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Awareness of rights and responsibilities in occupational accidents and diseases: scale development, construct validity and reliability study

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ABSTRACT

Objectives. This study aimed to develop a measurement tool to assess employees' awareness of their rights and responsibilities before and after a potential occupational accident and disease. *Methods*. The study used a quantitative research method and was conducted with factory workers in the production sector in Sakarya province between April and December 2023. Firstly, scope validity was performed to develop the scale. Confirmatory factor analysis (CFA) was then conducted for construct validity. The scale's reliability was determined using the Cronbach α internal consistency coefficient. In CFA, all goodness-of-fit indices confirmed the acceptable fit of the model: root mean square error of approximation (rmsea) $= 0.080$, normalized fit index (NFI $= 0.925$), comparative fit index (CFI $= 0.950$), standardized root mean square residual (SRMR $= 0.044$), χ^2 fit index ($\chi^2 / df = 2.800$), Tucker–Lewis index (TLI $= 0.944$). *Conclusion*. The occupational accident and disease awareness scale is a valid and reliable instrument for assessing employees' awareness of rights and responsibilities in occupational accidents and diseases.

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KEYWORDS
occupational accident; occupational disease; worker rights; worker responsibility

1. Introduction

An accident is an individual suffering harm from an involuntary or unexpected event [1]. An accident at work can occur when an individual suffers harm due to an unforeseen event during the execution of their job. Therefore, a work accident is a problem an individual encounters during work. The concept of a work accident is also defined in the international context. According to the International Labour Organization (ILO) [2], a work accident is defined as an unexpected and unplanned event, including acts of violence, that occurs in connection with or in the course of work and causes injury, illness or death to one or more workers. According to the World Health Organization (WHO), it is a situation that causes individual injuries that were not previously planned and causes financial loss to the business [3]. When the common point of these concepts is considered, it can be seen that a work accident occurs when it is related to work.

The types of work accidents are divided into three main groups. According to the severity of injuries, work accidents are categorized as those not requiring treatment that will keep the worker away from work for more than 1 day, those requiring treatment that will keep the worker away from work for more than 1 day and those requiring permanent disability; according to the type of injury, head and neck injuries, eye accidents, external body injuries, arm injuries, hand and finger accidents, foot and toe accidents, leg accidents, internal organ injuries, mental and nervous system injuries are listed; and according to the type of accident, they are listed as fall-injury accidents, falling object accidents, burn accidents, machinery accidents, hand tool accidents, electrical accidents, poisoning and crushing accidents [4]. Occupational diseases are considered as much of a problem in the workplace as work accidents.

According to the ILO [5], occupational disease is a disorder resulting from exposure to risk factors arising from work activities. Occupational diseases can also be defined simply as diseases that develop and worsen due to exposure in the workplace [6]. Occupational diseases are characterized by being preventable, the convergence of multiple harmful factors and the creation of a distinctive clinical picture [7]. Occupational diseases were determined by the ILO in 2010 [5] with an updated classification. According to the ILO, diseases arising during work activities are classified as diseases caused by the target organ system, occupational cancers and other diseases [5]. Occupational accidents and occupational diseases are conditions that can be encountered continuously despite the differentiation of the working field. When the literature is evaluated, it is seen that occupational accidents and diseases are encountered in different work areas. Megasari's [8] study observed that occupational accidents occur intensively among male workers and during daylight hours in Indonesia. Another study in Indonesia found that occupational accidents are prevalent among agricultural workers in tobacco farming [9]. Chirico's [10] study revealed a density of occupational accidents in Italy. A study by Lax and Zoeckler [11] determined that 35,000 workers in New York fall ill due to work-related issues every year. A study conducted by Ulfah et al. [12] found that occupational accidents due to unhealthy conditions occur in sugar workers. Another study by Alali et al. [13] concluded that there is a high rate of occupational accident-related deaths in Belgium. Compared to the current period, it has been concluded that there is an increase in occupational diseases and accidents during the COVID-19 period [14]. Similar results apply to Turkey as well. It is known that in a study on the opinions of workers working in mines regarding

