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Research Article

Analysing the Occupational Health and Safety Knowledge of Science Teachers

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Abstract

This study was conducted to evaluate the occupational health and safety knowledge of science teachers in Malatya, Turkey. 'Occupational Health and Safety' questionnaire was used as a data collection tool in the descriptive survey method. The results of the survey conducted with a total of 352 teachers were analysed by SPSS analysis and it was found that teachers had a high level of knowledge in this field and were aware of the rules and occupational risks. In addition, it was determined that teachers received basic occupational health and safety and first aid trainings more than fire safety and hygiene trainings and could intervene appropriately in emergencies. There is also a widespread opinion that occupational health and safety course should be compulsory in the curriculum. Teachers stated that they frequently encountered back, neck and joint disorders and infections.

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Introduction

In our age where industrial developments are accelerating, the number of occupational accidents is increasing in parallel. Millions of occupational accidents occur worldwide every year and these accidents cause many individuals to lose their lives or become disabled (Ali et al., 2022; Kılkış, 2013). In order to combat this problem, the Occupational Health and Safety Law No. 6331 was enacted in Turkey in 2012. This law defines injuries, losses or other harmful consequences that may occur during work as risks and explaines measures to be taken to reduce these risks. Identifying and managing risks to protect the health and safety of employees is essential to prevent possible occupational accidents (Rielander, et al., 2024). The Healthy Work Environment model proposed by the World Health Organization in 2010 identified four main areas of intervention to protect

health and safety in workplaces: physical working environment, psychosocial environment, individual health resources and workplace community involvement. However, in the time since this model was proposed, most research have focused on the physical work environment and workplace community engagement, while research on the psychosocial environment and individual health resources have been almost ignored (Fiorilli et al., 2019).

Occupational health and safety legislation classifies workplaces according to their risk levels. Educational institutions are in the category of low-risk areas in this classification. Although occupational health and safety studies are generally aimed at high-risk sectors, school administrators, teachers, students and other school employees are considered among the major risk groups in terms of occupational health and safety (Benevene et al., 2019). Identifying and analysing potential risks that may be encountered in schools and taking precautions against these risks are the basic components of occupational health and safety practices. In line with legal regulations, occupational health and safety experts can establish emergency teams consisting of school staff and make plans by organising trainings on what to do in emergencies such as fire and first aid. Although occupational health and safety practices are sometimes perceived as an additional burden by school administrators and teachers, they are of vital importance in terms of preventing injuries, loss of life and occupational diseases that may occur in schools where students spend a significant part of their lives (Türkoğlu, 2020).

In the process of effective implementation of occupational health and safety protocols, the roles of educators are of critical importance. Informing teachers in detail about the potential hazards that can be encountered in educational institutions and receiving training in this direction constitute the basis of a safe working environment. This study aims to examine the level of knowledge, attitudes and perspectives of science teachers working in public schools in Malatya on occupational health and safety, as the February 6, 2023 earthquakes emphasized the importance of occupational health and safety. The research aims to contribute to the development of safety culture in educational environments.

In line with the main problem of the research, answers to the following questions were sought:

1. Do the occupational health and safety knowledge levels of science teachers differ according to their gender?

2. Do science teachers' occupational health and safety knowledge levels differ according to their ages?
3. Do science teachers' occupational health and safety knowledge levels differ according to their professional experience?
4. Do science teachers' occupational health and safety knowledge levels differ according to their working time in their current schools?

Do science teachers' occupational health and safety knowledge levels differ according to their daily working hours?

Method

Research Model

This study, in which the knowledge levels of science teachers on occupational health and safety were evaluated, was conducted based on the descriptive survey method. This method is used to provide detailed information about events, facts or situations that reflect the views and attitudes of a large population. Descriptive survey involves collecting data about the existing situation of the subject under investigation without direct intervention (Karasar, 2011).

Universe and Sample

The population of this study consists of all science teachers working in secondary schools in Malatya province. However, the sample included in the study consists of 289 science teachers who participated in the study on voluntary basis by simple random sampling method.

Data Collection Tools

In this study, the 'Occupational Health and Safety' themed questionnaire form developed by Türkoğlu (2020) was used in the data collection process. The questionnaire includes 5 questions prepared to determine the demographic information of the teachers and 22 questions to evaluate the level of training and knowledge they have on occupational health and safety, and consists of 27 multiple-choice questions in total. Within the scope of the research, the opinions of experts were obtained for the validity and reliability analyses of the occupational health and safety questionnaire applied to science teachers. In this process, a total of five experts, including an occupational health and safety expert, academicians specialised in science education and science teachers working in schools affiliated to the

Ministry of National Education, were consulted. The experts were asked to score the questionnaire items and the content validity ratios for each item were calculated based on these evaluations. The sum of the content validity ratios obtained was divided by the number of experts (5) to determine the Content Validity Criterion (CVM) and this value was determined as 0.74. Then, the Content Validity Index (CVI) was calculated by taking the arithmetic mean of the content validity ratios and this value was found to be 0.77. As a result of the analyses, it was determined that the CGI was greater than the CQI (CGI > CQI) and this shows that the content validity of the questionnaire form used in the research is at a sufficient level.

