ORİJİNAL MAKALE / ORIGINAL ARTICLE
Balıkesir Sağlık Bilimleri Dergisi / BAUN Sağ Bil Derg
Balıkesir Health Sciences Journal / BAUN Health Sci J
ISSN: 2146-9601- e ISSN: 2147-2238
Doi: https://doi.org/10.53424/balikesirsbd.1582237

The Relationship between Occupational Accidents and Near-Miss Accidents and Occupational Safety Climate in a Metal Industry Workplace

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Geliş Tarihi / Received: *09.11.2024,* ***Kabul Tarihi / Accepted:*** *08.12.2024*

ABSTRACT
Objective: The aim of the research is to determine the relationship between occupational safety climate and occupational accidents and near-miss accidents in a workplace producing in the metal industry. **Material and Methods:** The cross-sectional study was conducted between 15 July and 30 August 2024 in an enterprise engaged in production in the metal sector in Balikesir province with a research group of 387 people. The dependent variables of the study are occupational accidents and near misses. **Results:** During their working lives, 37.2% of the participants had a near-miss accident and 34.1% had a work-related accident. The results of the multivariate logistic regression analysis showed that those who had a near-miss accident had low scores in the dimensions of Management Safety Priority, Commitment and Competence (OR: 0.56, CI: 0.38-0.82), Management Safety Justice (OR: 0.69, CI: 0.48-10), Workers' Safety Commitment (OR: 0.62, CI: 0.42-0.93), Workers' Safety Priority and Risk Non-Acceptance (OR: 0.40, CI: 0.27-0.61) and Safety Communication, Learning, and Trust in Co-Worker Safety Competence (OR: 0.65, CI: 0.45-0.94). According to multivariate logistic regression analysis, those who had a work accident had a significantly lower score on the dimension of Workers' Safety Priority and Risk Non-Acceptance (OR: 0.46, CI: 0.30-0.70). **Conclusion:** In the study, one in three people had a work accident or near-miss accident during their working life and the level of work safety climate was quite good. It was determined that the history of near miss accidents and work accidents was significantly related to the dimensions of occupational safety climate.
Keywords: Occupational Safety Climate, Near-Miss Accident, Work-Related Accident.

Metal İşkolunda Üretim Yapan Bir İşyerinde İş Kazası ve Ramak Kala Kaza Geçirme Durumunun İş Güvenliği İklimi ile İlişkisi

ÖZ
Amaç: Amaç: Araştırmanın amacı metal işkolunda üretim yapan bir işyerinde iş güvenliği ikliminin iş kazası ve ramak kala kaza geçirme ile ilişkisinin belirlenmesidir. **Gereç ve Yöntem:** Kesitsel tipteki çalışma 15 Temmuz-30 Ağustos 2024 tarihleri arasında Balikesir ilinde metal işkolunda üretim yapan bir işletmede 387 kişilik bir araştırma grubunda gerçekleştirilmiştir. Araştırmanın bağımlı değişkenleri iş kazası ve ramak kala kazadır. **Bulgular:** Katılımcıların çalışma yaşamları boyunca %37.2'si ramak kala kaza, %34.1'i iş kazası yaşamıştır. Çok değişkenli lojistik regresyon analizi sonuçlarında ramak kala kaza yaşayanların Yönetimin İş Güvenliği Taahhüdü ve Yetkinliği (OR: 0.56, GA:0.38-0.82), Yönetimin İş Güvenliği Adaleti (OR: 0.69, GA:0.48-10), Çalışanların İş Güvenliği Taahhüdü (OR: 0.62, GA:0.42-0.93), Çalışanların İş Güvenliği Önceliği ve Riski Kabul Etmemesi (OR:0.40, GA:0.27-0.61) ve Çalışanların İş Güvenliği İletişimi ve Yetkinliği (OR:0.65, GA:0.45-0.94) boyut puanları düşüktür. Çok değişkenli lojistik regresyon analizine göre iş kazası geçirenlerin Çalışanların Güvenlik Önceliği ve Riski Kabul Etmemesi boyutu puanı anlamlı olarak daha düşüktür (OR:0.46, GA:0.30-0.70). **Sonuç:** Araştırmada üç kişiden biri çalışma yaşamı boyunca iş kazası ve ramakkala kaza yaşamış olup iş güvenliği iklimi düzeyi oldukça iyidir. Ramak kala kaza ve iş kazası geçirme öyküsünün iş güvenliği ikliminin boyutları ile anlamlı düzeyde ilişkili olduğu belirlenmiştir.
Anahtar Kelimeler: İş Güvenliği İklimi, Ramak Kala Kaza, İş Kazası.

