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The Mediating Role of Safety Climate in the Relationship between Transformational Safety Leadership and Safe Behavior—The Case of Two Companies in Turkey and Romania

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Abstract: Safety leadership, safe behavior, and safety climate, which are important parts of occupational safety culture, are important in terms of preventing occupational accidents and making the working environment ergonomic. In this context, this study aims to examine the mediating effect of the safety climate on the relationship between transformational leadership and safe behavior. Research was carried out with 287 participants working in two manufacturing plants, one from Turkey and one from Romania. The two data sets were consolidated into a single database (both companies being providers of manufacturing products for the same client in the automotive industry) and were analyzed using the Preacher and Hayes plugin in the SPSS 21 package program because of the research interest in investigating safety behavior in the manufacturing field. The results of the analysis showed that the safety climate had a partial mediating effect on the relationship between transformational leadership and safe behavior. In addition, the study results demonstrated that transformational safety leadership has a significant influence on employees' perceptions of safety climate and plays an important role in occupational safety-related behaviors. Research results were helpful for practitioners (managers in both companies) and researchers in understanding the importance of safety-climate and transformational safety leadership practices in increasing occupational safety-related behaviors.

Keywords: transformational safety leadership; safe behavior; safe climate; mediating effect

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1. Introduction

Workplace accidents are generally regarded as a major concern in terms of occupational health and safety (OHS). According to International Labor Organization estimates, at a global level, 340 million employees are victims of workplace accidents every year [1]. Statistics on occupational accidents in Turkey reveal similar results. Official data indicate that in the past decade over 12,000 workers died in occupational accidents in Turkey [2]. In comparison with the European Union, the fatal occupational accident rate in Turkey (per 100,000 workers) is approximately seven times higher [3]. Therefore, there is a stringent need for research on strategies for improvement of workplace health and safety performance in Turkish companies, considering that prevention of accidents and risks in the workplace is the basis of occupational safety.

Romania (2009–2016) was consistently at the top of the EU ranking with a high rate of work fatal accidents, ranging from 9.9 to 4.7 per 100,000 workers [4,5]. In comparison with Romania, Turkey has an annual rate of work fatal accidents varying between 1.5 and 2 per 100,000 workers. Considering the most recently available national statistics in 2020,

Turkey has a total of 1231 work fatal accidents [6], and Romania only 143 [7]. In terms of nominal figures, Turkey has almost 10 times more fatal accidents, but the nominal figures must be reported per 100,000 workers. Considering that Turkey has 27.07 million workers [8] and Romania has only 5.16 million workers [9], we arrive at a fatal accident rate per 100,000 workers of: 4.55 for Turkey vs. 2.77 for Romania, observing almost twice as many fatal accidents in Turkey.

Moreover, there is an increasing focus on identification of solutions through research on the causes of occupational accidents. While research shows that many individual and situational factors [10] play a significant role in occupational accidents, the unsafe behavior of employees is often emphasized as the main cause of occupational accidents [11,12]. From human error to non-compliance with health and safety instructions and practices, risk factors specific to the human operator are subjective factors, generating occupational accidents and illnesses. Considering this, research on 'unsafe behavior' has gained momentum in recent years. Interest in the concept of safety leadership has increased in recent decades, as safety leadership is accepted as an important antecedent of employees' safety perceptions, attitudes, and behaviors [13]. Previous research demonstrated that the strong connection between safety learning (understood as employees' opportunity to learn from their own errors and compliance omissions in order to improve safe behavior) and safety participation is the result of leaders' supportive behavior [14]. Safety leadership was also proven to be more effective when characteristics of transformational leadership behavior were manifested [14].

To achieve workplace safety, an essential organizational factor is safety climate. The importance of safety climate is considered in the context of employees' unsafe behavior (i.e., employees' behaviors leading to exposure to risks of accidents and occupational disorders). Therefore, research on safety climate revealed a positive connection between employees' safe behaviors and their perceptions of occupational safety [15–20]. On the same note, studies on occupational safety and health in Turkey's companies indicate an increasing interest in the relationship between safety climate and safe behaviors, revealing that leadership behavior has a considerable influence on increasing safety in the workplace [21–24]. For example, Sadullah and Kanten [22] demonstrate a positive relationship between safety behaviors and management practices such as training on the use of personal protective equipment and safety protocols, a positive psychosocial environment and frequent maintenance and repair work (to reduce the risk of using faulty machinery and equipment). However, a limited number of studies have been conducted in the direction of safety leadership [25,26].

Moreover, safety climate was proven to have a mediating role in the effect of safety leadership on employees' safe behaviors [27,28]. Data show that fatal occupational accidents are considerably high in Turkey and Romania, ranking as the leading European countries by number of fatal accidents [29]. Despite the fact that the role of safe behavior in occupational accidents is an important research topic, there is a research gap in studying the connection between safe behaviors and safety climate in Turkey and Romania. Therefore, the main contribution of this study is to fill this gap in the literature and guide future studies to be carried out in the field of occupational safety.

