**////Title: Assessing and Improving Workplace Safety in Metal Mining**

**////Standfirst:**

Mining is a particularly hazardous industry, with miners often experiencing health problems, injuries and psychological issues. Dr David Gilkey, an Associate Professor of Safety, Health & Industrial Hygiene at Montana Technological University, has recently carried out a case study specifically investigating workplace safety climate in a metal mine in Montana. The study also assessed the effectiveness of a short training program to improve the metal mining company’s workplace safety leadership.

**////Main text:**

The mining industry, which specialises in sourcing coal, metals, and other minerals from underground, is often associated with serious health and safety risks. In addition to being very physically demanding, mining work can involve exposure to harmful chemicals and undesirable environmental stimuli, including coal dust, high noise levels, UV-rays, radioactive materials, and extremely high or low temperatures.

From 1911 to 1997, approximately 103,000 miners in the US died, either while working or due to health conditions developed through their work, including lung damage, musculoskeletal disorders, radiation exposure, various types of cancer and fatal traumatic injuries. It is also common for miners to suffer from lifting injuries, extreme stress and fatigue, hearing or vision impairments, cardiovascular issues, and reproductive damage.

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Over the past century, mining-related fatalities have decreased substantially, due to improvements in working conditions and the introduction of new health, safety regulations and safer work practices. Studies investigating the safety of different types of mining, however, are still of crucial importance, as they could help to further improve workplace safety for miners.

Dr David Gilkey of Montana Technological University recently carried out a case study exploring workplace safety climate in a specific metal mine in Montana. This study, conducted in partnership with a surface metal mining operation in Montana, aimed to evaluate the company’s safety climate, which describes the shared perceptions of employees about safety within their organisation. As part of the study, Dr Gilkey also assessed the effectiveness of the safety Leadership training program to improve workplace safety.

The mining company asked Dr Gilkey and his colleagues to look for any possible differences in safety climate scores that might exist between its three major divisions, namely operations, maintenance, and administration, as well as between middle and upper management workers. The learning program that the company’s employees took part in was a Foundations for Safety Leadership training workshop led by Dr Gilkey.

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The researchers’ study involved 365 full-time employees working at the mining company, 96% of whom were male, with ages ranging from under 25 years old to over 65 years old.

Dr Gilkey and his colleagues measured the level of workplace safety perceived by the participants using a simple questionnaire designed to measure safety climate, first introduced the US-based insurance firm Liberty Mutual Insurance Company research division.

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The study conducted by Dr Gilkey and his colleagues spanned three phases. During the first phase, which took place in 2019, the researchers asked participating workers to complete the questionnaire to assess their perceptions of how hazards in their workplace were managed at all levels and the commitment of management to ensure a safe workplace.

During Phase 2, in 2020, the front-line supervisors or leads were asked to attend the 3-hour safety leadership workshop, and they completed a training effectiveness questionnaire both before and after their training session. Finally, Phase 3 consisted of a follow-up safety climate questionnaire using the same Liberty Mutual Safety Climate Survey one year after they had attended the training workshop in 2020.

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Upon analysing the questionnaire results, Dr Gilkey and his colleagues found that there were significant differences between the responses provided by employees in different company divisions. Essentially, the team found that on average, those working in the company’s administration department had a more positive view of the company’s safety climate, followed by those working in maintenance, and finally operations.

These variations likely reflect the nature of the work associated with the different divisions, and the work environment experienced on a day-to-day basis. In other words, it would make sense for an administrator to feel safer than a miner.

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Interestingly, Dr Gilkey and his colleagues found that the training workshop led to significant improvements in safety climate leadership scores for 81 front-line supervisors or leads. Before the workshop, 90% of employee responses about safety in their workplace were positive, while after the training session, positive responses increased to 98%.

However, this drastic improvement in safety climate leadership scores observed immediately after the safety training workshop among the supervisors appeared to have little impact on those they managed across the company. In fact, the results from the follow-up questionnaires completed one year after the workshop revealed only a minimal increase in the climate scores.

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Overall, the findings gathered by Dr Gilkey and his colleagues suggest that mining company employees in specific divisions might have different perceptions of the overall safety of their workplace. In addition, they highlight the value of safety leadership training programs for improving metal miners’ perceptions of how safe their working environment is, by clarifying potential risks and measures that help to reduce hazards and associated risks.

The researchers’ study also suggested that for these interventions to be truly effective, a one-off 3-hour workshop might not be enough. Instead, mining companies might want to consider introducing recurring safety leadership training workshops to improve their employees’ understanding of mining-related hazards, and the importance of safety leadership skills to reinforce the belief that they are in control of their workplace practices and must make safe choices to ensure that they are protected against the many hazards and risks.

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While every mining operation is different and comes with its own unique health and safety challenges, the recent work by Dr Gilkey and his colleagues offers interesting insights that are likely applicable to other mining companies, and interventions that could help to improve workplace safety and workers’ perceptions of safety.

In the future, this study could thus inform the development and implementation of training programs designed to improve the actual safety and perceived safety of employees working in the mining industry.

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