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Bu makaleye atıf yapmak için / Cite this article: Cevik, C., Eroglu, B., Baydur, H., & Vurgun, H. (2024). The relationship between occupational accidents and near-miss accidents and occupational safety climate in a metal industry workplace. *BAUN Health Sci J,13(*3),705-714. https://doi.org/10.53424/balikesirsbd.1582237

INTRODUCTION

With the impact of neoliberal policies, industrialisation and technological developments, working life has undergone a significant transformation and this transformation has increased production and competition in the labour market (Celalettin Cevik & Ozkul, 2022; Kucukali & Ozmen, 2022). With the diversification of working life, working environments have become more dangerous and risky, so there has been an increase in occupational accidents, work-related diseases and occupational diseases (Takala et al., 2024). Despite significant improvements in occupational health and safety from the past to the present, occupational accidents and occupational diseases continue to be a global public health problem. According to International Labour Organization (ILO) global estimates, approximately three million workers die each year due to occupational accidents and occupational diseases and 395 million workers globally suffer a non-fatal occupational accident each year (International Labour Organization, 2024). Worldwide, occupational accidents and diseases cause the loss of approximately 4-5 per cent of the Gross National Product of countries (Shah & Mishra, 2024). According to ILO, an occupational accident is an event that occurs in the workplace or due to the execution of the work, which causes death or disability of the body integrity mentally or physically (International Labour Organization, 2011). Occupational accidents are also an important public health problem in Turkey and according to the Social Security Institution 2023 data, 681401 people in Turkey had occupational accidents and 1907 people died due to occupational accidents (Social Security Institution, 2023). Although there are various approaches to prevent occupational accidents, one of the most important ones is the determination of the probability of a near-miss event. Near-miss event is defined in the Regulation on Occupational Health and Safety Risk Assessment as 'an event that occurs in the workplace and has the potential to cause damage to the employee, workplace or work equipment but does not cause damage' and the determination of near-miss events is underlined (Çalışma ve Sosyal Güvenlik Bakanlığı, 2012b). Herbert W. Heinrich, in his study conducted in the late 1920s by examining 75000 industrial accidents, stated that 88% of occupational accidents were caused by unsafe behaviours, 10% were caused by unsafe conditions, 2% were unavoidable, and with the accident pyramid he put forward in 1959, he stated that every 300 unsafe behaviours caused 29 minor injuries and 1 major accident (Choudhry, 2014). As it is understood, to prevent occupational accidents, it is important to focus on unsafe behaviours and situations, and to identify and reduce near-miss accidents. This suggests the formation of an occupational safety climate and culture in working life.

Occupational safety climate aims to capture employees' perceptions of safety behaviours, policies, procedures and practices as well as managerial commitment and attitudes towards safety (Zohar, 2002). It is important to evaluate the occupational safety climate in the formation of occupational accidents and occupational accidents. In the literature, studies to determine occupational accidents and occupational diseases and near-miss accidents have been carried out by associating them with sociodemographic characteristics and working conditions (Arpat, 2015; Bingöl, 2010; Gokce, 2020). In the metal industry, which is one of the main production sectors in Turkey, there were 25081 work accidents recorded in 2023 and 36 workers lost their lives (Social Security Institution, 2023). According to the literature in Türkiye, there are studies evaluating the occupational safety climate in the metal industry and addressing the relationship between near miss accident and occupational accidents. For this reason, it is necessary both to determine the prevalence of occupational accidents and to reveal the relationship with occupational safety climate.

