factors that promote health rather than just those factors that deal with risk. There is a considerable need for the development of more specific, innovative protective factors and emerging intervention frameworks to mitigate the high incidence of mental ill health and suicidality presently plaguing the industry. The findings of this study are useful to policy makers, construction organizations, practitioners, and researchers to develop targeted and sustainable interventions in mitigating mental ill health and resulting impacts among construction personnel and other manual laborers.

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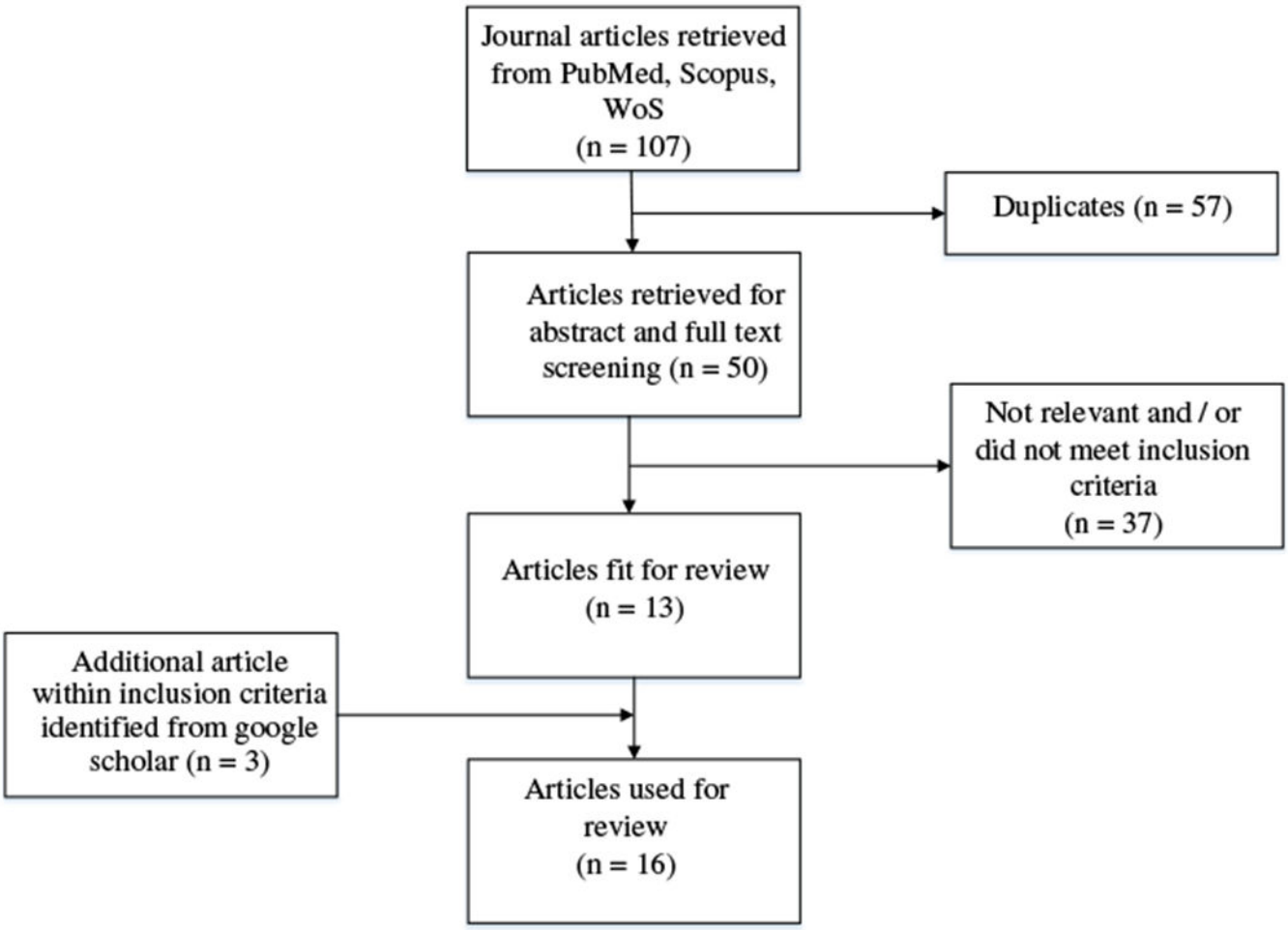

Fig. 1.
Flow chart for the study articles.