Research Process

Within the framework of this research, a questionnaire study on 'Occupational Health and Safety' was conducted on science teachers working in secondary education institutions in Malatya province. The questionnaire was prepared in a digital format through Google Forms and presented to the teachers online. Participating teachers were asked to respond honestly to the items in the questionnaire. They were also assured that their responses would be kept confidential and would only be utilised in the context of this research. The web link of the questionnaire was sent to science teachers through the Malatya Provincial Directorate of National Education and the relevant school administrations, and as a result, 289 teachers contributed to this study. In order to complete the questionnaire, Google Forms was set up so that the questions had to be answered compulsorily; this ensured that teachers answered the questions fully and completely. At the beginning of the questionnaire, information about the study and the consent form for voluntary participation were included in the explanation section of the questionnaire. Contact details were also provided in the questionnaire in case the researcher needed to be contacted. The research data were collected between September 2022 and January 2023.

Analysing the Data

The questionnaire data obtained in this study were evaluated using SPSS 21 statistical analysis software. Skewness and kurtosis values were calculated to determine whether the data obtained from the questionnaire forms conform to normal distribution. In the evaluations related to normal distribution, having values between -1 and +1 and especially close to zero indicates that the data show a normal distribution. As a result of the analyses, it was determined that the skewness and kurtosis values of the scale items conformed to the

specified criteria and in this direction, it was concluded that it was appropriate to use parametric tests in the analysis of the data. Frequency and percentage calculations were used in the analysis of the questions in the questionnaire form, and t-test and ANOVA tests were applied to examine whether teachers' knowledge levels on occupational health and safety differ according to demographic characteristics.

Finding

Demographic data of science teachers were analysed by descriptive statistics methods and the results obtained are presented in Table 1.

Table 1. Findings related to the demographic characteristics of the participants

Demographic Characteristics	Groups	Frequency	Percentage
Gender	Male	163	56,4
	Female	126	43,6
	TOTAL	289	100,0
Age	18-35	61	21,1
	36-50	172	59,5
	51 and over	56	19,4
	TOTAL	289	100,0
Professional experience	1-5 year	13	4,5
	6-15 year	117	40,5
	16 year and over	159	55,0
	TOTAL	289	100,0
Working Time at Current School	1-5 year	125	43,3
	6-15 year	142	49,1
	16 year and over	22	7,6
	TOTAL	289	100,0
How many hours do you work daily?	1-6 hour	170	58,8
	7-8 hour	91	31,5
	9 hour and over	28	9,7
	TOTAL	289	100,0

As a result of the examination of Table 3, it was determined that the gender distribution among science teachers was 56.4% male and 43.6% female. The distribution according to age categories shows that 59,5% of the teachers are between 36-50 years old, 21,1% are between 18-35 years old and 19,4% are over 51 years old. In terms of professional experience, 55,0% of the teachers have 16 years or more experience, 40,5% have 6-15 years experience and 4,5% have 1-5 years experience. The length of service in the school was recorded as 6-15 years with 49.1%, 1-5 years with 43.3% and 16 years or more with 7.6%. The daily working hours of the teachers were determined as 1-6 hours for 58.8%, 7-8 hours for 31.5%, and 9.7% for 9 hours or more.

The findings related to the knowledge of science teachers about the importance of occupational health and safety are given in Table 2.

Table 2. Findings related to participants' knowledge about the importance of occupational health and safety

Do you have information about the importance of Occupational Health and Safety?	Frequency	Percentage
Yes	245	84,8
No	3	1,0
Partially	41	14,2
TOTAL	289	100,0

Detailed analysis of Table 2 reveals that the majority of the participant science teachers (84.8%) found themselves knowledgeable in this field, while 14.2% of them had partial knowledge on this subject. Only a small group of 1% stated that they were uninformed about the subject.

Findings on the knowledge of the participants about the rules to be followed regarding occupational health and safety are given in Table 3.

Table 3. Findings on the knowledge of the participants about the rules to be followed regarding occupational health and safety

Do you have information about the rules you need to follow regarding Occupational Health and Safety?	Frequency	Percentage
Yes	201	69,6
No	6	2,1
Partially	82	28,3
TOTAL	289	100,0

When Table 3 is examined, it is understood that 69.6% of science teachers declared that they are knowledgeable about the rules they have to comply with in the field of occupational health and safety. 28.3% of the participants stated that they partially knew. 2.1% of the participants are not aware of these rules.

Findings related to the participants' knowledge about accident risks and hazards related to their professions are given in Table 4.

Table 4. Findings related to the participants' knowledge about accident risks and hazards related to their professions

Do you have information about accident risks and hazards related to your profession?	Frequency	Percentage
Yes	240	83,0
No	5	1,7
Partially	44	15,2
TOTAL	289	100,0

When Table 4 is examined, it is understood that 83.0% of the participants declared that they were knowledgeable about the risks and dangers related to their profession. It is understood that 15.2% of the participants have only partial knowledge on this subject, while 1.7% do not have knowledge about occupational risks and hazards.

