

3.5.5. Mental Disorders and Occupational Safety

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3.5.5. Mental Disorders and Occupational Safety

In this chapter, we looked at mental illness and its potential influence on safety engagement in the mining industry. Mental illness is defined by the Public Health Agency of Canada (PHAC) (2015) as “characterized by alterations in thinking, mood or behavior associated with significant distress and impaired functioning” (p. 1). The following are examples of mental illness: mood disorders (such as depression and bipolar disorder), schizophrenia, anxiety, personality disorders, gambling addictions, eating disorders, and substance dependency (PHAC, 2015).

The question that guided our scoping review was: What influence does mental illness have on safety engagement of employees in the mining industry?

Method

A scoping search of the literature was undertaken using the following key words:

1. Miners (Miners or mining or “resource extraction” or industry) and
2. Mental illness (“mental illness” or “psychiatric symptoms” or “mental disorders” or depression (all forms) or anxiety (all forms) or psychopathology) and
3. Safety engagement (“Risk taking behavior/behaviour” or “Safety behavior/behaviour” or Safety or Behav* (behaviour/behavior) or “High risk behavior/behaviour” or “Safety engagement” or “Safety rule violation” or “Accident proneness” or “Risk perception” or “Perception of safety” or “Safety devices” or “Workplace safety” or “Work safety” or “Risk tolerance” or “Industrial accidents” or “Occupational safety” or “Occupational health”

Search Strategy. The databases searched are listed in the results. From this search, we selected articles based on the inclusion/exclusion criteria. The inclusion and exclusion criteria were kept broad in that we did not specify the types of research methods to be included or excluded in order to capture as many research articles on the topic as possible. In our search, we collected articles that were pertinent in this topic area. The broad inclusion and exclusion criteria allowed us to explore the literature in this area more completely, see Table 1.

Table 1. Mental Disorders and Occupational Safety – Inclusion/Exclusion Criteria for Article Selection

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> • Articles with key terms in the title or abstract • Peer reviewed • Within 5 years • English language articles 	<ul style="list-style-type: none"> • Editorials • Commentaries • Book reviews

Screening Strategy. From the search results, we reviewed the title and abstract of each article to determine its inclusion in the scoping review. Each selected article was read by a team member and information pertinent to the study was extracted. Those not applicable to the scoping review were excluded. The selected articles were reviewed by at least two team members for inclusion in the study.

Results

A brief summary of each article including its location, population studied, main issue addressed, comparison group, and primary outcomes is provided in Appendix G. Table 2 is an overview of the scope of the review.

Table 2. *Mental Disorders and Occupational Safety: Databases Searched and Articles Selected*

Database	No of articles found from search	Articles Selected for Review	Final article selection
Academic Search Complete	23	245	31
Nursing and Allied Health	1		
PsychInfo	22		
CINAHL	5		
Medline	14		
Other	108		
Environment Complete	6		
ABI Inform	4		
Engineering Village	33		
CBCA Education	0		
CBCA Business	0		
Embase	5		
Scopus	4		
Web of Science	20		

Description of Included Articles. Table 3 provides an overview of the types of publications, country of publication, and populations studied.

Description of Identified Factors. In order to make it easier to describe the results of the scoping review, the articles were divided into four categories: prevalence of mental illness, mining and mental health, workplace factors, and interventions.

Table 3. *Mental Disorders and Occupational Safety: Population, Country of Research, and Type of Study*

Type of Publication	Country of Research	Population
Quantitative studies	The Netherlands (2)	Mining community, miners (13 studies)
<ul style="list-style-type: none"> • Secondary analysis of data (2) • Cross sectional survey (14) • Longitudinal study (2) 	China (4)	
Qualitative studies	Thailand	
<ul style="list-style-type: none"> • Ethnography (1) • Phenomenology (1) • Descriptive qualitative (2) • Exploratory (1) 	Vietnam	Other industrial workers (forestry, oil, bricklayers, electronics, agriculture, poultry processing, telecommunications, electricity supply, offshore, hazardous, subcontractors, male dominated, stressful workplaces, and other) (13 studies)
Other	United States (2)	
<ul style="list-style-type: none"> • Systematic review of the literature (1) • Mixed methods (1) • Participatory research (1) • Literature reviews (2) • Articles (3) 	India	
	Canada (3)	
	Australia (5)	
	Finland (2)	
	France	
	South Korea	
	Germany	
	South Africa	Other categories of workers (Injured, FIFO, shift, blue collar) (6 studies)
	UK (2)	
	Norway	
	New Zealand	
	Japan (2)	

Prevalence of mental illness. There were five studies identified relating to the prevalence of mental illness in the workplace. The studies described in these articles took place in The Netherlands (two articles), China, Thailand, and Vietnam.