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occupational health and safety, results such as the absence of engineers conducting electrical checks and sirens to be used in explosions, the absence of special traction ventilation systems in welding areas and the lack of periodic checks related to fire were obtained [15]. In studies evaluating the occupational health and safety of those working in household waste collection areas, it was found that there are risks and that diseases occur due to these risks [16]. Studies show that there are human and financial losses due to occupational accidents [17]. This situation exposes occupational accidents and diseases, bringing along different consequences. These two existing problems have effects on employers, workers and society. From the employer's perspective, the effects include frequent turnover of workers, training costs, reduction in production, insurance costs and mandatory legal expenses; from the worker's perspective, they include income loss, difficulty in finding employment, health expenses and rehabilitation costs; and from society's perspective, they include social losses, research, inspection, loss of workforce and production, and health expenses [18]. To minimize these effects, employees must be aware of their responsibilities and for employees to know their rights in the event of a possible work accident or occupational disease. In this context, awareness is considered among the essential issues.

The responsibilities of employees regarding occupational accidents and diseases are evaluated within the legislative framework. Since this research is explicitly conducted in Turkey, the responsibilities will be presented in this context. In Turkey, the rights that employees can acquire in the case of work accidents and occupational diseases, as well as the responsibilities of employees, are regulated in the Occupational Health and Safety Law [19]. Workers have rights such as to request tools/equipment for more occupational health and safety, to refrain from work, to terminate the employment contract, to express their opinions on occupational safety, to compensation for loss of workforce, to request health services, to receive compensation, to receive temporary incapacity benefit, to receive disability retirement, to provide income to the family in the case of death, to receive marriage benefit for daughters and to receive funeral benefit. In addition, there are responsibilities such as using tools/equipment properly to prevent work accidents and occupational diseases, using personal protective equipment (PPE), informing the employer or employee representative about the risk of work accidents and occupational diseases, cooperating and refraining from substance abuse.

There are various educational initiatives to convey these responsibilities to individuals, primarily in occupational health and safety. However, it is believed that this needs to be fully reflected in practice. This study research aims to develop a measurement tool focused on enhancing awareness of rights and responsibilities pertaining to work accidents and occupational diseases. The measurement tool is a guide for identifying awareness and addressing deficiencies in terms of knowledge, responsibility and rights in occupational accidents and diseases.

2. Materials and methods

The research design for the study is presented in the following.

2.1. Study design, sample and data collection

This study was planned based on a methodological design and conducted in 2023 with individuals working in factories in the manufacturing sector in Sakarya province. Individuals working in factories were considered a criterion for selecting the research participants due to the higher risk of occupational accidents and diseases in the manufacturing sector. In methodological studies, it is recommended that the sample size is 10 times the number of scale items or between 200 and 300 [20]. Therefore, this criterion was taken into account in the selection of the population sample. To reach the number of individuals working in the production sector in Sakarya, contact was made with the Employment Agency in the province. As a result of the discussions, it was determined that there were a total of 50,250 insured employees. For the representation of the population sample, it is recommended to work with 381 people for a 95% confidence interval (CI) in a population of around 50,000 [21]. In this study, data were collected in two stages. In the first stage, 300 individuals were reached for the primary study, and analyses were conducted on 280 individuals. In this stage, construct validity and internal consistency were tested. In the second stage, 285 individuals were reached to determine the final version of the scale, and exploratory factor analysis (EFA) was performed. In these stages, the researcher collected data through the distribution of survey forms between April and December 2023.

2.2. Ethical considerations

This study reflects the data collected for a doctoral dissertation conducted with the approval of the Istanbul University-Cerrahpaşa Social and Humanities Research Ethics Committee (January 31, 2023; Decision No. 2023/52). After being informed about the research, the employees agreed to participate by signing an informed consent form.