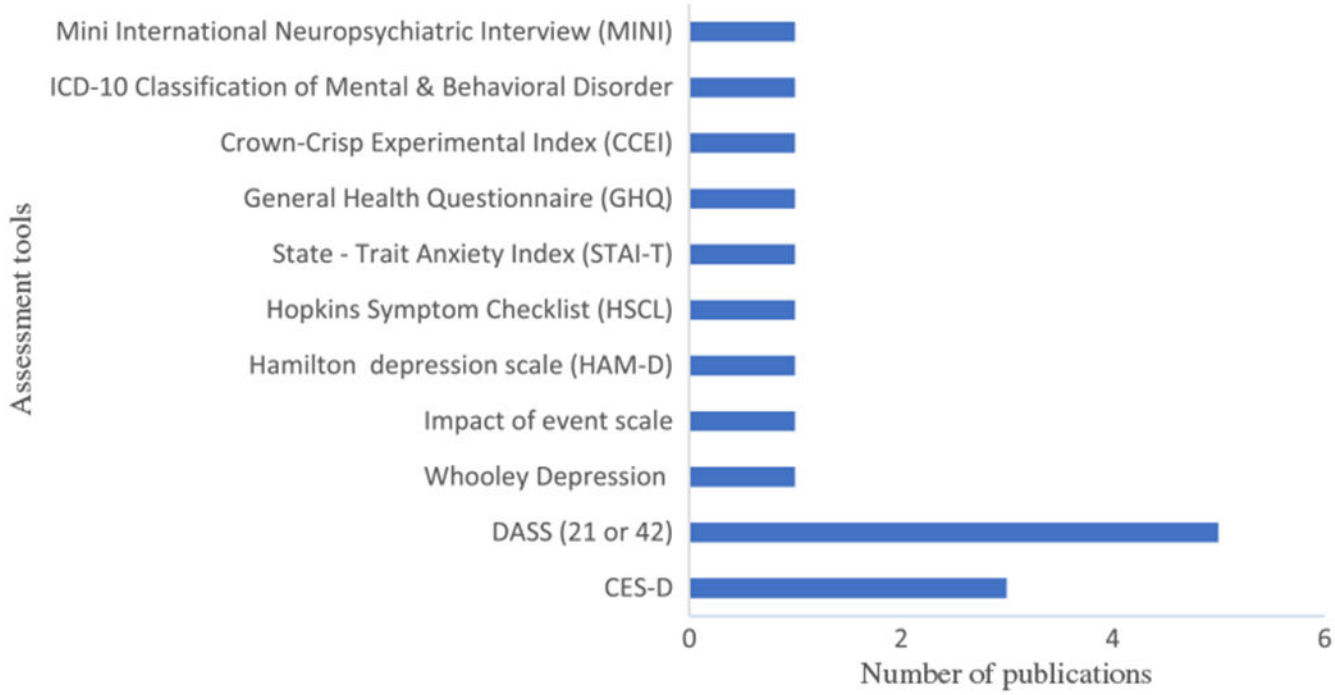

Fig. 2.
Mental health assessment tools used in the selected studies.