One study reported on work ability. In a Dutch study to identify prevalence of mental health

disorders amongst bricklayers and construction supervisors, Boschman, van der Molen, Frings-Dresen, and Sluiter (2014) found 32% of bricklayers and 22% of construction supervisors suffered from mental health disorders. They found a statistically significant relationship between mental disorders and general work ability. In this article, work ability was defined as “the ability of workers to perform their tasks” (p. 51). Another study of female workers in Thailand reported on causes of mental health disorders. According to an analysis by Charoenpaitoon Jirapongsuwan, Sangon, Sativipawee and Kalampakorn (2012), sudden death of a family member, severe illness, or critical events were noted to be stressful situations among female workers in the electronics industry. In addition, poor or fair family relationships, low reward and poor social supports were associated with depression (28.8% prevalence rate) among the female electronics workers (Charoenpaitoon et al., 2012).

One article discussed common mental health disorders (CMDs). In a comparison of telecommunication and post companies in The Netherlands, Koopmans et al. (2011) identified a higher number of employment absences due to CMDs. The authors noted an overall decline in absence rates from the beginning of the study to end of study period, with women having a higher median absence when compared to men. Koopmans et al. noted, in men, there was a higher rate of recurrence of depressive symptoms when compared to distress symptoms and adjustment disorders, while women had no difference in recurrence rate; however lower salary, marital status, and duration of employment impacted recurrence rate of absence due to CMD in women. One study reported on the influence of life events on safety. Zhang (2014) examined coal mining accidents in China; and he stated there is a discrepancy between competency and human error. He found workers who responded positively to the physiological, psychological, and professional surveys were less likely to be involved in an accident than those who responded negatively to any of these categories. Zhang suggested employers should evaluate miners' life events to determine if they are at risk for becoming injured. In a qualitative analysis of male workers in Vietnam; Van Huy, Dunne, and Debattista (2015) identified a relationship between marital status, living status, social connectedness, and drug use to depression. The authors found more than 25% prevalence rate for depression among all participants, and they found a higher depression rate was associated with longer periods of separation from family, drug use. and being married while lower rates of depression were found among socially supported male casual laborers.

Mining and mental health. Eleven articles were related to mining and mental health. The articles were related to mining in the United States, India, Australia (five articles), China, and Canada (two articles). An additional theoretical article from China proposed a psychological contract model for mine operators. The topics covered by the articles were social isolation and mental health of miners, and mental health in mining communities in Australia and Canada.

Three articles were related to social isolation and mining, and the effect on mental health and wellbeing. In a secondary analysis of the 2006 Behavioral Risk Factor Surveillance System data, Zullig and Hendryx (2011) determined the health of residents in the central Appalachian region mining communities in the United States, and they compared these communities to non-mining communities and other coal mining communities outside the Appalachian region. The researchers found the residents of mountain-top mining communities reported more days of poor mental health and inactivity than the other

two groups. In a cross sectional study of randomly selected women in socially and economically disadvantaged communities in India; D'Souza, Karkada, and Somayaji, (2013) found more physical and mental health issues in mining communities as compared to agricultural communities. They reported factors such as length of time in community, education, and employment impacted women in the agricultural community whereas these factors were not significant factors for mining community residents; and participants in the mining community reported more psychological illness due to stress and stressful events (D'Souza et al., 2013). D'Souza et al. found that those women who had unmet physiological or psychosocial needs resulting from polluted environments, poor self-concept or inadequate role function, found activities of daily living and interpersonal interactions more difficult; and, they indicated this was more common in mining communities. Torkington, Larkins, and Gupta (2011) explored how fly-in, fly-out (FIFO) and drive-in, drive-out (DIDO) mining affected the psychosocial wellbeing of miners in a rural Queensland town in Australia and what supports were identified by the miners. The participants identified both positive and negative impacts on family life, relationships, social life, work satisfaction, mood, sleep, and financial situations identified and awareness of onsite support varied (Torkington et al., 2011). As well, the participants identified friends and partners, and sometimes coworkers, as the most important supports; and, they reported a reluctance to seek support through Employee Assistance Programs (Torkington et al., 2011).