2.3. Measures

2.3.1. Participant information form

Seven demographic questions were asked to access the participants' demographic information, including gender, age, marital status, monthly income, education level, duration of working in the profession and duration of working in the factory.

2.3.2. Occupational accident and disease awareness scale

The researcher designed and developed the scale. A pool of 36 questions was created for the scale, which was then reduced to a 27-item form following a pilot study. The confirmatory factor analysis (CFA) of the scale resulted in a structure consisting of 27 questions and three factors. The factors in the scale include knowledge awareness (items 1–7), rights awareness (items 8–15) and responsibility awareness (items 16–27). Each item was measured on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). There were no reverse-coded items in the scale. The reliability coefficient of each dimension in the scale was found to be above 90. These values indicate that the scale has high reliability [22]. While each subscale ranges from 7 to 35, the total score ranges from

27 to 135. As employees' scores on the scale increase, their levels of awareness also increase positively.

2.4. Content validity

The scope validity of the planned scale was evaluated by sending the scale questions and evaluation forms to 10 individuals, including academics and experts. The following method was used to assess scope validity.

After preparing the draft scale form and identifying expert opinions, the next step involved calculating the scope validity ratios. In this context, the following formula was used to ensure the scope validity of a scale [23]:

$$KGO = \frac{Nu - N/2}{N/2} \quad (1)$$

(Note: KGO: Content validity ratio, N: Total number of experts, Nu: Number of experts giving their opinions).

Equation (1) represents the number of experts who agree that the item is relevant to item *N* and the number of experts who provide opinions on item *N*. This study calculated the content validity ratio for each item using the equation. The content validity ratio is expected to range between −1 and +1. As the ratio approaches −1, absolute rejection is considered. To account for margins of error or chance occurrences, the highest acceptable value is considered to be 0.99 [23]. Upon reviewing the literature, it is observed that a content validity ratio of 0.800 or higher is considered a reference value [24,25]. In this context, the content validity of the scale items was evaluated by ten experts, and the content validity ratio was found to be above 0.800.

This study calculated the content validity of the draft form consisting of 33 items. It was found that each item fell between 0.40 and 0.80, with a content validity ratio of 0.80. According to expert opinions and the responses provided by individuals, it was also determined that the content validity index of the items was 0.80. When the content validity index in the candidate scale forms is equal to or greater than the content validity ratio, this indicates that the scale items have content validity [25]. Thus, it is concluded that the content validity of the scale items has been established in the candidate scale form prepared in this study.

2.5. Pilot study

To check whether the items of the scale developed to determine occupational accident and disease awareness were understandable, a pilot study was conducted with 30 participants. Participants were asked to evaluate and interpret the items. Feedback from the participants indicated that the items were clear and understandable. These participants were not included in the analysis.

2.6. Statistical analysis

For descriptive statistics and reliability analyses, statistical analyses were conducted using IBM SPSS version 25.0. Moreover, AMOS version 24.0 was used for CFA to evaluate the scale's construct validity. To assess reliability, item–total correlations and Cronbach's α values were calculated. Descriptive statistics were presented as frequencies, percentages, means and standard deviations.

Table 1. Exploratory factor analysis sample.

Variable	*n*	%	Mean ± *SD*
Gender			
Man	60	21.42	
Woman	220	78.58	
Educational status			
Illiterate	5	10.78	
Elementary	70	25.00	
Middle school	62	22.14	
High school	125	46.44	
University	13	4.64	
Marital status			
Married	100	35.71	
Single	180	64.29	
Age (years)			30.25 ± 7.50

Note: $N = 280$. n = number of respondents; N = sample size.

Table 2. Confirmatory factor analysis sample.