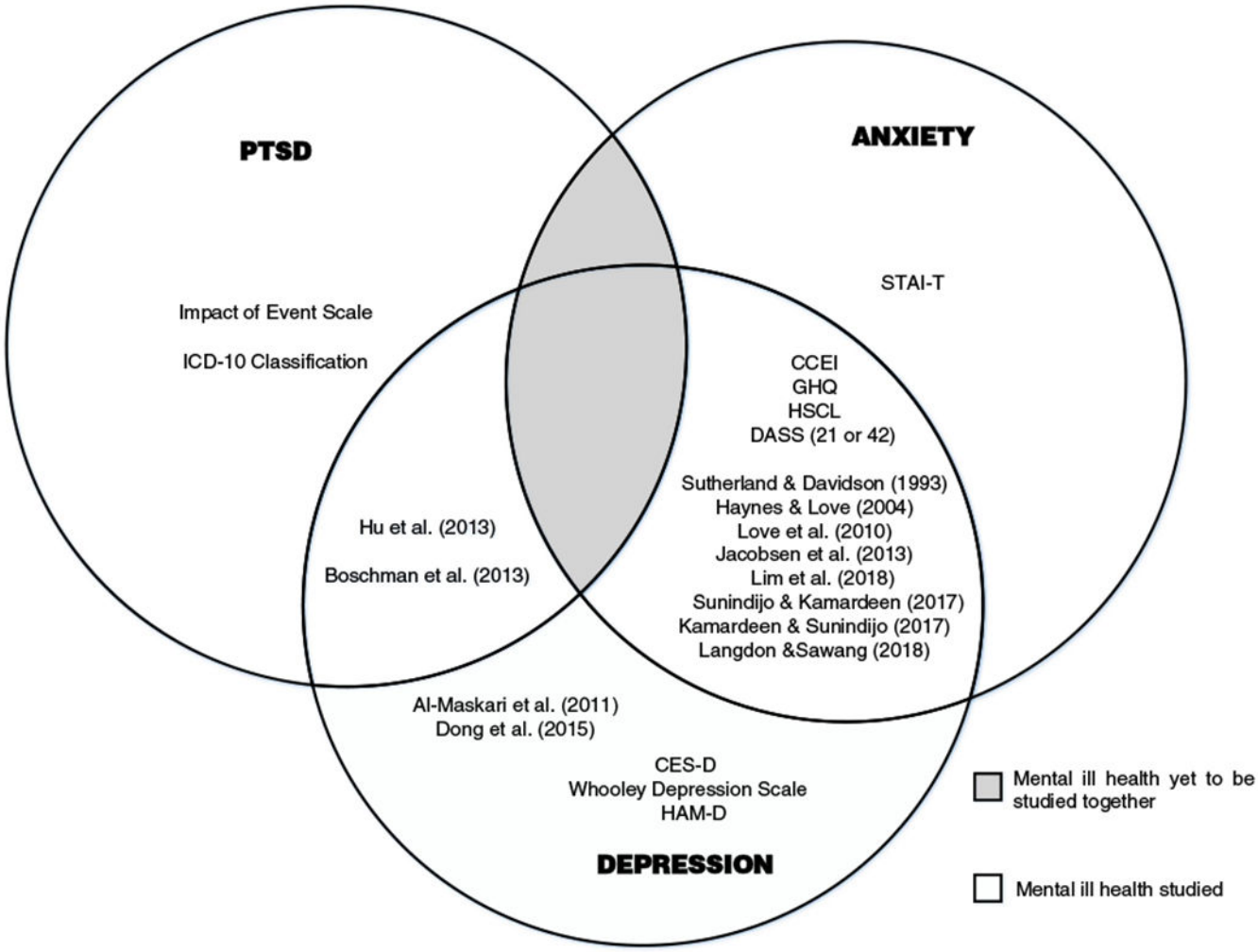

Fig. 3.
Mental ill-health and validated assessment scales used in the articles reviewed.