The aim of the research is to determine the relationship between occupational safety climate and occupational accidents and near-miss incidents in a workplace producing in the metal sector in Balikesir province centre.

MATERIALS AND METHODS

Study type

The cross-sectional study was conducted between 15 July-30 August 2024 in an enterprise engaged in production in the metal sector in Balikesir province.

Study group

The population of the study consisted of 1450 people and all blue-and white-collar employees in the enterprise were included. In the study, with a total universe population of 1450 people at 50% unknown prevalence, 5% deviation and 95% confidence level, the smallest sample size was calculated as 304 in Epiinfo 7.2. program (CDC, 2024), and 387 people who met the acceptance-exclusion criteria were reached by convenience sampling. Data collection was carried out by intermittently sending the questionnaire prepared in Google Forms to the workers via business e-mail, SMS and WhatsApp groups.

Dependent and independent variables

The dependent variables of the study are the status of experiencing occupational accidents and near-miss incidents. The independent variables are the sociodemographic characteristics of the employees, variables related to working life and the seven sub-dimensions of the NOSACQ-50 TR Occupational Safety Climate scale: Management Safety Priority, Commitment and Competence; Management Safety Empowerment; Management Safety Justice; Workers' Safety Commitment; Workers' Safety Priority and Risk Non-Acceptance; Safety

Communication, Learning, and Trust in Co-Worker Safety Competence; Workers' Trust in the Efficacy of Safety Systems.

Procedures

Data collection was carried out by sending the questionnaire prepared on Google Forms to the employees who volunteered to participate in the research, who were 18 years of age and over, who worked in the metal business line in Balikesir province, who could access the internet via mobile phone or computer, via business e-mail, SMS and WhatsApp groups. The questionnaire consists of sociodemographic characteristics, working conditions, NOSACQ-50 TR Occupational Safety Climate Scale.

Sociodemographic Characteristics Form: The form consists of questions prepared by the researchers in line with the literature such as age, gender, educational status, income status, health perception and working conditions, working environment. In addition, among these questions are the dependent variable of the research, the status of having an occupational accident and the status of having a near-miss accident (Kayabek & Cevik, 2022; Kines et al., 2011).

NOSACQ-50 TR Occupational Safety Climate Scale: The scale, developed by Kines et al. (2011) and adapted into Turkish by Cevik et al. (2024), consists of 50 items in total and a four-point Likert structure (strongly disagree, disagree, agree and strongly agree). The scale consists of seven sub-dimensions: Management Safety Priority, Commitment and Competence; Management Safety Empowerment; Management Safety Justice; Workers' Safety Commitment; Workers' Safety Priority and Risk Non-Acceptance; Safety Communication, Learning, and Trust in Co-Worker Safety Competence; Workers' Trust in The Efficacy of Safety Systems. The first three dimensions are related to employees' perception of safety management within the company and the other four dimensions are related to employees' perceptions of the work group. In the scale, questions 3, 5, 8, 9, 13, 15, 18, 21, 25, 26, 28, 29, 30, 31, 32, 34, 35, 41, 45, 47, 49 are reverse scored.

The scale score is obtained by calculating the average of the answers given to the questions for each dimension, and the higher the score obtained, the higher the occupational safety climate. The mean score of a single dimension in the scale below 2.70 indicates a low level of occupational safety climate and a great need for improvement, between 2.70 and 2.99 indicates a very low level of occupational safety climate and a need for improvement, between 3.00 and 3.30 indicates a very good level of occupational safety climate and only a slight need for improvement, and above 3.30 indicates a good level of safety climate. In the study in which the scale was developed, Cronbach's alpha values ranged between 0.79-0.85 in seven dimensions and between 0.85-0.93 in the adaptation study (C Cevik, Eroglu, Baydur, & Vurgun, 2024; Kines et al., 2011).