Variable	*n*	%	Mean ± *SD*
Gender			
Man	55	19.3	
Woman	230	80.7	
Educational status			
Illiterate	6	2.1	
Elementary	67	23.5	
Middle school	48	16.8	
High school	140	49.1	
University	24	8.4	
Marital status			
Married	145	50.9	
Single	135	47.4	
Divorced	5	1.8	
Age (years)			29.77 ± 8.66

Note: $N = 285$. n = number of respondents; N = sample size.

3. Results

3.1. Sociodemographic characteristics

When the demographic information of the participants in the first section of the research is examined, it is found that 78.58% are female; 46.44% are high school graduates or equivalent, 22.14% are middle school graduates and 25.00% are elementary school graduates; and 64.29% are single. The average age of the employed individuals is 30.25 years (Table 1).

When the demographic information of the participants in the second section of the research is examined, it is found that 80.7% are female; 49.1% are high school graduates or equivalent, 23.5% are elementary school graduates and 16.8% are middle school graduates; 50.9% are married; 32.3% have been in the workforce for 2–4 years; and 37.5% have been working in the factory for less than a year. It is concluded that the average age of the participants is 29.77 years (Table 2).

3.2. Construct validity

Firstly, EFA was performed, which allows the statements that measure the same feature among many statements to be gathered together and easily interpreted. For factor analysis, the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was conducted to assess the suitability of the correlation

Table 3. Exploratory factor analysis of the occupational accident and disease awareness scale.

Factor	Item	Factor loading	*Factorexplainedvariance*	Cronbach's α
Responsibility awareness	RESP9	0.943	16.155	0.970
	RESP11	0.931		
	RESP7	0.922		
	RESP12	0.867		
	RESP10	0.862		
	RESP6	0.855		
	RESP3	0.853		
	RESP5	0.842		
	RESP8	0.827		
	RESP2	0.772		
	RESP4	0.759		
	RESP1	0.755		
Knowledge awareness	KNOW2	0.915	2.424	0.940
	KNOW1	0.884		
	KNOW3	0.870		
	KNOW4	0.818		
	KNOW5	0.648		
	KNOW6	0.625		
	KNOW7	0.543		
Rights awareness	RIGHT5	0.929	1.350	0.938
	RIGHT6	0.842		
	RIGHT7	0.831		
	RIGHT8	0.779		
	RIGHT2	0.728		
	RIGHT3	0.687		
	RIGHT1	0.592		
	RIGHT4	0.524		
	Total explained variance		73.810	
KMO				0.967
Barlett's sphericity test		χ^2		7537.72
		df		351
		p		0.000

Note: KMO = Kaiser–Meyer–Olkin; KNOW = Knowledge; RESP = Responsibility; RIGHT = rights.

Table 4. Confirmatory factor analysis goodness-of-fit indices ($N = 285$).

Index	Scale value
SRMR	0.044
CFI	0.950
NFI	0.925
TLI	0.944
χ^2 / *df*	2.800
rmsea	0.80

Note: CFI = comparative fit index; NFI = normed fit index; rmsea = root mean square error of approximation; SRMR = standardized root mean square residual; TLI = Tucker–Lewis index.

matrix for factorization. The KMO value was found to be 0.967. Following this test, the result of Bartlett's test of sphericity was 7537.72 ($df = 351$, $p < 0.001$) (Table 3).

CFA was conducted to test the scale's structure's fit, consisting of three subscales. The following results were obtained for goodness-of-fit indices: root mean square error of approximation (rmsea) = 0.080, normed fit index (NFI) = 0.925, comparative fit index (CFI) = 0.950, standardized root mean square residual (SRMR) = 0.044, χ^2 fit index (χ^2 / *df*) = 2.800 and Tucker–Lewis index (TLI) = 0.944 (Table 4).

3.3. Reliability

3.3.1. Internal consistency analysis

The Cronbach's α coefficient was calculated to assess the internal consistency of the scale as a whole and its subscales. The Cronbach's α values ranged from 0.938 to 0.970, indicating high internal consistency. Specifically, the Cronbach's α values were 0.970 for responsibility awareness, 0.940 for knowledge awareness, 0.938 for rights awareness and 0.967 for the overall scale.