Findings on the training received by the participants on occupational health and safety are given in Table 5.

Table 5. Findings on the training received by the participants on occupational health and safety

Do you have any training or education on the following topics?	Frequency	Percentage
Basic Occupational Health and Safety Training	207	71,6
Basic First Aid Training	202	69,9
Fire Training	79	27,3
Hygiene Training	72	24,9

When Table 5 is examined, it is understood that a significant portion of the participants (71.6%) have completed basic occupational health and safety training. 69.9% of the participants declared that they had received basic first aid training, 27.3% had attended fire safety training and 24.9% had received hygiene training.

Findings on the drills or exercises that the participants have participated in before is presented in Table 6.

Table 6. Findings on the drills or exercises that the participants have participated in before

Are there any drills or exercises related to the following topics that you have participated in before?	Frequency	Percentage
Earthquake drill	262	90,7
Fire drill	191	66,1
First aid drill	99	34,3

When Table 6 is analysed, it is seen that the majority of the participant science teachers (90,7%) participated in earthquake drills. In addition, the rate of participation in fire drills was recorded as 66.1%. As for first aid drills, this rate was 34.3%.

Findings on the participants' knowledge of emergency exit doors, escape stairs and gathering places in case of emergency in the school where they work are presented in Table 7.

Table 7. Findings on the participants' knowledge of emergency exit doors, escape stairs and gathering places in case of emergency in the school where they work

Do you know where the emergency exit doors, escape stairs and emergency gathering place are located in the school where you work?	Frequency	Percentage
Yes	274	94,8
No	15	5,2
TOTAL	289	100,0

The detailed analysis of Table 7 reveals that the majority of the participant science teachers (94.8%) have mastered the emergency protocols in the educational institutions where they work. These teachers indicated the locations of emergency exit doors, escape stairs and emergency assembly areas. On the other hand, 5.2% stated that they did not have information on these issues.

Findings on the participants' knowledge of the meaning of health and safety signs are presented in Table 8.

Table 8. Findings on the participants' knowledge of the meaning of health and safety signs

Are you familiar with what health and safety signs mean?	Frequency	Percentage
Yes	214	74,0
No	4	1,4
Partially	71	24,6
TOTAL	289	100,0

As a result of the examination of Table 8, it was determined that most of the participant science teachers (74.0%) had sufficient knowledge about the meanings of health and safety signs. 24.6% of the teachers stated that they partially knew the meanings of these signs and 1.4% of the teachers stated that they were uninformed about this issue.

Findings related to the opinions of the participants on whether teachers' awareness of occupational health and safety reduces accidents and injuries in schools are presented in Table 9.

Table 9. Findings related to the opinions of the participants on whether teachers' awareness of occupational health and safety reduces accidents and injuries in schools

Do you think that teachers' awareness of occupational health and safety reduces accidents and injuries in schools?	Frequency	Percentage
Yes	280	96,9
No	9	3,1
TOTAL	289	100,0

Evaluation of Table 9 reveals the prevalence of occupational health and safety awareness among teachers and the possible impact of this awareness on accident and injury rates in schools. The majority of science teachers participating in the research (96.9%) think that teachers' awareness on this issue will play a critical role in reducing accidents and injuries that may occur in educational institutions to a very low level. However, 96.9% of teachers do not agree with this opinion.

Findings on the participants' informing students about the dangers and accident risks at school are presented in Table 10.

Table 10. Findings on the participants' informing students about the dangers and accident risks at school

Do you inform your pupils about dangers and accident risks at school?	Frequency	Percentage
Yes	222	76,8
No	7	2,4
Partially	60	20,8
TOTAL	289	100,0

Analysis of Table 10 reveals that the majority of science teachers (76.8%) inform their students about possible dangers and accident possibilities in the school environment. While 20.8% of the teachers stated that they provided partial information on this subject, only 2.4% stated that they did not provide such information.

Findings related to the participants' opinions on the most common places where falls and injuries related to students occur are presented in Table 11.

Table 11. Findings related to the participants' opinions on the most common places where falls and injuries related to students occur

What is the most common place or places where falls and injuries to students occur?	Frequency	Percentage
School playground	241	83,4
Classes	35	12,1
Koridorlar	127	43,9

Table 11 indicates that a significant majority of science teachers (83.4%) report that incidents of falls and injuries among students most frequently occur in the schoolyard. Additionally, 43.9% of teachers identify corridors as another significant area where such incidents take place, while 12.1% point to classrooms.

Findings related to the status of risk assessment conducted at the schools where participants are employed are given in table 12.

Table 12. Findings related to the status of risk assessment conducted at the schools where participants are employed.

Has a risk assessment been conducted at the school you are working at?	Frequency	Percentage
Yes	240	83,0
No	42	14,5
Don't know	7	2,4
TOTAL	289	43,9

Table 12 reveals that a significant majority of the participant science teachers (83.0%) confirm that risk assessments have been conducted at the schools where they serve. 14.5% of the teachers report that such an assessment has not been carried out, while 2.4% indicate that they do not possess information on this matter.

