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## Synthetic assessment of mining rescuers' behavior according to the parameter "coping with occupational stress"

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# Synthetic assessment of mining rescuers' behavior according to the parameter "coping with occupational stress"

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**Abstract.** The article presents the results of research on the synthetic assessment of mining rescuers according to the parameter "coping with occupational stress". The survey used a questionnaire containing 9 closed questions, for which 6 negative and 3 affirmative answers were expected. An assessment was made on the basis of the number of affirmative and negative answers. The final synthetic assessment of risky behaviors was made on the basis of the sum of ranks obtained from the number of affirmative and negative answers. The article was completed with conclusions resulting from it.

## 1. Introduction

In science, you can come across the concept of a threat defined as a source of stress. This is undoubtedly a very frequently discussed issue, not only when analyzing work safety. In mining rescue, this subject was discussed, inter alia, in the aspect of occupational stress accompanying the performance of work activities. All rescue operations are carried out in accordance with the regulations. Rescuers taking part in them are very well preparing not only theoretically but also practically. Knowledge is verified during training and rescue exercises.

Rescuers participating in the rescue operation, depending on their individual vulnerability, undergo stress associated with the dynamics and the occurrence of sudden events, for example natural hazards. Rescuers are trained and prepared how to cope with stress not only during the action but also after its completion. Therefore, in the synthetic assessment of behaviors, the criterion of coping with occupational stress was taken into account.

Simply put, stress can be defined as disruptions in behavior when performing an activity. Stress can lead to a threat and itself becomes a factor that threatens human remedial abilities. The basic components of the capacity are: energy, information and instrumental resources. Human traits that determine the effectiveness of the remedial process are innate traits such as temperament (resistance, endurance) and acquired in the course of the experiment. The magnitude and duration of the stress response along with the balance of profits or losses in the process of dealing with it depends on immunity [1].

To determine the stress response, its common denominator is to disturb the balance in the correlation between human capabilities and the requirements of the environment [1].

According to Łuczak, difficult and dangerous professions are those that require special psychophysical fitness from employees, where work is associated with the risk of life and health of people performing it and with the threat to other people.



These professions include, among others, firefighters, policemen, miners, drivers and rescuers [2].

According to the opinion of the World Health Organization, the workplace is considered one of the main sources of stress. According to the opinion of the World Health Organization, the workplace is considered one of the main sources of stress [3].

Stress is one of the elements leading to an accident during work. One of the methods of preventing accidents was proposed in the publication Noor Afifah Y et al. [4] based on identifying threats and causes by the training participants. Then these threats are analyzed and discussed. The training aims to make participants aware that security conditions are very important.

Safety culture is one of the areas dealing with occupational safety according to Susanne Bahn [5] the introduction of a solid security system could improve the safety culture of the organization.

According to MA YC [6] safety culture in mining companies actually helps to reduce the number of accidents at work.

After the occurring accidents at work, many factors affect the return of employees to their positions, for example: age, education, gender, severity of injuries, psychosocial and socio-economic factors. Scientific research has revealed that younger employees return to work more often than older people [7].

Dasinger et al. stated that a younger employee who was injured did not suffer a serious injury like an employee with a longer work experience [8, 9].

This study presents a proposal for a synthetic assessment of behaviors on the example of mining rescuers in the aspect of occupational stress.

The proposal to study risky behavior aims to reduce the number of accidents in the context of one of the elements of the safety culture which is the behavior of the employee.

## 2. Methodology of testing the parameter "coping with occupational stress"

Synthetic questions from the publication [10] were used to synthesise the behavior of mining rescuers according to the criterion "coping with professional stress". The questionnaire consisted of 9 closed questions, where 3 positive answers and 6 negative answers were expected (table 1). All respondents were instructed on how to complete the questionnaire, anonymity and the time required to complete it. The research sample consisted of 25 mining rescuers who were informed about the method of performing the research and their purpose.

*"depending on the number of the rescuer's preferred answers, the appropriate rank was assigned to them - separately for questions with the preferred answers (...) and negative" -*

for the parameter analyzed here, presented in table 2 and 3.