3.3.2. Item–total correlation analysis

When evaluating the item–total correlations of the scale items, they ranged from 0.705 to 0.865 (Table 5).

4. Discussion

In this study, the scope and construct validity of the occupational accident and disease awareness scale were established to determine employees' awareness of occupational accidents and diseases. Consistent with the scale development process, EFA and CFA were conducted [26]. For CFA, an rmsea value below 0.05 or 0.06 indicates excellent fit, while a value between 0.05 and 0.08 is considered acceptable [27]. This study found

Table 5. Item–total correlation analysis for the scale.

Factor	Item	Item–total correlation	Cronbach's α
Responsibility awareness	RESP1	0.815	0.970
	RESP2	0.807	
	RESP3	0.844	
	RESP4	0.812	
	RESP5	0.860	
	RESP6	0.858	
	RESP7	0.842	
	RESP8	0.825	
	RESP9	0.865	
	RESP10	0.857	
	RESP11	0.878	
	RESP12	0.794	
Knowledge awareness	KNOW1	0.750	0.943
	KNOW2	0.804	
	KNOW3	0.835	
	KNOW4	0.833	
	KNOW5	0.815	
	KNOW6	0.800	
	KNOW7	0.788	
	KNOW8	0.727	
Rights awareness	RIGHT1	0.754	0.955
	RIGHT2	0.705	
	RIGHT3	0.736	
	RIGHT4	0.751	
	RIGHT5	0.795	
	RIGHT6	0.769	
	RIGHT7	0.784	
	RIGHT8	0.849	
	RIGHT9	0.769	
	RIGHT10	0.764	
	RIGHT11	0.758	
	RIGHT12	0.800	
	RIGHT13	0.783	

Note: KNOW = Knowledge; RESP = Responsibility; RIGHT = Rights.

an rmsea value of 0.080, which falls within acceptable ranges. The SRMR value was also found to be 0.044. While an SRMR value between 0 and 1 is required to be below 0.08 [28], values between 0.05 and 0.10 are also considered acceptable in some cases [27]. Moreover, this study's CFI, NFI and TLI values were above acceptable thresholds [29]. According to the literature, the χ^2 / *df* value was determined to be 2.800, which falls within the acceptable range of 1–3 [30]. Considering all these values, all goodness-of-fit indices of the scale indicate an acceptable level of fit.

The factor loading values were examined to evaluate the relationship between variables and factors, and all values were above 0.70 (Figure 1). Hair et al. [31] state that factor loadings exceeding 0.70 indicate a well-defined structure. Tavakol and Wetzel [32] suggest that factor loadings indicating a moderate relationship between an item and a factor should be above 30. In this regard, it can be concluded that all values preserved the original structure.

The Cronbach's α coefficient was used in the reliability analysis of the scale. It was determined that the scale's reliability coefficient was above 0.90. In the literature, a reliability coefficient above 0.90 is considered excellent [31]. Another measure of the scale's reliability was conducted based on item–total correlations. It is considered acceptable for the total correlation between items on a scale to be above 0.30 [32]. In light of all these values, the scale is reliable.

The literature reveals a need for studies addressing awareness of rights and responsibilities regarding occupational accidents and diseases. Some studies briefly touch upon this topic with basic questions, while others primarily focus on assessing the level of occupational health and safety knowledge [33–36]. The objectives of this study include reducing the causes of occupational accidents and raising awareness regarding responsibilities in the field of occupational health and safety. Indeed, the necessity of creating awareness in this field is underscored by various factors, such as the contribution of individual characteristics to workplace accidents [37], the absence of safety equipment on-site [38], insufficiently regulated working conditions [39], careless behaviors [40], lack of supervision [41], the predominance of workplace-related accidents [42], equipment failures and the lack of replacement by employers [43]. From the perspective of responsibility, it has been identified that neglectful and erroneous behaviors also play a role in the occurrence of workplace accidents [44]. The correlation between employers' failure to take measures to ensure employee safety and the occurrence of workplace accidents further highlights the need for responsibility awareness [45]. Moreover, another study found that the insufficient provision of occupational health and safety training by employers contributes to the occurrence of workplace accidents [46], demonstrating that employers are not adequately fulfilling their responsibilities. Studies in the literature indicate that the two primary actors in workplace accidents are employers and employees. As individuals fulfill their responsibilities, workplace accidents are expected to decrease. In this context, developing a measurement tool to assess awareness of responsibilities and rights would be a meaningful step. For all these reasons, this research has been designed with the aim of developing a new measurement tool.