Findings related to the knowledge of participants regarding their rights and responsibilities in the event of a workplace accident are presented in Table 13.

Table 13. Findings related to the knowledge of participants regarding their rights and responsibilities in the event of a workplace accident.

Are you informed about your legal rights and responsibilities in the event of a workplace accident?	Frequency	Percentage
Yes	92	31,8
No	38	13,1
Partially	159	55,0
TOTAL	289	43,9

Table 13 displays the levels of awareness among participant science teachers regarding their legal rights and responsibilities in the face of workplace accidents. Of the teachers who participated in the study, 55% reported having partial knowledge on the subject, while 31.8% declared themselves to be fully informed, and a segment of 13.1% admitted to being uninformed.

Findings related to the participants' knowledge of personal protective equipment are presented in Table 14.

Table 14. Findings related to the participants' knowledge of personal protective equipment

Are you knowledgeable about personal protective equipment?	Frequency	Percentage
Yes	133	46,0
No	21	7,3
Partially	135	46,7
TOTAL	289	100,0

When Table 14 is examined, it is understood that 46.7% of the science teachers who participated in the research stated that they had partial knowledge about "Personal protective equipment". 46.0% of the teachers stated that they had knowledge about the mentioned subject. 7.3% of the participants stated that they were unaware of the issue.

Findings related to the participants' adequacy in first aid are presented in Table 15.

Table 15. Findings related to the participants' adequacy in first aid

Do you consider yourself to be proficient in first aid?	Frequency	Percentage
Yes	66	22,8
No	53	18,3
Partially	170	58,8
TOTAL	289	100,0

Table 15 reveals the self-assessments of science teachers regarding their knowledge and skills in first aid. Among the teachers participating in the study, 58.8% consider themselves to be 'partially proficient' in first aid, while 22.8% view themselves as 'proficient' in this area, and a segment of 18.3% acknowledges being 'inadequate'.

Findings on the participants' knowledge regarding occupational diseases are presented in Table 16.

Table 16. Findings on the participants' knowledge regarding occupational diseases

Are you knowledgeable about occupational diseases?	Frequency	Percentage
Yes	128	44,3
No	19	6,6
Partially	142	49,1
TOTAL	289	100,0

Table 16 reflects the knowledge levels of science teachers regarding occupational diseases. Approximately half of the teachers involved in the study (49.1%) have indicated that they are 'partially knowledgeable' on the subject, 44.3% have described themselves as 'knowledgeable', and a group of 6.6% have stated that they are 'uninformed'.

Findings concerning the availability of students' blood type lists at the schools where participants work are presented in Table 17.

Table 17. Findings concerning the availability of students' blood type lists at the schools where participants work.

Do you have a list of your students' blood types available at the school you work at?	Frequency	Percentage
Yes	14	4,8
No	272	95,2
TOTAL	289	100,0

Table 17 reveals that a significant majority of the participant science teachers (95.2%) responded negatively to the question, 'Do you have a record of the blood groups of students at the educational institution where you work?' Conversely, a minority group (4.8%) indicated that they do possess such records.

Findings related to the participants' encounters with diseases associated with their professions are presented in Table 18.

Table 18. Findings related to the participants' encounters with diseases associated with their professions.

Do you encounter any diseases that you believe are related to your profession?	Frequency	Percentage
Yes	247	85,5
No	42	14,5
TOTAL	289	100,0

Table 18 indicates that a substantial portion of the participating science teachers (85.5%) answered 'yes' to the question regarding the presence of diseases associated with their professional activities. On the other hand, a segment of 14.5% reported not encountering such diseases.

Findings on the types of diseases encountered by participants in relation to their professions are presented in Table 19.

Table 19. Findings on the types of diseases encountered by participants in relation to their professions

What diseases do you consider to be related to your profession?	Frequency	Percentage
Musculoskeletal disorders (such as back, neck, and joint ailments resulting from standing)	216	74,7
Ear, nose, and throat diseases (like pharyngitis, sinusitis, etc.)	212	73,4
Allergic conditions (asthma, bronchitis, etc.)	97	33,6
Microbial illnesses (flu, common cold, etc., transmitted from students)	208	72,0

74.7% of teachers stated that they experienced illnesses resulting from their profession, such as back, neck and joint disorders (musculoskeletal disorders), since their jobs often require standing for long periods of time. 73.4% of teachers stated that they experienced ear, nose and throat diseases such as pharyngitis and sinusitis due to their profession. 72% of the participants stated that they experienced microbial diseases such as flu and cold transmitted to them from students. 33.6% of the participants stated that they experienced illnesses such as asthma and bronchitis caused by their profession.

Findings related to the psychological states encountered by participants in connection with their professions are presented in Table 20.

Table 20. Findings related to the psychological states encountered by participants in connection with their professions.