Four articles were related to mental health and mining. In a secondary analysis of Australian WorkSafe data; Smith, Black, Keegal, and Collie (2014) determined that mental health claims were less likely than musculoskeletal injury claims in the mining industry, but these claims resulted in more days away from work with the added difficulty of getting adequate return to work accommodation. The researchers suggested engaging systems that are supportive of those with mental health issues would assist in their prevention, thereby reducing the genuine need for accommodation. Hong, Hui, & Ru-Yin (2009) proposed a concept model to identify the psychological contract of mine operators. In this theoretical article, the model was deemed appropriate for demonstrating the concept; and the conceptual framework indicates the obligations to the organization of both the organization and the employee. Chen, Wong, and Yu (2009) researched the content and structure of coal mine operator psychological contracts in Chinese coal enterprises; and they found psychological contracts between mine operators are different from the employees but they mutually influence one another. The researchers suggested mine operators develop a better understanding with mine employees about their psychological contract and mining safety in order to create opportunity for communication and understanding of the needs of both groups. In descriptive qualitative study exploring psychosocial issues at a mining community in Queensland, Australia; McLean (2012) found that positive relationships with others was important to psychological well-being. The author identified both positive and negative impacts on psychosocial well-being in the areas of relationships, lifestyle, work characteristics, and mental health attitudes. Respect for management, and adequate sleep recovery time and family time were indicated as being important to psychosocial wellbeing (Mclean, 2012).

Four articles were related to mining communities and mental health. In a qualitative study of a mining community in Canada; Shandro, Veiga, Shoveller, Scoble, and Koehoorn (2011) outlined mental

health concerns related to the boom-and-bust cycle of the mining industry. They reported an increase in stress, anxiety, depression, and alcoholism in miners and their families during mine closures, as well as an increase in family crisis calls. As well, the authors found negative effects on families such as divorce and violence. Mining communities have limited resources such as maternity and sexual health as well (Shandro et al, 2011). In a Canadian study; Goldenberg, Shoveller, Koehoorn, and Ostry (2010) found substance abuse and sexually-transmitted diseases were a concern due to a mobile workforce, gender relations, and high levels of income. Goldenberg et al. noted there is a perception that some mining communities are a “place to party” (p. 163), and being introduced to drugs by supervisors may be an entry point to drug use for many workers. The authors also noted there were more Aboriginal youth working in the mining community as opposed to those in a non-mining community; and while this is a positive development, addiction is a concern in this population.

With a focus on Australian male miners, Sharma (2009) reviewed the literature related to mining towns in order to identify key issues and problems in mining towns, and the author found there was a higher level of alcohol consumption and more leisure time spent with workmates. Sharma stated the patriarchal culture marginalizes women, thus straining marital relationships and affecting the emotional wellbeing of children. Mental health professionals must be aware of the negative impacts of mining on the community, the families, and the individual (Sharma, 2009). In a quantitative phenomenological study, Lovell and Critchley (2010) explored factors they believed to influence the wellbeing of women living in remote mining communities in Australia. They found despite the isolation and decreased services, there was little evidence which suggested it was more depressing than other communities. The women found important factors in determining their psychosocial wellbeing were work, isolation, culture, and social environment (Lovell et al, 2010).

Workplace factors. Ten articles were identified which related to workplace factors and mental health. The populations included workers from Finland, France, South Korea, Germany, South Africa, UK, Canada, Norway, and the United States. As well, one theoretical article from the UK was included. The topics included the psychological demands of the workplace, the organization of the workplace and mental health, and other workplace issues and mental health.