Statistical analysis

In the analyses, the number and the percentage distributions were presented for descriptive findings. In analytical findings, Mann-Whitney U test and Kruskal-Wallis analysis were applied in univariate analysis. Univariate analysis results are presented with Effect Size (ES) and significance levels. Multivariate logistic regression analyses were performed for the dependent variables of accident and near-miss accident. According to the results obtained from the univariate analysis in logistic regression analyses; age, gender and other significant variables and each dimension of the NOSACQ-50 TR scale were included in the model separately. The results obtained from the analysis models created for each dimension of the NOSACQ-50 TR scale are presented in the form of Odds Ratio and 95% Confidence Interval (OR (95% CI)). SPSS 27 and Jamovi 2.3.28 statistical package programs were used in the analyses.

Ethical considerations

Before the study was conducted, permission was obtained from the company and Balikesir University Health Sciences Non-Interventional Research Ethics Committee (Date: 04/06/2024, Approval No:2024/84).

RESULTS

91.9% of the participants were male and the mean age was 38.9±8.8 years. 26.9% of the participants were working between the ages of 33-39, 51.2% were high school graduates, 77.8% were married, 72.9% had children, 48.6% had an income equivalent to expenses, 53.2% had good general health perception, and 18.3% had chronic diseases (Table 1).

The average weekly working hours was 48.1±5.2, the average duration of experience in the current unit was 11.5±8.8 years and the average total working experience was 17.9±9.7 years. 78.6% of the employees were blue collar and 21.4% were white collar. 59.2% of the employees work in shifts, 45.0% work in production-assembly, 21.2% work in quality control-final operations and 11.4% work in maintenance-mechanical-infrastructure support unit. Of the participants, 4.4% were diagnosed with occupational disease, 37.2% had a near-miss incident, and 34.1% had an occupational accident (Table 1).

The participants' NOSACQ-50 TR Occupational Safety Climate scale Management Safety Priority, Commitment and Competence score average is 3.36 (95% CI: 3.30-3.41), the Management Safety Empowerment score average is 3.19 (95% CI: 3.13-3.25), the Management Safety Justice score average is 3.17 (95% CI: 3.11-3.23), the Workers' Safety Commitment average score is 3.20 (95% CI: 3.14-3.25), the Workers' Safety Priority And Risk Non-Acceptance average score is 3.06 (95% CI: 3.00-3.11), the Safety Communication, Learning, and

Trust in Co-Worker Safety Competence score average is 3.08 (95% CI: 3.02-3.14), the Workers' Trust in the Efficacy of Safety Systems average score is 3.32 (95%: 3.26-3.37) (Table 2).

Table 1. Sociodemographic and working life characteristics of the participants (n=387).

Variables	**n**	**%**
Age X±SD 38.9±8.8		
18-32	98	25.3
33-39	104	26.9
40-45	101	26.1
46-65	84	21.7
Gender		
Male	356	92.0
Female	31	8.0
Education level		
Primary education	4	1
High School	198	51.2
University	165	42.6
Master's degree	17	4.4
PhD	3	0.8
Marital status		
Married	301	77.8
Single	86	22.2
Having a child		
Yes	282	72.9
No	105	27.1
Income		
Income less than expenditure	144	37.2
Income equals expenditure	188	48.6
Income more than expenditure	55	14.2
General health perception		
Very bad	1	0.3
Bad	21	5.4
Centre	118	30.5
Good	206	53.2
Very good	41	10.6
Chronic illness		
Yes	71	18.3
No	316	81.7

n: Count, **X:** Mean, **SD:** Standard deviation.

Table 1 (Continued). Sociodemographic and working life characteristics of the participants (n=387).