Do you encounter psychological states that you believe are related to your profession?	Frequency	Percentage
Yes	245	84,8
No	44	15,2
TOTAL	289	100,0

Upon examining Table 20, it has been found that a significant portion of the science teachers who responded to the survey (84.8%) have affirmed encountering psychological issues related to their profession. On the other hand, a minority of 15.2% reported not facing such psychological conditions.

Findings related to the types of psychological problems encountered by participants in relation to their professions are presented in Table 21.

Table 21. Findings related to the types of psychological problems encountered by participants in relation to their professions.

What are the psychological conditions you believe to be associated with your profession?	Frequency	Percentage
Excessive fatigue	206	71,3
Stress	198	68,5
Anxiety	59	20,4
Headache	156	54,0
Nervous problems	68	23,5
Desire for absenteeism from work	60	20,8

An evaluation of Table 21 provides insights into the psychological conditions encountered by science teachers within a professional context. 71.3% of the teachers reported experiencing excessive fatigue, 68.5% identified stress, 54.0% complained of headaches, 23.5% faced nervous problems, 20.8% expressed a reluctance to attend work, and 20.4% experienced anxiety. These findings reflect the psychological impact of their professional lives on the teachers. Findings on participants' knowledge of how to act in cases of injuries are presented in Table 22.

Table 22. Findings on participants' knowledge of how to act in cases of injuries

Do you know how to conduct yourself in the event of an injury?	Frequency	Percentage
Yes	136	47,1
No	14	4,8
Partially	139	48,1
TOTAL	289	100,0

In response to the question 'Do you possess the appropriate knowledge for intervention in injury scenarios?', 48.1% of the participant science teachers indicated 'partially', 47.1% responded 'fully', and 4.8% answered 'no'. These data serve as a significant indicator of the extent to which teachers feel competent in necessary first aid techniques during injury scenarios.

Findings related to the participants' ability to use fire extinguishers are presented in Table 23.

Table 23. Findings related to the participants' ability to use fire extinguishers.

Can you use fire extinguishers?	Frequency	Percentage
Yes	198	68,5
No	91	31,5
TOTAL	289	100,0

Table 23 presents data on the science teachers' proficiency in using fire extinguishing devices. Of the teachers participating in the study, 68.5% indicated that they could effectively use fire extinguishers, while 31.5% expressed that they were not sufficiently skilled in this area.

Findings on the participants' ability to remain composed in the event of an emergency are presented in Table 24.

Table 24. Findings on the participants' ability to remain composed in the event of an emergency

Can you remain composed when faced with an emergency situation?	Frequency	Percentage
Yes	232	80,3
No	57	19,7
TOTAL	289	100,0

Table 24 reflects the opinions of teachers regarding their capacity to act calmly and deliberately in emergency situations. While 80.3% of science teachers expressed that they could maintain composure in such circumstances, 19.7% indicated that they did not possess this ability.

Findings on participants' perspectives regarding the compulsory status of occupational health and safety courses are presented in Table 25.

Table 25 Findings on participants' perspectives regarding the compulsory status of occupational health and safety courses

"Should Occupational Health and Safety be a mandatory course in schools?"	Frequency	Percentage
Yes	251	87,2
No	38	12,8
TOTAL	289	100,0

Table 25 presents the views of science teachers regarding the question, 'Do you believe that Occupational Health and Safety should be included as a compulsory subject in the school curriculum?' 87.2% of the participants expressed the opinion that this course should be mandatory, while 12.8% opposed this idea.

Within the scope of the research, normality test was applied to analyse the data collected through the questionnaire form. As a result of the analysis, it was determined that the data showed normal distribution. Accordingly, parametric tests were preferred for the

analysis of the data set and evaluations were carried out on the basis of this method. Variation in participants' knowledge of occupational health and safety according to their gender is presented in Table 26.

Table 26. Variation in participants' knowledge of occupational health and safety according to their gender

Sub Dimension	Gender	n	X	ss	Levene's Test		sd	t	p
					F	p			
Knowledge of occupational health and safety	Male	163	2,15	,20	,577	,448	287	2,512	0,013*
	Female	126	2,09	,22					
	Total	289	2,13	,21					

The independent groups t-test analysis conducted based on the data presented in Table 26 has revealed a statistically significant difference in the knowledge levels of occupational health and safety among science teachers based on gender. The results obtained [$t(287) = 2.512$; $p < .05$] indicate a meaningful distinction between male and female teachers. The average scores of male teachers ($X = 2.15$) are slightly higher compared to their female counterparts ($X = 2.09$), suggesting that both genders possess a 'Moderate' level of knowledge regarding occupational health and safety.

Variation in participants' knowledge of occupational health and safety according to their age is presented in Table 27.