4.1. Limitations and future research directions

The study's limitations stem from the challenges encountered by the researcher during the study. One of the most significant limitations is the reluctance of every factory manager or owner to participate in the study due to its subject matter. Since implementation could not be carried out in every sector, generalizations to all sectors cannot be made, constituting another limitation. The next limitation of the study arises from the researcher's environmental constraints. The final limitation of the study is its inherent limitations specific to social sciences. This study can measure employees' awareness of occupational accidents and diseases, and increase awareness of occupational health and safety in this area. In the future, other types of validity, such as predictive validity, should also be conducted. This should be supported by longitudinal studies.

5. Conclusions

The findings of this study indicate that the occupational accident and disease awareness scale, consisting of three subscales and 27 items, is a valid and reliable scale based on the sample of employees. Since the scale was not developed specifically for a particular sector, it can be applied to all sectors.

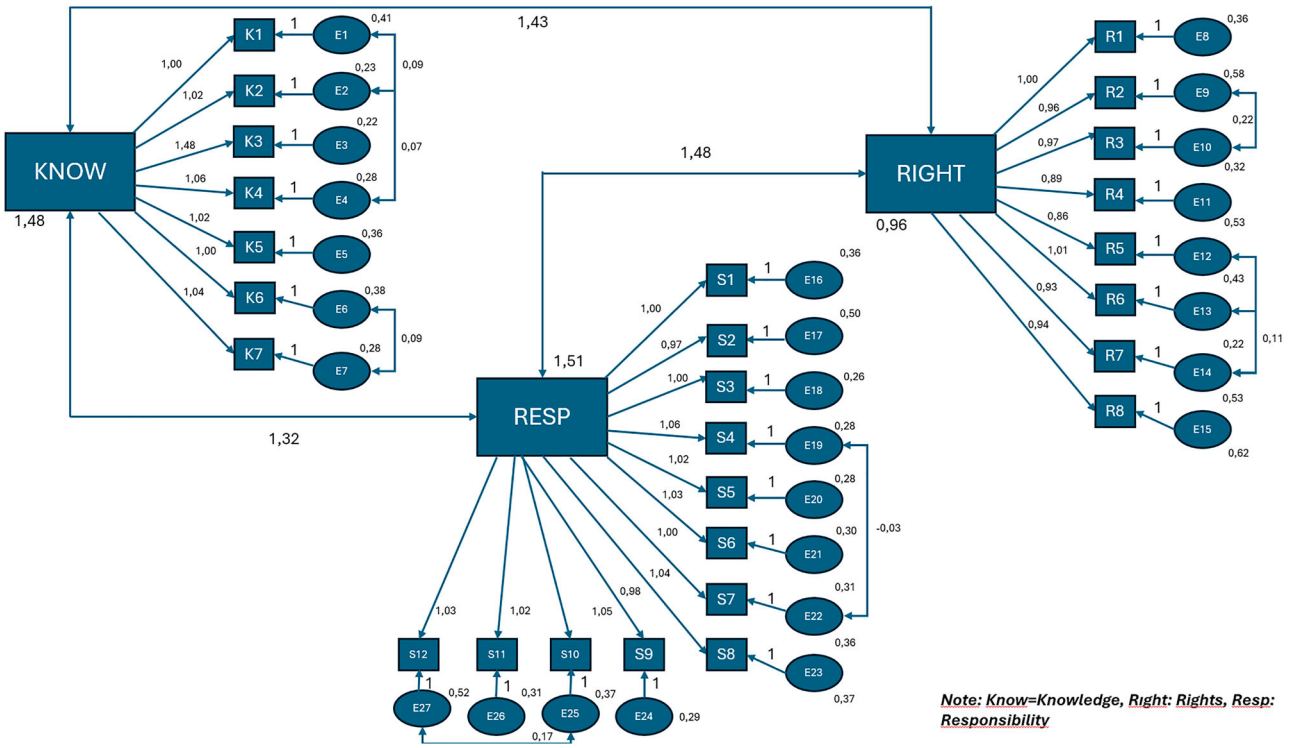

Figure 1. Path diagram.

This study was developed with the aim of being original, informed by a review of existing scales in the literature. An evaluation of scales addressing 'occupational accidents and occupational diseases' in the literature reveals that these studies are limited to specific areas. Existing research predominantly focuses on topics such as perceptions of occupational health and safety competency [47], occupational health and safety performance [48], occupational health and safety culture and occupational health literacy [49]. The innovative aspect of this study lies in its focus on awareness of rights and responsibilities. From this perspective, it is anticipated that the study will contribute significantly to the existing literature.

This scale, adapted to Turkish culture, is intended to serve as a diagnostic tool in studies aimed at raising awareness about workplace accidents that have occurred or may potentially occur. The scale is designed to emphasize the development of projects to reduce workplace accidents, particularly in various industrial sectors within the manufacturing industry. An evaluation of the items reveals an emphasis on the responsibilities of both employees and employers for ensuring occupational health and safety.