Five articles were related to the psychological demands of the workplace. In a cross-sectional study of workers in the Finnish forestry industry; Ahola, Salminen, Toppinen-Tanner, Koskinen, and Vaananen (2013) found 40% of participants (majority female and manual workers) had symptoms of burnout measured by the Maslach Burnout Inventory-General Survey. They found a one-unit increase in burnout score was related to a 9% increase in injury risk, and those workers who experienced monthly or more frequent symptoms of burnout had a 1.18 greater chance of being injured. In a cross-sectional survey of French working people, Chau et al. (2011) found occupational injury was strongly related to the physical and psychological demands of the work especially in workers with untreated depressive symptoms. They suggested early identification and monitoring of these individuals to prevent future injuries. In a study comparing traditional workers and subcontractors in South Korea; Min, Park, Song, Jang, and Min (2013) found subcontractors have a higher risk for health related problems and almost the same alcohol consumption habit as traditional workers. The authors found exposure to physical and

chemical factors, tiring or painful positions, lifting, and carrying or moving heavy loads were higher in subcontractors which can lead to skin problems, backache, muscle pain, headache/eyestrain, respiratory difficulties, injury, anxiety/depression, fatigue, sleeping problems which eventually lead to deterioration in mental and physical health.

In a mixed methods study of employers and managers in Germany; Siebert-Adzic (2012) found negative emotions in an organization can cause dissatisfaction, reduce performance, and or physical and mental strain. The author found a direct relationship between emotion and leadership behavior with positive leadership behavior increasing work performance, and employee mental and physical health, as well as provide an emotional positive atmosphere through appreciation, feedback, praise, affiliation, and support. In a quantitative analysis of employees from an electricity supply organization in South Africa, Kotze and Steyn (2013) found cognitive ability did not play a role in workplace incidents and accidents compared to work-wellness factors and personality traits. They found wellness factors such as cynicism, sense of coherence and personality traits such as pragmatic, conscientiousness, and reserved-gregarious were significantly correlated with workplace incidents and accidents.

Four articles were related to organization of the workplace and mental health. In an article from the UK; Fruhen, Flin, and McLeod (2013) conducted a systematic review of the literature related to chronic unease and how managers manage risk in hazardous industries, and they identified five attributes: pessimism, propensity to worry, vigilance, requisite imagination, and flexible thinking. They suggested these attributes, in accordance with personality, will influence perception of risk, assessment of that risk, and how risks are managed in the workplace. In a study of Canadian workplaces; Marchand, Haines, and Dextras-Gauthier (2013) used group, hierarchical, developmental, and rational culture on a 26-item Occupational Culture Profile (OCP) scale to determine the effect on mental health and wellbeing. They found higher levels of psychological and emotional distress are seen with rational culture. They also found age, gender, education, marital status, and working schedules are associated with psychological wellbeing while income level is not associated with wellbeing. Marchand et al. suggested using the OCP scale in occupational health studies because of the ability to measure mental health and wellbeing. In a cross-sectional survey of UK offshore workers, Parkes (2015) found a correlation between sleep quality and time offshore. The author found workers had less anxiety and longer sleep periods during their home week. Parkes suggested there was a higher risk for accident during the offshore week related to poor sleep quality. In a qualitative study of women workers in an American poultry plant, Horton and Lipscomb (2011) examined work organization factors, and they did not find a strong correlation between work organization factors and depression. However, they identified lower social support, higher risk at work, and lower job security for women working in a poultry processing plant compared to other industries.

Two articles were identified which related to other workplace issues and mental health. In a cross-sectional survey of 1017 Norwegian employees in the oil and gas industry; Nielsen, Glaso, Matthiesen, Eid, and Einarsen (2013) found workplace bullying was a strong predictor of mental health problems in the workplace whether or not self-esteem was taken into account. They suggested monitoring and preventing psychosocial risks in the workplace as a means of preventing mental health

issues. In a secondary analysis of Workers' compensation claimants between 2001 and 2008 in Washington, USA; Anderson, Bonauto, and Adams (2011) found evidence that psychiatric disorders were connected to occupational burns. They found married employees were more susceptible to a mental disorder and burns to the face or head, multiple burns, and electrical burns are associated with an increase in neurological disorders.