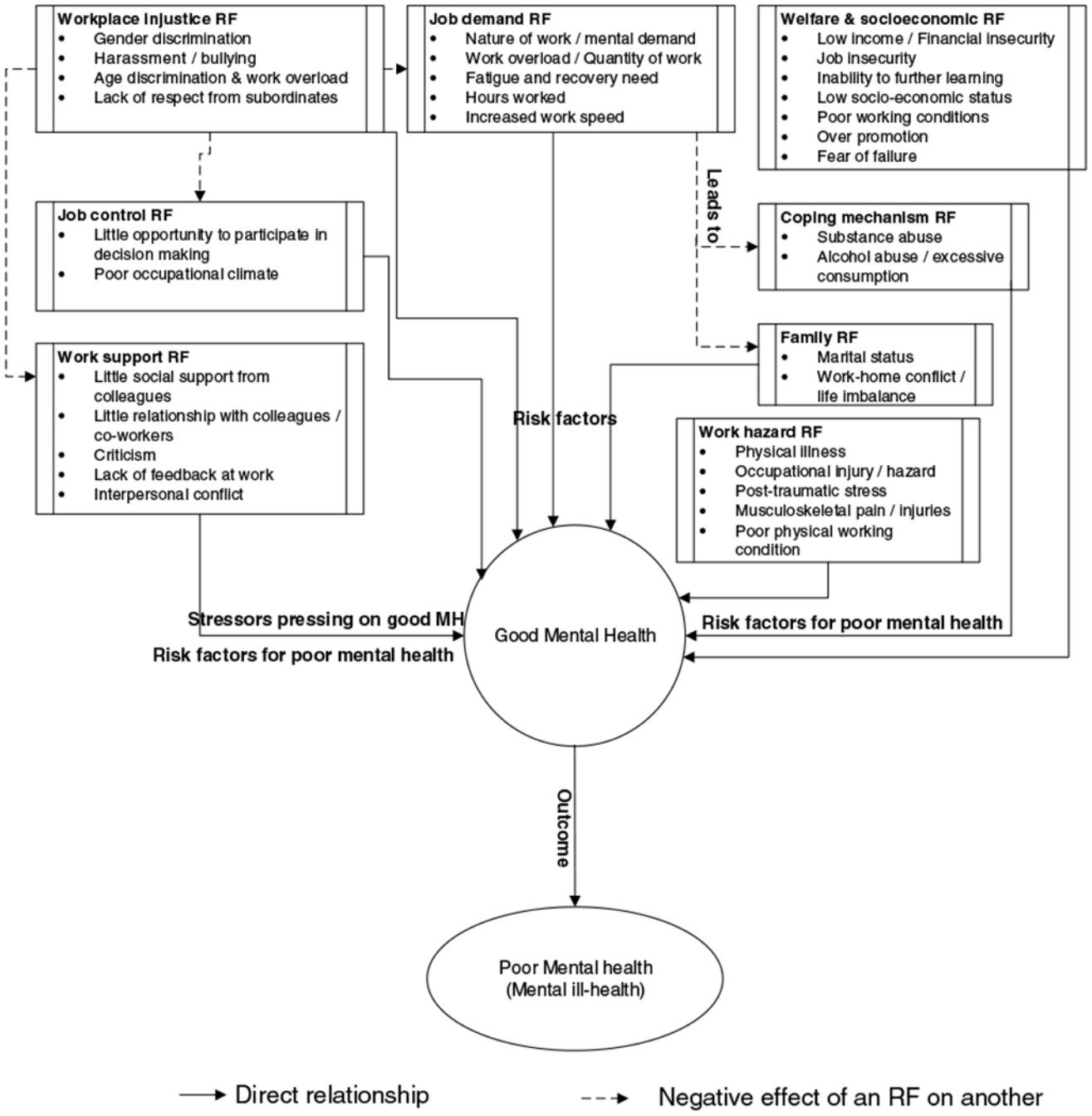

Fig. 4.

Conceptual framework for mental ill-health risk factors in the construction industry.

Table 1.