*"The summed up ranks of both groups of answers gave the basis for a summary assessment of risky behavior of individual rescuers according to the analyzed criterion" (table 4).*

**Table 1.** List of questions contained in the questionnaire, according to [10, 11].

Lp.	Questions asked in the questionnaire	Preferred answer
1.	Do you consider work in mining as stressful?	negative
2.	Do you consider work as a mining rescuer to be stressful?	negative
3.	Does performing work affect your personal life?	negative
4.	Does the phone signal make you uneasy?	negative
5.	Do you think about your family during the action?	negative
6.	Are you satisfied with your work?	affirmative
7.	Can you count on your colleagues during the action?	affirmative
8.	Do you want to improve your qualifications?	affirmative
9.	Would you change your profession more safely?	negative

**Table 2.** Proposals of criteria for the assessment of the parameter "coping with occupational stress" - affirmative answers, according to [11].

Lp.	Number of negative answers of a given rescuer to questions No. 6-8	Rank of the criterion	Interpretation evaluation
1.	3	3	distinguishing mark
2.	2	2	satisfactory mark
3.	1	1	correct mark
4.	0	0	Incorrect mark

**Table 3.** Proposals of criteria for the assessment of the parameter "coping with professional stress" - negative answers, according to [11].

Lp.	Number of affirmative answers of a given rescuer to questions No. 1-5, 9	Rank of the criterion	Interpretation evaluation
1.	6	3	distinguishing mark
2.	4-5	2	satisfactory mark
3.	2-3	1	correct mark
4.	0-1	0	Incorrect mark

**Table 4.** Proposals for summary assessment (affirmative and negative answers) according to the parameter "Coping with occupational stress", according to [1].

Lp.	Rank sum according to the parameter "coping with occupational stress"	Interpretation of the summary assessment according to the parameter "coping with occupational stress"
1.	6	distinguishing mark
2.	4-5	satisfactory mark
3.	2-3	correct mark
4.	0-1	Incorrect mark

Table 5 presents aggregate results of responses obtained by 25 mine rescuers. For nine questions, six negative answers were preferred, among other things for the question whether you consider work in mining as stressful? Seven rescuers declared an affirmative answer, while only 4 considered that work in emergency care was stressful. Lifeguard No. 4 admitted that the phone's signal caused him stress. The phone signal itself is not stressful, but the rescuer probably associates with an unscheduled rescue operation. The above-mentioned feelings may have rescuers who have already participated in the rescue operation. Execution of work affects the personal life of 2 rescuers participating in the study. Four rescuers think about their family during the rescue operation and three would change their profession to a more secure one. Perhaps those are the ones who are not satisfied with their work.

However, all rescuers surveyed admitted that they could count on their colleagues 100% during rescue operations. 19 rescuers want to raise their qualifications.

**Table 5.** Statement of answers (T - affirmative, P - negative) of the rescuers examined

Nr of the rescuer	No question								
	1.	2.	3.	4.	5.	6.	7.	8.	9.
1.	P	P	P	P	P	T	T	T	P
2.	P	P	P	P	P	T	T	T	P
3.	P	T	P	P	P	T	T	P	P
4.	P	P	T	P	P	P	T	T	P
5.	P	P	P	P	P	T	T	T	P
6.	P	P	P	P	P	T	T	P	P
7.	P	P	P	P	T	T	T	T	T
8.	P	P	P	P	P	T	T	P	P
9.	P	P	P	T	P	T	T	P	P
10.	P	T	P	P	P	T	T	P	P
11.	P	P	P	P	T	T	T	T	P
12.	P	P	P	P	P	T	T	T	P
13.	P	P	P	P	P	T	T	T	P
14.	P	P	P	P	P	T	T	T	P
15.	T	P	P	P	P	T	T	T	T
16.	T	P	P	P	P	T	T	T	P
17.	T	T	P	P	P	P	T	T	P
18.	P	P	P	P	P	P	T	T	P
19.	P	P	P	P	T	T	T	P	P
20.	T	P	P	P	P	T	T	T	P
21.	P	P	P	P	P	T	T	T	T
22.	T	P	P	P	P	T	T	T	P
23.	T	P	P	P	P	T	T	T	P
24.	T	T	P	T	P	T	T	T	P
25.	P	P	P	P	T	T	T	T	P

Table 6 contains results consistent with the preferred affirmative answers along with the interpretation, taking into account the proposal for the assessment according to the parameter "coping with occupational stress" for affirmative answers presented in table 2. Of the entire research sample for affirmative questions, 9 satisfactory and 16 distinguishing marks were obtained.

Table 7 contains results consistent with the preferred negative responses along with their interpretation, taking into account the proposal for the assessment according to the parameter "coping with occupational stress" for negative answers presented in table 3. Of the entire test sample for negative questions, 16 satisfactory grades were obtained, 1 correct for rescuer no. 8 and 24 distinguishing marks.