Table 27. Variation in participants' knowledge of occupational health and safety according to their age

	Age	n	X	s.s	ANOVA TESTİ						Differentiating Groups
					Var. Kay.	Kar. Top.	sd	Kar. Ort.	F.	p	
ot occupational	25-35 (a)	61	2,12	,18	Between groups	,368	2	,184	4,099	,018*	a-c, b-c
	36-50 (b)	172	2,11	,21	Within groups	12,834	286				
	51 and over (c)	56	2,20	,23	Total	13,202	288				
	TOTAL	289	2,13	,21							

According to the statistical analysis results presented in Table 27, the knowledge levels of science teachers regarding occupational health and safety vary according to age groups. The variance analysis has shown that the age factor has a statistically significant

effect on teachers' knowledge levels. This is supported by the values of F(2, 288) = 4.099, p < .05. It has been determined that teachers aged 51 and above have superior knowledge levels compared to teachers in the 25-35 and 36-50 age ranges. The LSD post-hoc test indicates that this significant difference is particularly in favor of teachers aged 51 and above.

Variation in participants' occupational health and safety knowledge based on their professional experience is presented in Table 28.

Table 28. Variation in participants' occupational health and safety knowledge based on their professional experience.

					ANOVA TEST						
	Professional experience	**n**	**X**	**s.s**	**Var. Kay.**	**Kar. Top.**	**sd**	**Kar. Ort.**	**F.**	**p**	**Differentiating Groups**
Knowledge of occupational health and safety	1-5 year (a)	13	1,95	,29	Between groups	,488	2	,244	5,484	,005*	a-b, a-c
	6-15 year (b)	117	2,11	,21	Within groups	12,715	286				
	16 year and over (c)	159	2,15	,19	Total	13,202	288				
	TOTAL	289	2,13	,21							

The analytical findings in Table 28 indicate that the accumulation of knowledge among science teachers regarding occupational health and safety is significantly variable in relation to their professional experience durations. The variance analysis has revealed a statistically significant difference among different professional experience groups. This is supported by the values of F(2, 288) = 5.484, p < .05. According to the results of the LSD post-hoc test, teachers with 6-15 years of professional experience have superior knowledge levels compared to those with 1-5 years of experience. Similarly, when comparing teachers with 1-5 years and 16 or more years of professional experience, a favorable difference is observed in favor of teachers with 1-5 years of experience.

Variation in participants' occupational health and safety knowledge based on their current working durations in schools is presented in Table 29.

Table 29. Variation in participants' occupational health and safety knowledge based on their current working durations in schools.

	Working hours at current schools	n	X	s.s	ANOVA TEST Var. Kay.	Kar. Top.	sd	Kar. Ort.	F.	p
Knowledge of occupational health and safety	1-5 year (a)	125	2,12	,20	Between groups	,045	2	,022	,489	,614
	6-15 year (b)	142	2,13	,20	Within groups	13,157	286			
	16 year and over (c)	22	2,17	,31	Total	13,202	288			
	TOTAL	289	2,13	,21						

The analysis of the data presented in Table 29 reveals that the knowledge levels of science teachers regarding occupational health and safety do not show a statistically significant difference based on the duration of employment at their current schools. The statistical test results support this situation with values of [F(2, 288) = 0.22, p > .05]. When comparing the arithmetic means of the work duration groups, it is observed that teachers who have worked between 1-5 years have the lowest average score (X = 2.12), while those who have worked for 16 years or more have the highest average score (X=2.17). The findings of the study indicate that teachers generally assess their knowledge of occupational health and safety at a "Partially" level.

Variation of participants' knowledge of occupational health and safety according to their daily working hours is presented in Table 30.

Table 30. The variation of participants' knowledge of occupational health and safety according to their daily working hours.

	Daily working time	n	X	s.s	ANOVA TEST Var. Kay.	Kar. Top.	sd	Kar. Ort.	F.	p	Differentiating Groups
Knowledge of occupational health and safety	1-6 hour (a)	170	2,09	,19	Between groups	,599	2	,300	6,775	,001*	a-b, a-c
	7-8 hour (b)	91	2,18	,20	Within groups	12,560	284				
	9 hour and over (c)	28	2,19	,28	Total	13,159	288				
	TOTAL	289	2,13	,21							

When examining the data presented in Table 30, it was determined that the knowledge levels of science teachers regarding occupational health and safety showed a statistically significant difference based on professional experience ($F(2\text{-}288)=6.775$; $p<0.05$). The LSD post-hoc analysis revealed that this significant difference favored teachers who work between 1 to 6 hours daily compared to those working 7 to 8 hours. Similarly, when comparing teachers with a working duration of 1 to 6 hours to those working 16 hours or more per day, it was seen that teachers with longer working hours had a higher level of knowledge.