Mental health studies and diagnosed mental illnesses

S/No.	Authors	Diagnosis	Mental health screening tool or scale used
1	Al-Maskari et al. (2011)	Depression	DASS 42
2	Boschman et al. (2013)	Depression Posttraumatic stress disorder (PTSD)	Whooley Depression Screen Impact of event scale
3	Bowen et al. (2018)	Psychological distress	Questions extracted from previous studies [7 items from Kessler K10 used in Schieman and Young (2013)]
4	Dong et al. (2015)	Depression	Center for Epidemiological Studies—Depression (CES—D)
5	Haynes and Love (2004)	Depression Anxiety	DASS 21
6	Hu et al. (2013)	PTSD Depression	HAM-D ICD-10 Classification Mental and Behavioral Disorders
7	Jacobsen et al. (2013)	Depression Anxiety Suicide	HSCL-25 MINI
8	Kamardeen and Sunindijo (2017)	Anxiety Depression	DASS 21
9	Langdon and Sawang (2018)	Depression Anxiety	DASS 21
10	Lim et al. (2018)	Depression Anxiety	CES-D STAI-T
11	Love et al. (2010)	Depression Anxiety	GHQ-12
12	Sutherland and Davidson (1993)	Anxiety Depression	CCEI
13	Sunindijo and Kamardeen (2017)	Depression Anxiety	DASS 21
14	Tsutsumi et al. (2001)	Depression	CES-D
15	Bowen et al. (2014)	Psychological strain	Questions extracted from previous studies
16	Lingard et al. (2007)	Mental distress	Questions extracted from GHQ-12

Table 2.

Risk factors for mental ill-health identified from the literature

	Publications																
Risk factors	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**Total**
Physical illness	x	—	—	x	—	—	x	—	—	—	—	—	—	—	—	—	3
Nature of work/mental demand	x	x	—	—	—	—	—	—	—	x	—	—	x	—	—	—	4
Hours worked per day (Excess of 60 h per week)	x	—	—	—	x	—	—	—	x	—	x	x	x	x	x	x	9
Low income/financial insecurity	x	—	—	—	—	—	—	x	x	—	—	—	—	—	—	—	3
Work overload/quantity of work	x	x	—	—	x	—	—	—	—	—	x	x	—	x	x	—	7
Increased work speed/pressure	—	x	x	—	x	—	—	—	—	x	—	—	—	—	x	—	5
Little opportunity/ability to participate in decision making	—	x	—	—	—	—	—	—	—	x	x	—	—	x	x	—	5
Little social support from colleagues/immediate supervisors	—	x	—	—	—	—	—	—	—	—	x	—	—	—	—	—	2
Little relationship with colleagues/coworkers	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	1
Occupational injury/hazards	—	—	—	x	—	x	—	—	—	—	—	—	—	—	—	—	2
Poor working conditions	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	1
Inability to further learning	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Job insecurity (fear and uncertainty about the work)	—	—	—	—	x	x	—	—	—	x	—	x	—	—	—	—	4
Posttraumatic stress	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	1
Fatigue and need for recovery	—	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Criticism	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	1
Lack of feedback mechanism in place	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	1
Low socioeconomic status	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	1
Overpromotion concerns	—	—	—	—	—	—	—	—	—	—	—	x	—	—	—	—	1
Poor occupational climate (i.e., task autonomy, responsibility, authority)	—	—	—	—	x	—	—	—	—	x	—	—	—	—	x	—	3
Fear of failure	—	—	—	—	x	—	—	—	—	—	x	—	—	—	—	—	2
Interpersonal conflict	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	1
Substance abuse	—	—	—	—	—	—	x	—	x	—	—	—	—	—	—	—	2
Alcohol consumption	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	1
Musculoskeletal pain and injuries	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	1
Poor physical working condition	—	—	—	—	—	x	—	—	—	—	x	—	—	—	—	—	2
Marital status	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	1

Risk factors	Publications																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Gender discrimination	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	1
Lack of respect from subordinates	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	1
Workplace harassment/bullying	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	1
Work—home conflict/life imbalance (lack of time for family and other leisure due to work)	—	—	x	—	x	—	—	x	x	—	—	—	—	—	—	x	5
Age discrimination	—	—	—	—	—	—	—	—	—	—	—	—	—	—	x	—	1

Table 3.

Risk factors' variable ranks

Risk factor	Mean	Rank
Job demand	5.20	1
Job control	4.00	2
Family	3.00	3
Welfare and socioeconomic	1.86	4
Work hazard	1.80	5
Coping mechanism	1.50	6
Work support	1.20	7
Workplace injustice	1.00	8