Mental Health and Unsafe Behaviors in Mining Workers: A Cross-Sectional Study of Workplace Exclusion, Organizational Identity, and Alcohol Use

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Abstract. Objective: This study used cross-sectional method to explore the relationship between the mental health problems and unsafe behaviors of Chinese mining workers in the new era, and to explore the related factors, and to discuss the solutions to the mental health problems of mining workers. Methods: This study used self-made general population knowledge volume, Depression Anxiety Stress Scale, alcohol dependence scale, organizational identification scale, job burnout scale, workplace exclusion scale and other research tools to conduct online questionnaires. Spss27.0 was used for statistical analysis. Results: 384 valid data of this study showed that workplace exclusion, organizational identification and alcohol dependence were significantly correlated with the levels of stress, depression, anxiety and job burnout of mining workers (Ps<0.05). Stress, depression and workplace exclusion can positively predict job burnout (Ps<0.05). Job burnout, anxiety, depression and alcohol dependence can positively predict the level of stress (Ps<0.05). Depression, stress and alcohol dependence can positively predict anxiety level (Ps<0.001). Stress, anxiety and job burnout can positively predict the level of depression (Ps<0.001). Organizational identification can negatively predict job burnout (P<0.001). Conclusion: This study reveals the mental health level of Chinese mining workers in the new era, and finds that workplace exclusion and alcohol dependence are the risk factors of the mental health level of mining workers, and organizational identification is the protective factor of the mental health level. For the mental health problems of mining workers, all parties need to take effective measures to intervene.

Keywords: Mining workers, risk factors, physical and mental health, production safety.

1. Introduction

The mining industry is a high-risk sector where workers are chronically exposed to physical hazards, extreme environments, and psychosocial stressors, leading to prevalent mental health issues such as anxiety and depression. These psychological challenges are strongly associated with unsafe behaviors, including non-compliance with safety protocols and impaired decision-making(Rodrigo G. Mira et al., 2019). Although safety regulations in the industry have been progressively refined, the mechanisms by which psychosocial factors influence safety behaviors remain understudied. Workplace exclusion—the marginalization of employees within teams—can disrupt the collaboration and communication critical to mining operations, exacerbating feelings of alienation and risk-taking tendencies(Evangelos Evangelou et al., 2021). Conversely, organizational identity, defined as employees' sense of belonging to their workplace, may buffer these negative effects by reinforcing safety values. However, how these factors interact to shape miners' behaviors, particularly when combined with risk factors like alcohol use, has not been sufficiently explored(Georg Rahn et al., 2021).

Alcohol abuse is a common coping strategy in mining to alleviate stress and isolation, yet its cognitive impairments and blunted risk perception significantly increase accident risks. The industry's tacit tolerance of alcohol consumption further undermines the effectiveness of safety policies. Previous research has predominantly focused on isolated risk factors or singular psychological outcomes, lacking systematic analysis of the synergistic effects of psychosocial stressors, behavioral choices, and cultural norms(Weiss et al., 2021). By integrating theories from

occupational health and organizational psychology, this study aims to unravel the complex relationships among workplace exclusion, organizational identity, and alcohol use, providing empirical evidence for interventions that simultaneously enhance mental well-being and safety compliance(Hao, 2023).

2. Method

2.1. Research Design and Samples

This study adopts a cross-sectional survey design and collects data on the mental health and unsafe behavior of Chinese mining workers through an online questionnaire platform. A total of 384 valid participants (55.5% male and 44.5% female) were included in the study, covering the main labor groups in the construction industry. By random sampling, ensure the representativeness of the sample in terms of gender, marital status (65.9% married, 34.1% divorced), and job type. The questionnaire includes demographic information, a mental health scale, and a self-assessment module for unsafe behavior. Statistical analysis was conducted using SPSS 27.0, and Pearson correlation test and logistic regression model were used to explore the correlation between variables.