Table 8 contains the results of the interpretation of the synthetic risk-taking assessment according to the "coping with occupational stress" parameter based on the proposal for a summary assessment contained in table No. 4. From the entire research sample, 5 distinctive and 20 satisfactory marks were obtained.

**Table 6.** Results of answers for questions in accordance with the preferred affirmative answers along with the interpretation.

Rescuer	Negative answers to questions no. 6-8	Rank criterion	Interpretation assessment
1.	3	3	distinguishing mark
2.	3	3	distinguishing mark
3.	2	2	satisfactory mark
4.	2	2	satisfactory mark
5.	3	3	distinguishing mark
6.	2	2	satisfactory mark
7.	3	3	distinguishing mark
8.	2	2	satisfactory mark
9.	2	2	satisfactory mark
10.	2	2	satisfactory mark
11.	3	3	distinguishing mark
12.	3	3	distinguishing mark
13.	3	3	distinguishing mark
14.	3	3	distinguishing mark
15.	3	3	distinguishing mark
16.	3	3	distinguishing mark
17.	2	2	satisfactory mark
18.	2	2	satisfactory mark
19.	2	2	satisfactory mark
20.	3	3	distinguishing mark
21.	3	3	distinguishing mark
22.	3	3	distinguishing mark
23.	3	3	distinguishing mark
24.	3	3	distinguishing mark
25.	3	3	distinguishing mark

**Table 7.** Results of answers for questions in accordance with the preferred negative answers along with the interpretation

Rescuer	Affirmative answers to questions no. 1-5, 9	Rank criterion	Interpretation assessment
1.	6	3	distinguishing mark
2.	6	3	distinguishing mark
3.	5	2	satisfactory mark
4.	5	2	satisfactory mark
5.	6	3	distinguishing mark
6.	6	3	distinguishing mark
7.	4	2	satisfactory mark
8.	6	3	distinguishing mark
9.	5	2	satisfactory mark
10.	5	2	satisfactory mark
11.	5	2	satisfactory mark
12.	6	3	distinguishing mark
13.	6	3	distinguishing mark
14.	5	2	satisfactory mark

15.	4	2	satisfactory mark
16.	5	2	satisfactory mark
17.	4	2	satisfactory mark
18.	6	3	distinguishing mark
19.	5	2	satisfactory mark
20.	5	2	satisfactory mark
21.	5	2	satisfactory mark
22.	5	2	satisfactory mark
23.	5	2	satisfactory mark
24.	3	1	correct mark
25.	5	2	satisfactory mark

**Table 8.** Total rank along with the interpretation of the summary assessment according to the criterion "coping with professional stress".

Rescuer	Sum of rank	Interpretation of the assessment the total
1.	6	distinguishing mark
2.	6	distinguishing mark
3.	4	satisfactory mark
4.	4	satisfactory mark
5.	6	distinguishing mark
6.	5	satisfactory mark
7.	5	satisfactory mark
8.	5	satisfactory mark
9.	4	satisfactory mark
10.	4	satisfactory mark
11.	5	satisfactory mark
12.	6	distinguishing mark
13.	6	distinguishing mark
14.	5	satisfactory mark
15.	5	satisfactory mark
16.	5	satisfactory mark
17.	4	satisfactory mark
18.	5	satisfactory mark
19.	4	satisfactory mark
20.	5	satisfactory mark
21.	5	satisfactory mark
22.	5	satisfactory mark
23.	5	satisfactory mark
24.	4	satisfactory mark
25.	5	satisfactory mark

### 3. Discussion of research results according to the parameter "coping with occupational stress"

Based on the interpretation of the synthetic assessment of risky behaviors according to the parameter "coping with occupational stress" 20 satisfactory grades were obtained, which means that rescuers do not show increased nervousness or indifference [11]

In addition, there were as many as 8 distinctive marks interpreted as rescuers characterized by mastery of stress in variable and difficult rescue actions [11].

During the assessment of risky behaviors according to the parameter "coping with occupational stress", no correct or incorrect assessment was obtained. An incorrect assessment would indicate a reassessment preceded by additional training.

Stress can play a big role not only in the personal life of rescuers, but also during work activities. During the rescue action, stress accompanies them. It depends on the individual vulnerability of the rescuers and on the ability to master it. Each rescuer is trained in conditions as close as possible to the real ones prevailing at the bottom of the mine. They are well aware that their working conditions are often described by scientists as extreme.

The solidarity of rescuers plays a major role in coping with stress. Their inseparability and teamwork. They know that they can count on one another and it is one of the points that helps them master the stress that occurs during their work activities.

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