Interventions. Four articles were related to interventions. The populations studied were from New Zealand and Japan. There was one systematic review from Japan and Finland and one article from China. All four articles were related to interventions to improve mental health in the workplace.

In a systematic review of the literature from Japan and Finland; Lee, Roche, Duraisingam, Fischer, and Cameron (2014) identified the following interventions which can reduce mental health problems in the workplace: distribution of mental health related information to worker, social support, access to treatment, advice from specialist, manager education, and targeting high risk group for early intervention. In an article from China, Liu and Luo (2012) explored psychological factors in coal mining safety management, and they found psychological education is an important way to promote safety. The authors stated psychological education should focus on workers' attitudes, organizational safety culture, interpersonal relationships, leading authority, and other psychological factors. In a study of New Zealand workers; Widanarko et al. (2012) found that miners with both physical and psychosocial risk factors, who were permanent workers, and who worked night shifts were most likely to report low back pain. The authors suggested industry developing countries become more familiar with the risk factors and implement interventions aimed at reducing awkward or tiring positions, lifting and work in cold or damp environments, tight deadlines, and work in hot or warm environments. In a randomized, participatory intervention study with production line workers in Japan, Tsutsumi, Nagami, Yoshikawa, Kogi, and Kawakami (2009) found no deterioration in mental health in those groups who were in an intervention as compared to the control groups which did have a deterioration in mental health. The intervention included education and training, individual identification of hazards, checklists, and group discussion and planning; and it resulted in an increase in productivity as well as a maintenance of mental health in those groups involved (Tsutsumi et al., 2009).

Discussion

Stressful events, life events, and workplace factors can impact the mental health of a worker, which in turn impacts their work ability and their safety on the job. Due to the nature of the mining industry, it can have an effect on the mental health of the worker and the community. For FIFO and DIDO workers, and for those working and living in remote mining communities, social isolation can impact mental health (Zullig & Hendryx, 2011; D'Souza et al., 2013; Torkington et al., 2011; MacLean, 2012; Lovell et al., 2010). Mining communities have been identified as having higher levels of alcohol, substance abuse, and sexually-transmitted disease (Goldenberg et al., 2010; Sharma, 2009). The boom-and-bust cycle of mining can create added stress and anxiety in a community (Shandro et al., 2011).

The psychological demands a workplace places on the workers can also affect their mental health. Burnout, bullying, occupational injuries, and negative emotions in a workplace can cause mental strain (Aloha et al., 2013; Min et al., 2013; Siebert-Adzic, 2012; Nielsen et al., 2013; Anderson et al., 2011).

Workers with high psychological demands may be more at risk for mental illness. Workers employed in the mining industry may be more at risk for substance abuse and isolation which can negatively impact their mental health putting them at risk for injury at work (Goldenberg et al, 2010; Shandro et al., 2011). Due to the nature of the workplace, these workers may also experience greater psychological demands (Zhang, 2014; Zullig & Hendryx, 2011; D'Souza et al., 2013; Smith et al., 2014).

Interventions suggested in this scoping review include: distribution of educational materials related to mental health and access to treatment (Lee et al., 2014; Liu & Luo, 2012; Tsutsumi et al., 2009), interventions to reduce physical stress (Widanarko et al., 2012), social support (Lee et al., 2014), and targeting of high-risk groups (Lee et al. 2014). The interventions were found to be helpful in reducing deterioration in mental health and promoting safety.

Gaps in the Literature. Mental health concerns related to mining were not specifically discussed, therefore more research is required to determine if mental illness impacts safety engagement. Strategies to encourage workers to buy into healthier lifestyles and safety engagement would help with decreasing negative impacts of mining, but there was not a lot of information on what these strategies should be.

Recommendations. There was insufficient information to make specific recommendations related to mental health of employees in the mining industry. However, the following general recommendations may be considered based on the current scoping review:

- Provide educational material to employees related to mental health and substance abuse.
- Identify mental health resources for miners who are needing services.
- Educate supervisors and managers related to identifying those employees who may need support.

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