2.2. Depression Anxiety Stress Scale (DASS-21)

The Depression Anxiety Stress Scales-21 (DASS-21) was developed by Lovibond and Lovibond (1995) to assess an individual's negative emotional state. This scale is a simplified version of DASS-42, consisting of 21 items divided into three dimensions: depression, anxiety, and stress, with high clinical screening efficiency. Depression dimension (7 questions): Evaluate low mood, lack of self-worth, etc. (e.g. "I feel like life is meaningless"). Anxiety dimension (Question 7): Measure physiological tension and fear (e.g. "I feel my heart beating faster"). Stress dimension (Question 7): Reflecting sustained tension and irritability (e.g. "I find it difficult to relax"). Using Likert 4-point scoring (0="never" to 3="always"), the total score range for each dimension is 0-21 points. In the study, the total score needs to be multiplied by 2 to match the score interpretation criteria of the original version DASS-42. The Cronbach's alpha coefficients for depression, anxiety, and stress dimensions in this study were 0.89, 0.85, and 0.82, respectively. According to Lovibond and Lovibond (1995), scores of depression ≥ 14, anxiety ≥ 10, and stress ≥ 19 indicate moderate to severe symptoms.

2.3. Alcohol Dependence Scale (ADS)

The Alcohol Dependence Scale (ADS) is revised based on the DSM-5 diagnostic criteria and is used to assess an individual's alcohol use patterns, withdrawal symptoms, and social dysfunction. Drinking behavior (4 questions, example: "Number of days per week of drinking in the past month"); Withdrawal symptoms (3 questions, e.g. "Do you experience hand tremors after stopping drinking"); Tolerance (2 questions, example: "Need to increase alcohol consumption to achieve the same effect"); Functional impairment (3 questions, example: "Does alcohol consumption affect work performance"). The mixed question type includes Likert 5-point scoring (1="never" to 5="always") and binary options (0="no", 1="yes"), with a total score range of 0-48 points. A score of ≥ 16 indicates high-risk dependence. In this study, the Cronbach's alpha of the total scale was 0.78, and the alpha coefficients of each sub dimension ranged from 0.71 to 0.83.

2.4. Organizational Identification Scale (OIS)

The Organizational Identification Scale (OIS) was developed by Bergami and Bagozzi (2000) to measure individuals' cognitive, emotional, and behavioral identification with organizations based on social identity theory. There are 6 items in total, with a single dimensional structure (e.g. "I feel offended when someone criticizes the organization"). Using a Likert 7-point scoring system (1="completely disagree" to 7="completely agree"), the total score ranges from 6 to 42 points, with

higher scores indicating stronger organizational identification. In the study, the total score was standardized to Z-score for cross group comparison. In this study, Cronbach's alpha was 0.91.

3. Result

Among the 384 respondents, 213 were males, accounting for 55.5%, and 171 were females, accounting for 44.5%. The gender distribution was relatively balanced. In terms of marital status, there were 253 married workers, accounting for 65.9%, and 131 divorced workers, accounting for 34.1%. In terms of psychological symptoms, there were 234 workers with anxiety symptoms, accounting for 60.9%, 171 workers with depression symptoms, accounting for 44.5%, and 199 workers with stress symptoms, accounting for 51.8% (see Table 1).

Table 1. Analysis of demographic variables (N=384)

Variable	Category	Frequency	Percentage (%)
Gender	Male	213	55.5
	Female	171	44.5
Marital Status	Unmarried	0	0.0
	Married	253	65.9
	Divorced	131	34.1
Anxiety	Yes	234	60.9
	No	150	39.1
Depression	Yes	171	44.5
	No	213	55.5
Stress	Yes	199	51.8
	No	185	48.2

Table 2 shows the Pearson correlation coefficients among variables, and the results show that there are significant correlations in different degrees between variables (P<0.05). There was a significant positive correlation between stress, anxiety and depression (Ps<0.001). The job burnout was positively correlated with stress, anxiety and depression (Ps<0.001). Workplace exclusion was moderately positively correlated with stress, anxiety, depression and job burnout (Ps<0.001). Alcohol dependence was moderately positively correlated with stress, anxiety and depression (Ps<0.001). Organizational identification was negatively correlated with depression, job burnout and workplace exclusion (Ps<0.001) (see Table 2).