Variables	**X**	**SD**
Weekly working hours	48.1	5.2
Duration of experience in the unit (years)	11.5	8.8
Working life (years)	17.9	9.7
	n	**%**
Status		
Blue-collar employee	304	78.6
White-collar employee	83	21.4
Mode of work		
Shifts	229	59.2
Overtime	158	40.8
Department worked in		
Human Resources-Occupational Health and Safety-Accounting-Finance	17	4.4
Engineering-Project-Design-R&D	34	8.8
Administrative Affairs	6	1.6
Planning-Logistics-Warehouse	10	2.6
Customer Service-Service-Purchasing-Information Processing	20	5.2
Production-Assembly	174	45.0
Quality Control-Final Operations	82	21.2
Maintenance-Mechanical-Infrastructure and support	44	11.4
Occupational disease		
No	370	95.6
Yes	17	4.4
Number of occupational disease cases (n=17)		
Yes, once	15	88.2
Yes, twice	2	11.8
Near-miss accidents in working life		
No	243	62.8
Yes	144	37.2
Number of near-miss accidents in working life (n=144)		
Once	63	43.8
Twice	41	28.5
3 times	17	11.8
4 times or more	23	15.9
Experiencing occupational accidents in working life		
No	255	65.9
Yes	132	34.1
Number of occupational accidents in working life (n=132)		
Yes, once	88	61.1
Yes, twice	39	27.1
Yes, 3 times	5	3.5

n: Count, **X:** Mean, **SD:** Standard deviation.

Table 2. NOSACQ-TR Occupational Safety Climate scale score distribution (n=387).

Dimensions of NOSACQ-50 TR	X (%95 C.I.)	Min-Max.
Management Safety Priority, Commitment and Competence	3.36 (3.30-3.41)	1.00-4.00
Management Safety Empowerment	3.19 (3.13-3.25)	1.00-4.00
Management Safety Justice	3.17 (3.11-3.23)	1.00-4.00
Workers' Safety Commitment	3.20 (3.14-3.25)	1.83-4.00
Workers' Safety Priority and Risk Non-Acceptance	3.06 (3.00-3.11)	1.43-4.00
Safety Communication, Learning, and Trust in Co-Worker Safety Competence	3.08 (3.02-3.14)	1.13-4.00
Workers' Trust in the Efficacy of Safety Systems	3.32 (3.26-3.37)	1.86-4.00

X: Mean, **C.I.:** Confidence Interval, **Min:** Minimum, **Max:** Maximum.

The univariate analysis of the NOSACQ-50 TR Occupational Safety Climate scale according to independent variables is presented in Table 3. Accordingly, the score of Management Safety Priority, commitment and competence are significantly low in the 18-39 age group (ES:0.16, p<0.01), shift workers (ES:0.17, p<0.01), those who have had a near-miss incident (ES:0.21, p<0.001), and those who have had an occupational accident (ES:0.14, p<0.05). The score of Management Safety Empowerment is significantly low in the 18-39 age group (ES:0.15, p<0.05), shift workers (ES:0.21, p<0.001), and those who have had an occupational accident (ES:0.13, p<0.05). The Management Safety Justice score is significantly lower in shift workers (ES:0.21, p<0.001), those who have had a near-miss accident (ES:0.16, p<0.05), and those who have had a work accident (ES:0.13, p<0.05). Workers' Safety Commitment score is significantly lower in shift workers (ES:0.17, p<0.01), and those who have had a near-miss accident (ES:0.16, p<0.01). The Workers' Safety Priority and Risk Non-Acceptance score is significantly lower in those who have had a near-miss incident (ES:0.25, p<0.001), and those who have had a work accident (ES:0.21, p<0.001). The score of Safety Communication, Learning, And Trust in Co-Worker Safety Competence is significantly lower in women (ES:0.37, p<0.001), shift workers (ES:0.21, p<0.01), those who have had a near-miss incident (ES:0.21, p<0.001), and those who have had a work accident (ES:0.13, p<0.05). The score of Workers' Trust in the Efficacy of Safety Systems is significantly lower in men (ES:0.23, p<0.05) and in the 18-39 age group (ES:0.13, p<0.05) (Table 3).

Table 3. The relationship between the sub-dimensions of NOSACQ-50 TR Occupational Safety Climate scale and sociodemographic characteristics (n=387).