Discussion and Conclusion

The purpose of the study was to examine the knowledge of science teachers regarding occupational health and safety. In this context, an online "Occupational Health and Safety" survey was administered to 289 science teachers working in middle schools in the province of Malatya via the Google Forms application. Recent research on teachers on the subject has revealed that teachers have a high level of knowledge about occupational health and safety (Doğdu, 2019). Türkoğlu's (2020) study conducted on 150 teachers in the center of Kırklareli demonstrated that 66% of teachers were knowledgeable about occupational health and safety. Yivli's (2018) study on kindergarten teachers in the Fatih and Zeytinburnu districts of Istanbul found that 52.5% of participants were informed about Law No. 4857 related to labor, while 47.5% were knowledgeable about Occupational Health and Safety Law No. 6331. In a study conducted by Babaloglu (2020) on teachers working in Vocational and Technical Anatolian High Schools in Trabzon, it was determined that 79 percent of the teachers were knowledgeable about occupational health and safety. In the current study, similar to those in the literature, it was determined that the majority of participants (84.8%) had basic knowledge in the field of occupational health and safety. Another point emphasized in the studies in the literature is that teachers generally have a high level of knowledge about occupational risks and hazards (Birken, 2018; Yivli, 2018). In the current study, similar to this finding in the literature, it was determined that the rates of teachers receiving basic occupational health and safety training and basic first aid training were high (69% and 71.6%, respectively). As a result of their study on teachers in Istanbul, Gümüş and Dalbay (2016) stated that 52% of the participants received first aid training and 30% received hygiene training. However, as a result of the current research, it was determined that the rates of teachers receiving fire training and hygiene training were lower (27.3% and 24.9%

respectively). In the emergence of the results reached in the research, the convenience offered by the developing internet and digital technologies to teachers' information acquisition processes on occupational health and safety played a decisive role. Online training materials, open-source content, social media platforms and mobile applications have enabled teachers to learn about legal regulations and safety measures. Online seminars and interactive sessions, which became widespread during the pandemic, increased access to up-to-date information, while social media and media content raised awareness levels. In addition, the spread of occupational health and safety culture in educational institutions, regular information meetings and risk assessment practices contributed to teachers' effective use of their knowledge in this field in their daily professional practices. The combination of these factors constituted the main reasons for the high level of knowledge observed in the research findings.

In the current study, it is seen that the majority of science teachers actively participate in earthquake (90.7%) and fire (66.1%) drills. However, it was found that the participation rate in first aid drills (34.3%) was relatively low. In a similar study in the literature conducted by Türkoğlu (2020), it was seen that teachers' participation in earthquake (42.4%) and fire (42.1%) drills was higher than their participation in first aid (15.5%) drills, similar to the results of the current study. As a result of another study, it was determined that teachers' participation rates in earthquake (45.0%) and fire (41.0%) drills were higher than their participation rate in first aid (15.0%) drills (Gümüş, 2016). However, Birken (2018) concluded that teachers' participation rates in earthquake (61.9%), first aid (60.3%) and fire (58.7%) drills were close to each other as a result of his research. Earthquake and fire drills are comprehensive activities that are generally mandated and regularly implemented by school administrations. This may be effective in teachers' easier access to and participation in these drills. In addition, the fact that events such as earthquakes and fires carry the risk of direct physical harm may increase teachers' interest in such drills. On the other hand, organising first aid drills is a process that requires more specific knowledge and expertise and it is observed that such activities are carried out less frequently in schools. In addition, the fact that teachers may have insufficient knowledge about first aid or may not have sufficiently grasped the importance of these drills may also contribute to the low participation rates.

As a result of the current research, it was found that science teachers' level of recognition of emergency exits, stairs, and assembly areas was quite high (94.8%). As a result

of similar studies in the literature, it was seen that teachers' knowledge level about emergency exits and safe assembly areas was high, similar to the result of the current research (Birken, 2018; Uzun, 2019). As a result of the current research, it was seen that science teachers had a high level of knowledge about the meaning of health and safety signs (74.0%). In addition, it was determined that the majority of teachers believed that occupational health and safety awareness could reduce school accidents and injuries (96.9%). As a result of a similar study conducted by Türkoğlu (2020), it was found that teachers had a high level of knowledge about the meaning of health and safety signs (54.0%). Similar results were obtained in the study conducted by Babaoğlu in 2020. Similar results were obtained as a result of the studies conducted by Tokpınar (2019), and Taşdemir and Gür (2021). As a result of the current research, it was determined that the majority of science teachers (76.8%) informed their students about possible dangers and accident risks at school. As a result of the current research, it was determined that teachers thought that there was a higher risk of falling and injury in school yards (83.4%) and corridors (43.9%) than in classrooms. Similar findings were obtained as a result of studies in the literature (Gümüş, 2016; Taşdemir & Gür, 2021; Türkoğlu, 2020; Yivli, 2018). The high level of knowledge of science teachers about emergency exits, gathering areas and health and safety signs is due to the fact that these elements are standardised in schools and supported by regular trainings. In addition, teachers' awareness that occupational health and safety awareness will reduce accidents may have been strengthened by legislation, accidents in the media and information activities of school administrations. Teachers' informing students about potential hazards reflects their perception of safety as a responsibility, while the perception of gardens and corridors as risky areas may have been influenced by mobility and past experiences in these areas. These results show the importance of systematic trainings and school safety culture in increasing this awareness.