Table 2. Correlation Analysis of variables

Variable	Alcohol Dependence	Stress	Anxiety	Depression	Workplace Exclusion	Organizational Identification	Job Burnout
Alcohol Dependence	1.000	0.471	0.517	0.380	0.299	-0.068	0.258
Stress	0.471	1.000	0.808	0.838	0.433	-0.163	0.585
Anxiety	0.517	0.808	1.000	0.793	0.433	-0.197	0.563
Depression	0.380	0.838	0.793	1.000	0.457	-0.257	0.660
Workplace Exclusion	0.299	0.433	0.433	0.457	1.000	-0.251	0.474
Organizational Identification	-0.068	-0.163	-0.197	-0.257	-0.251	1.000	-0.569
Job Burnout	0.258	0.585	0.563	0.660	0.474	-0.569	1.000

P<0.05.

This study shows that stress can positively predict the job burnout (P<0.05), that is, the job burnout increases with the increase of workers' stress. Depression can positively predict the job burnout

(P<0.001), that is, the job burnout increases with the aggravation of depression. Organizational identification can negatively predict the job burnout (P<0.001), that is, workers' organizational identification is strengthened, and the job burnout is weakened. Workplace exclusion can positively predict the job burnout (P<0.001), that is, the job burnout increases with the aggravation of workplace exclusion (see Table 3).

Table 3. Logistic regression of job burnout

Variable	B	SE	β	t	p	VIF
(Constant)	2.869	0.132	—	21.669	<0.001	—
Stress	0.014	0.006	0.149	2.301	0.022	4.280
Depression	0.035	0.006	0.342	5.378	<0.001	4.136
Organizational Identification	-0.348	0.028	-0.415	-12.576	<0.001	1.113
Workplace Exclusion	0.125	0.035	0.138	3.816	<0.001	1.340

Dependent variable: job burnout.

This study shows that anxiety can positively predict stress (P<0.001), that is, workers' anxiety increases and stress increases. Depression can positively predict stress (P<0.001), that is, workers' depression worsens and stress increases. Alcohol dependence can positively predict stress (P<0.01), that is, workers' alcohol dependence increases and stress increases. Job burnout can positively predict stress (p<0.05), that is, workers' job burnout increases, and stress increases accordingly (see Table 4).

Table 4. Logistic regression of stress

Variable	B	SE	β	t	p	VIF
(Constant)	-3.166	1.689	—	-1.875	0.062	—
Anxiety	0.376	0.052	0.321	7.255	<0.001	3.205
Depression	0.550	0.050	0.502	11.078	<0.001	3.360
Alcohol Dependence	0.113	0.037	0.090	3.086	0.002	1.391
Job Burnout	1.007	0.437	0.093	2.301	0.022	2.681

Dependent variable: stress.

This study shows that depression can positively predict anxiety (P<0.001), that is, workers' depression worsens and anxiety worsens. Stress can positively predict anxiety (P<0.001), that is, workers' stress increases and anxiety increases. Alcohol dependence can positively predict anxiety (P<0.001), that is, the aggravation of alcohol dependence will aggravate the anxiety of workers (see Table 5).

Table 5. Logistic regression of anxiety

Variable	B	SE	Beta	t	p	VIF
(Constant)	-1.027	1.577	—	-0.651	0.515	—
Depression	0.344	0.050	0.368	6.867	<0.001	3.959
Stress	0.326	0.045	0.382	7.255	<0.001	3.808
Alcohol Dependence	0.191	0.033	0.179	5.797	<0.001	1.309

Dependent variable: anxiety.

This study shows that stress can positively predict depression (P<0.001), that is, the increase of workers' stress will aggravate depression. Anxiety can positively predict depression (P<0.001), that is, workers' anxiety is aggravated and depression is aggravated. Job burnout can positively predict depression (P<0.001), that is, the job burnout of workers increases, and depression worsens (as shown in Table 6).