Variables	D1	D2	D3	D4	D5	D6	D7
Gender (male-female)	0.01	0.07	0.06	0.13	0.09	0.37***	0.23*
Age (18-39/40-65)	0.16**	0.15*	0.10	0.05	0.02	0.05	0.13*
Education (high school and below/university)	0.06	0.06	0.01	0.03	0.03	0.11	0.05
Mode of work (shift/working schedule)	0.17**	0.21***	0.21***	0.17**	0.11	0.17**	0.06
Marital status (married/single)	0.07	0.06	0.05	0.14*	0.1	0.03	0.02
Having children (present/none)	0.06	0.07	0.05	0.08	0.1	0.07	0.01
Near-miss accident (no/yes)	0.21***	0.11	0.16*	0.16**	0.25***	0.21***	0.06
Work accident (no/yes)	0.14*	0.13*	0.13*	0.09	0.21***	0.14*	0.01
Status (blue collar/white collar)	0.05	0.04	0.12	0.02	0.13	0	0.01
Weekly working hours (under 45 hours-45 hours and above)	0.31	0.21	0.23	0.05	0.02	0.02	0.27
Years of employment (under 17 years - 17 years and above)	0.11	0.11	0.1	0.05	0.06	0.03	0.10

#: Effect Size (Rank biserial correlation coefficient) $0.1 \leq rrb < 0.30$ small effect size. $0.30 \leq rrb < 0.50$ medium effect size. $rrb \geq 0.50$ indicates large effect size. * p<0.05, ** p<0.01, *** p<0.001.

D1: Management Safety Priority, Commitment and Competence; **D2:** Management Safety Empowerment; **D3:** Management Safety Justice; **D4:** Workers' Safety Commitment; **D5:** Workers' Safety Priority and Risk Non-Acceptance; **D6:** Safety Communication, Learning, and Trust in Co-Worker Safety Competence; **D7:** Workers' Trust in The Efficacy of Safety Systems.

In the results of multivariate logistic regression analysis adjusted for age, gender and other variables found to be significant in univariate analyses, it was determined that those who experienced a near-miss incident had lower scores for Management Safety Priority, Commitment And Competence (OR: 0.56, CI: 0.38-0.82), Management Safety Justice (OR: 0.69, CI: 0.48-10), Workers' Safety Commitment (OR: 0.62, CI: 0.42-0.93), Workers' Safety Priority And Risk Non-Acceptance (OR: 0.40, CI: 0.27-0.61) and Safety Communication, Learning, and Trust in Co-Worker Safety Competence (OR: 0.65, CI: 0.45-0.94). Similarly, in the adjusted analysis results applied for work accidents, it was determined that only the Workers' Safety Priority and Risk Non-Acceptance dimension score was significantly lower in those who had a work accident (OR: 0.46, CI: 0.30-0.70) (Table 4).

Table 4. Logistic regression analysis results of the relationship between near misses and occupational accidents and NOSACQ-50 TR Occupational Safety Climate scale dimensions (n=387).

	Dimensions	**Near-miss accident#**	**Work accident#**
		OR (%95 CI)	**OR (%95 CI)**
D1	**Management Safety Priority, Commitment and Competence**	0.56 (0.38-0.82)**	0.75 (0.51-1.11)
D2	**Management Safety Empowerment**	0.80 (0.56-1.15)	0.80 (0.55-1.18)
D3	**Management Safety Justice**	0.69 (0.48-10)*	0.87 (0.59-1.27)
D4	**Workers' Safety Commitment**	0.62 (0.42-0.93)*	0.90 (0.59-1.36)
D5	**Workers' Safety Priority and Risk Non-Acceptance**	0.40 (0.27-0.61)***	0.46 (0.30-0.70)***
D6	**Safety Communication, Learning, And Trust in Co-Worker Safety Competence**	0.65 (0.45-0.94)*	0.94 (0.64-1.37)
D7	**Workers' Trust in the Efficacy of Safety Systems**	0.74 (0.50-1.09)	0.97 (0.65-1.44)

Results of logistic regression analyses adjusted for age, gender and variables found significant in univariate analysis.
***** p<0.05; ****** p<0.01; ******* p<0.001. **C.I.:** Confidence Interval.

D1: Management Safety Priority, Commitment and Competence; **D2:** Management Safety Empowerment; **D3:** Management Safety Justice; **D4:** Workers' Safety Commitment; **D5:** Workers' Safety Priority and Risk Non-Acceptance; **D6:** Safety Communication, Learning, and Trust in Co-Worker Safety Competence; **D7:** Workers' Trust in The Efficacy of Safety Systems.