The current study found that science teachers have partial knowledge about their legal rights and responsibilities after occupational accidents (55.0%), personal protective equipment (46.7%), first aid (58.8%) and occupational diseases (49.1%). In Türkoğlu's (2020) study, similar to the results of the current study, it was found that teachers have partial knowledge about legal rights (36.0%), personal protective equipment (28.7%), occupational diseases (40.7%) and first aid (22.7%). Gümüş (2016) found that half of the participating teachers had partial knowledge about personal protective equipment, while 28% were

informed about occupational accidents and occupational diseases. However, Doğdu (2019) determined that teachers and school personnel have a high level of knowledge about the use of protective equipment, first aid and occupational diseases and that they know their legal rights and responsibilities in case of accidents and injuries that may occur at the workplace. The vast majority of teachers participating in the current study (95.2%) stated that there were no blood type lists of students in their schools. The absence of blood group lists in schools may be an indication that possible risks are being ignored. Türkoğlu (2020) also found in his research that 73.3% of teachers stated that there was no blood group list in their schools. The main reasons for science teachers' partial knowledge of legal rights and responsibilities regarding occupational accidents, personal protective equipment, first aid and occupational diseases are the lack of systematic occupational health and safety trainings and the limited relevance of these issues to teachers' daily professional practices. In addition, deficiencies in emergency planning in schools and the lack of blood type lists of students indicate that occupational safety practices are not given sufficient priority. This situation reveals the need to make training programmes more comprehensive and to strengthen the school safety culture.

The majority of science teachers (85.5%) reported that they encountered occupational diseases. Teachers stated that they frequently encountered back, neck and joint disorders (74.7%), ear, nose and throat disorders (73.4%) and microbial infections (72.0%). The incidence of allergic diseases is lower. Teachers also stated that they encountered psychological conditions related to their profession (84.8%) and that psychological disorders such as excessive fatigue (71.3%), stress (68.5%) and headache (54.0%) were more common than other disorders. Similar findings were found in other studies in the literature. For example, Türkoğlu (2020) determined that 90.7% of teachers encountered occupational physical diseases in his research. The researcher also found that back, neck, joint disorders (70.6%), ear, nose and throat disorders (75.7%), microbial infections (73.5%), psychological disorders (87.3%), excessive fatigue (74.8%), stress (65.6%) and headache (58.0%) were frequently seen. Şenel and Kalanlar (2018) found that teachers experienced posture disorders, throat and vocal cord disorders and that science teachers experienced disorders due to exposure to chemicals in laboratories. Birken (2018) found that occupational diseases such as psychosocial problems, stress and respiratory diseases were common in teachers. The prevalence of occupational diseases in science teachers is due to the physical, chemical and

psychological demands of the teaching profession. Low back, neck and joint disorders can be caused by prolonged standing and repetitive physical movements; ear, nose, throat disorders and infections can be caused by working conditions in closed and crowded environments. Exposure to laboratory chemicals increases health risks due to deficiencies in safety precautions. Psychological disorders can be caused by intense workload, time pressure and the necessity to cope with student problems. These situations reveal the importance of increasing vocational trainings, providing ergonomic working conditions and psychological support mechanisms.

The current study found that science teachers have partial knowledge of appropriate intervention methods in case of injury (48.1%), can use fire extinguishers effectively (68.5%), and can act calmly and in control in emergencies (80.3%). In the study conducted by Aslan (2019) in Bingöl province, similar to the results of the current study, it was revealed that the vast majority of teachers (47.3%) know what to do in emergencies. As a result of the study conducted by Babaoğlu (2020), it was determined that teachers' skills in using fire extinguishers and their level of knowledge of how to act in emergencies are high. As a result of the study conducted by Türkoğlu (2020), it was determined that 52% of teachers cannot use fire extinguishers. In the same study, it was determined that 87.2% of teachers believe that occupational health and safety training should be included in the curriculum as a compulsory course. In the study conducted by Gümüş (2016), it was revealed that although the vast majority of teachers (89%) do not have sufficient knowledge about occupational health and safety legislation, they emphasize the importance of teaching this subject as a compulsory course in schools. As a result of the current research, it was determined that teachers' occupational health and safety knowledge differed depending on variables such as gender, age, professional experience and daily working hours. A tendency was found in favor of male teachers, older teachers, teachers with more professional experience and teachers with long daily working hours. However, Türkoğlu (2020) found that teachers' occupational health and safety knowledge did not show a significant difference depending on variables such as gender, age, professional experience and daily working hours. There is a discrepancy between the current study and the findings in the literature on whether teachers' level of knowledge about occupational health and safety depends on variables such as gender, age, professional experience and daily working hours. This may be due to different research methods, sample diversity and regional differences. While the current study shows

that male teachers, older teachers, more experienced teachers and teachers with longer working hours have higher levels of knowledge, some other studies reported that these variables do not significantly affect the level of knowledge. These contradictory results suggest that the factors affecting teachers' occupational health and safety knowledge should be examined in a more comprehensive and systematic way. Future studies with larger samples, standardised methods and interdisciplinary approaches will provide more consistent and generally valid results.

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Author Contribution Statement

Gülen ÖNAL KARAKOYUN: *Conceptualization, literature review, data curation, methodology, implementation, data analysis, original draft, language editing, organization, and writing.*

Meysa Simge SARUL: *Conceptualization, literature review, data curation, methodology, implementation, data analysis, original draft, language editing, organization, and writing.*

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