Table 6. Logistic regression of depression

Variable	B	SE	Beta	t	p	VIF
(Constant)	-5.193	1.507	—	-3.447	0.001	—
Stress	0.447	0.040	0.489	11.078	<0.001	3.274
Anxiety	0.323	0.047	0.302	6.867	<0.001	3.246
Job Burnout	2.059	0.383	0.209	5.378	<0.001	3.274

Dependent variable: depression.

4. Discuss

Stress, anxiety, depression and job burnout in the workplace have become common psychological problems, and alcohol dependence, workplace exclusion and organizational identification have different effects on the problems. There was a positive predictive relationship between stress, anxiety and depression, indicating that these three psychological symptoms were interdependent(Peng & Chan, 2020). This may be one of the reasons why psychological problems exist for a long time and are difficult to solve. The result is similar to most previous studies. Specifically, the increase of stress will lead to some physiological and psychological changes, making people more likely to feel anxious and depressed. Anxiety can cause people to be prone to fixate on the negative aspects of things, and further aggravate stress and depression. With the deepening of depression, a person's self-efficacy will gradually weaken, and the ability to deal with stress and anxiety will also decrease(Torkild Thanem & Hadar Elraz, 2022). This study found that stress and depression can each positively predict job burnout, and job burnout can positively predict stress and depression. This indicates a significant interaction between job burnout and psychological symptoms. In other words, stress causes workers to lose confidence and the ability to handle difficulties at work by consuming employees' mental resources, which leads to job burnout. Depression further deepens job burnout by weakening employees' self-efficacy and interest in work. In addition, job burnout, as a negative experience, can reduce workers' sense of occupational efficacy, aggravate emotional exhaustion, amplify stress, and increase the risk of depression. In addition, we also found that there was a significant positive correlation between job burnout and anxiety, but there was no significant positive predictive effect (Pauksztat et al., 2022).

The study found that workplace exclusion can positively predict the job burnout, which shows that in addition to the three psychological symptoms, workplace exclusion behavior is also an important risk factor of job burnout. Specifically, social support can alleviate the psychological pressure of employees, improve self-efficacy, and help prevent occupational exhaustion. While workplace exclusion will destroy the social support system of employees, aggravate the degree of fatigue, anxiety and depression of employees, and cause emotional exhaustion .In addition, workplace exclusion may also reduce the core self-evaluation of workers, leading to job burnout (Maslach et al., 2001). Moreover, workplace exclusion also undermines the good cooperation of the team, which may aggravate their job burnout and be unfavorable to the overall development of the construction site. Therefore, site managers should take measures to enhance the cohesion of the site, reduce workplace exclusion and prevent the continuous rise of job burnout(Thang M. Le et al., 2020).

In addition, alcohol dependence may also affect the physical and mental health of workers, thereby threatening safe production. This study showed that alcohol dependence was significantly positively correlated with job burnout; With the deepening of alcohol dependence, stress and anxiety will increase. This shows that although alcohol dependence has a certain regulatory effect on negative emotions, in the long term, it will aggravate stress and anxiety, thus having a positive impact on job burnout. Not only that, alcohol dependence also weakens the self-regulation ability of individuals, and causes certain damage to physical functions (Benjamin O. Anderson et al., 2023). The physical and mental health of workers has been damaged, their ability to adjust and cope with the pressure situation has also been weakened, and the level of job burnout has increased simultaneously. Site

managers shall formulate suitable mental health education programs and management measures, and carry out alcohol dependence screening and intervention plans. In addition, they can also help workers cope with emotional problems and reduce the risk of alcohol dependence by offering psychological lectures and publicizing various methods to relieve pressure to workers(Wendy Jones et al., 2019).

Although this study provides a theoretical reference for dealing with the psychological problems of railway workers, it also has some limitations(Fu et al., 2024). First, this study adopts the research method of cross-sectional design, so it is difficult to determine any causal link. In order to more clearly explain and deal with the psychological problems of railway workers, it is suggested that the research method of longitudinal design can be considered in future research. Second, the organizational identification mentioned in this paper is only a factor that can protect job burnout. Future research can further explore whether other protective factors can also reduce job burnout(Michael C. Peasley et al., 2020).

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