DISCUSSION

The research is important in terms of determining the incidence of work accidents and near-miss incidents as well as revealing the relationship with the NOSACQ-50 TR Occupational Safety Climate scale. The study shows that 37.2% of the participants experienced at least one near-miss incident during their working life. In a study conducted by Arpat, similar to our study, the incidence of near-miss incidents was found to be 29% (Arpat, 2015). In another study conducted by Arpat and Ozkan in the cable manufacturing industry, it was reported that 27.0% of the participants experienced a near-miss accidents (Arpat & Ozkan, 2015).

In this study, 34.1% of the participants experienced occupational accidents in their working life. In the study conducted by Arpat et al. 28% of the participants had occupational accidents, which is similar to our study (Arpat, 2015). In another study conducted by Arpat and Ozkan in the cable manufacturing industry, it was reported that 37.5% of the participants were exposed to occupational accidents at least once during their working life (Arpat & Ozkan, 2015). In addition to these studies, a study conducted in Bursa province shows that the incidence of occupational accidents in enterprises belonging to the metal sector in the last 1 year is 15.5% (Bingöl, 2010). In this respect, it is seen that the accident frequency in our study is lower, given that it is evaluated throughout the working life. This situation may be due to the institutional structure of the company where the research was conducted and the fact that the study conducted in Bursa was conducted in different scales of companies. In fact, in the same study, it is seen that the accident frequency is approximately twice as high in very small-scale companies. When we look at the literature, it is seen that the frequency of occupational accidents in the main metal sector in Turkey was 4080 in 2009 and increased to 10710 in 2018 (Erin, Akın, & Alkan, 2023). In the relevant study, it is observed that the number of work accidents has increased especially as of 2012. This situation may be related to the fact that the outputs in working life became more visible with the enactment of the Occupational Health and Safety Law No. 6331 (Çalışma ve Sosyal Güvenlik Bakanlığı, 2012a).

In the study, NOSACQ-50 TR sub-dimension scores were found to be between 3.06-3.36 and it can be said that the level of occupational safety is at a good level. When we look at the studies conducted using NOSACQ-50 Occupational Safety climate in the literature; similar to our study, the safety climate level of low and high voltage workers in Iceland

(Eðvaldsson, 2018), the safety climate level of production workers of a factory in Indonesia are similar to our study (Prameswari & Cimera, 2023).

In our study, all dimension scores of NOSACQ-50 TR scores were at a good level. The mean score of dimension 1, which measures how employees evaluate management safety priority, commitment and competence, is 3.36, which is the highest dimension score. This indicates that employees' perception of management's commitment and competence towards safety is quite good. On the other hand, for the dimension 5, which assesses employees' commitment to safety; which covers workers' safety priority and risk non-acceptance, has a mean score of 3.06 and has the lowest dimension score, but it is still sufficient. Giving importance to safety before production is important in terms of ensuring that employees prioritize not exposing themselves to risky situations. In a study examining the safety climate level of forest workers in the USA, dimension 1 has a mean score of 3.40 and has the highest dimension score average (Lagerstrom, Magzamen, Kines, Brazile, & Rosecrance, 2019). In a study conducted with farmers in Italy, the range was 2.67-3.06, which is lower than our study, which may be related to the fact that it is a different group and the level of education is lower (Fargnoli & Lombardi, 2020). In addition, it is important to provide occupational health and safety trainings to employees periodically. Indeed, safety training has an impact on safety climate dimensions and safety climate has an impact on employees' perceptions of workplace safety (Alamoudi, 2022). For those working in the field of renewable energy in the USA, it ranges between 3.20-3.45 (Waller, 2023). This relatively high level may be related to the fact that the participants in the study, conducted in the USA, were employed in a sector where occupational health and safety trainings are more intensive.