The responsibilities of employees include reporting workplace regulations to employers, notifying responsible individuals (e.g., occupational health and safety specialists) when necessary measures are not taken, exercising care in using equipment, properly utilizing PPE, cooperating with others and abstaining from substance use. Employers, on the other hand, are responsible for providing occupational health and safety training, taking preventive measures, supplying necessary tools and equipment, conducting risk assessments, ensuring regular inspections and assigning tasks based on suitability.

Similarly, in the event of a workplace accident, employees have rights such as requesting tools and equipment, terminating their contracts, expressing opinions and claiming allowances or compensation. This scale aims to foster a dual awareness of rights and responsibilities.

The developed scale is applicable to all sectors, with particular relevance to industries where workplace accidents are prevalent. Given the high rate of workplace accidents today, utilizing this scale in projects to propose constructive solutions aimed at improving awareness levels would be highly beneficial.

5.1. Implications for workers

The developed occupational accident and disease awareness scale will be useful for identifying and assessing employees' awareness and responsibilities regarding occupational accidents and diseases. Based on the results, projects to improve workers' and employers' awareness of rights and responsibilities can be developed to enhance the working environment. Hence, the scale can increase awareness of occupational accidents and diseases, resulting in improved occupational accidents and disease rates.

In this study, data were collected from individuals in specific sectors. Therefore, the research does not generalize findings to a single sector. Future studies could benefit from using the scale to conduct research across various sectors, emphasizing the level of awareness. By doing so, awareness levels in different sectors could be identified, enabling the development of awareness projects prioritized by sector-specific importance. Consequently, it is recommended that the scale be applied separately to each sector and occupational field in future studies.

Additionally, while the scale was developed based on the industrial sector, it is important to acknowledge that work environments are evolving, and there are sectors beyond industry. Thus, it would be appropriate to conduct awareness studies in sectors where white-collar employees are prevalent. Such efforts would enhance awareness levels across all sectors and contribute to the development of a robust occupational health and safety culture on a broader, national scale. In this

respect, the scale is anticipated to make significant contributions to occupational health and safety policies.

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No potential conflict of interest was reported by the authors.

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