In the results of multivariate logistic regression analysis, it was determined that those who experienced near-miss incidents had low scores in the dimensions of management safety priority, commitment and competence, management safety justice, workers' safety commitment, workers' safety priority and risk non-acceptance, and safety communication, learning, and trust in co-worker safety competence. it is important to reveal the relationship between occupational safety climate and near-miss accidents, which are among the important determinants of occupational accidents but there are problems with their recording. In addition, these significant variables are also related to increasing the occupational safety performance of management-employee communication (Alamoudi, 2022). In this respect, when occupational safety is provided by the management in the workplace and spread throughout the workplace, when employees prioritize the risk and exhibit an approach according to the risk, and when employees' communication and competence in occupational safety increase, the possibility of near-miss accidents will decrease. As a matter of fact, Lagerstrom et al. found that as the occupational safety climate increases, the number of employees reporting problems also increases (Lagerstrom et al., 2019).

According to the multivariate regression analysis, the score of workers' safety priority and risk non-acceptance dimension is significantly lower in those who have had a work accident. These findings show that employees' prioritizing safety and not accepting risk are related to the absence of occupational accidents. In a study conducted in Iran, it was revealed that job stress negatively affects the work safety climate and that safety climate is an important determinant in reducing accidents (Khoshakhlagh et al., 2021). Similarly, Christian et al. found that occupational safety climate is an important determinant in reducing accidents and injuries (Christian, Bradley, Wallace, & Burke, 2009). A study conducted in Saudi Arabia found that employee knowledge, motivation and participation are important.

In our study, the Workers' safety priority and risk non-acceptance sub-dimension of the Occupational Safety Climate is found to be related to the occurrence of both occupational accidents and accidents at work, which is important in terms of employee participation in risk management and increasing the awareness of employees.

In our study, the workers' safety priority and risk non-acceptance sub-dimension of the Occupational Safety Climate is found to be related to the occurrence of both occupational accidents and accidents at work, which is important in terms of employee participation in risk management and increasing the awareness of employees. As a matter of the fact, it is seen in the literature that being in balance with social environment contributes to occupational safety, reduces stress, and common occupational safety perceptions contribute to the development of work group norms in the workplace (Kines et al., 2011). In addition, in his meta-analysis study on safety climate, Clarke suggested that employees feel more connected to the work group rather than the organisation and that the perception of work group norms is highly determinant for group safety climate (Clarke, 2006).

Limitations and Strengths

The use of the NOSACQ-50 TR scale, which is a comprehensive and international measurement tool for safety climate measurement in our study, provides the opportunity to compare and infer our research results with similar studies conducted in other countries in the NOSACQ-50 database. In addition, it is a strength that it is conducted in a high-risk line of work and includes blue and white collar employees. It is also a unique aspect that it deals with occupational accidents and near-miss accidents in terms of occupational safety climate dimensions. However, the fact that the data of the study was

collected online, and convenience sampling method was used is a limitation in terms of generalizability.

CONCLUSION

One third of the participants had at least one near miss accident and occupational accident in their working life. The NOSACQ-50 TR occupational safety climate score of the research group was quite good. It was determined that occupational safety climate dimensions were significantly associated with near misses and occupational accidents. Recording near-miss accidents in the work environment and taking the necessary measures to be analysed will contribute to the prevention of occupational accidents. It is important to create and develop an occupational safety climate to prevent near-miss accidents. Workers' safety priority and risk non-acceptance should be given importance, their participation in decisions should be ensured and their awareness should be increased to prevent the occurrence of occupational accidents at the workplace. It is recommended to create and maintain a safety climate to prevent near-misses and occupational accidents in workplaces. It is also recommended to reveal the occupational safety climate and its determinants in other study areas.

Acknowledgement

The authors would like to extend their sincere thanks to anyone who contributed to this study.

Conflict of Interest

The author declares no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Funding

None.

Author Contributions

Plan, design: CC., BE., HB., HV; **Material, methods and data collection:** CC., BE., HV; **Data analysis and comments:** CC, HB; **Writing and corrections:** CC., BE., HB., HV.

Ethical Approval

Institution: Balikesir University Health Sciences Non-Interventional Research Ethics Committee.
Date: 24.06.2024
Approval No: 2024/84

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