Finally, the COVID-19 pandemic, which frightened the world in 2020, forced many manufacturers from both Europe and the world to experience supply chain problems. One of the striking effects of the pandemic was the understanding of the importance of geographical proximity in the production process. Accordingly, the fact that China was the sole and most important producer put some countries at risk. On top of all these developments, Russia's invasion of Ukraine caused the supply chain and production problem to be much more serious. For these reasons, companies started to look for new places for production chains, and manufacturers, who moved away from China and Ukraine, started to feel interested in countries with a production culture and proximity to Europe. such as Turkey and Romania. Therefore, it has become important to examine the

occupational safety culture in these countries sensitively, and for these reasons this study was designed.

2. Conceptual Framework and Research Hypotheses

2.1. Safety Culture, Safety Climate, Safety Leadership Measurement

Attempting to understand the general preoccupation with research in the field of safety culture and safety climate, the visual representation in Figure 1 is a conceptual map that reflects the connections between the topics of interest, as well as the group relationships and similarities between safety culture and safety climate—indicated by the dimensions and intensity of the colors of the indicators [30]. Figure 1 was generated with VOS viewer (VOS Visualization of Similarities), which creates maps based on data from the Internet network or bibliographic files [31].

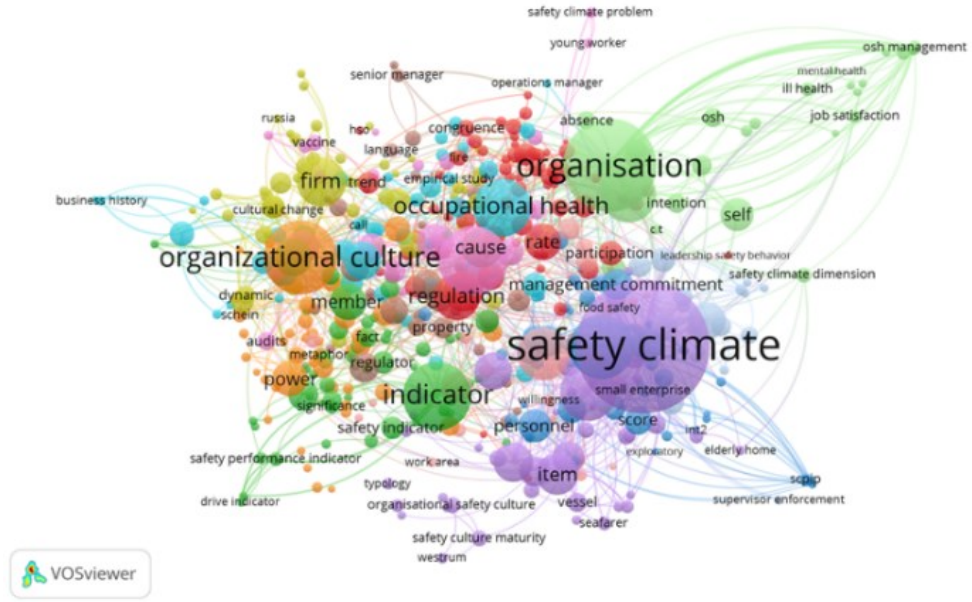

Figure 1. Safety culture—Safety climate bibliographic topic measurement (source: [31]).

The application is developed by researchers from the University of Liden, Netherlands. As a bibliographic database, the data relied on bibliography focused on scientific works on security culture. This database from which the keywords have been extracted sums up over 1500 publications stored in the authors' bookstore, managed with the Mendeley bibliographic program.

Safety climate is the temporal dimension of safety culture, subject to commonalities among individual perceptions of the organization [32]. It is therefore situationally based, referring to the perceived state of safety at a particular place and a particular time; additionally, it is relatively unstable and subject to change depending on the features of the current environment or prevailing conditions.

When referring to safety culture and safety climate, there is a certain level of ambiguity in defining the two concepts and, consequently, there is a considerable variety of tools measuring one or both concepts. However, most available measuring instruments are oriented towards the assessment of safety climate, whereas safety culture has typically been measured as a dimension of safety climate [33]. Reviewing and evaluating safety culture and safety climate measurement tools, Vu and De Cieri [33] investigated safety culture and safety climate tools as presented in 412 publications. Most of the analyzed tools are quantitative instruments for measuring safety climate. A small number of tools are qualitative instruments. Traditionally, organizational culture has been studied by sociologists through qualitative methods such as observations and interviews, while the organizational climate has been studied by psychologists in a psychometric setting—for example, the

questionnaires administered by Guldenmund [34–36]. Cox and Flin [37] suggest that such measurements allow managers to see changes in the workplace psychosocial environment, which are important indicators for management of workplace safety. While qualitative tools were beyond the scope of the review, they could be used in conjunction with (quantitative) safety climate measures (e.g., [38,39]) as part of a combination of methods for evaluation of safety culture.

Peter Drucker, a thoughtful broadcaster in the field of management, explains that "An institution is like a tune; it is not constituted by individual sounds but by the relations between them" [40]. Employees' safe behavior is a key component of safety climate, as organizational culture is a means of promoting and enhancing safe behavior, thus leading to safety culture. Basically, this orchestra (the organization and its members) gives a pleasant sound to both auditors and performers only if it has an effective conductor, that is, an orchestrator (manager) of all the conjugated elements that compose the safety climate, as expressed in Figure 2.

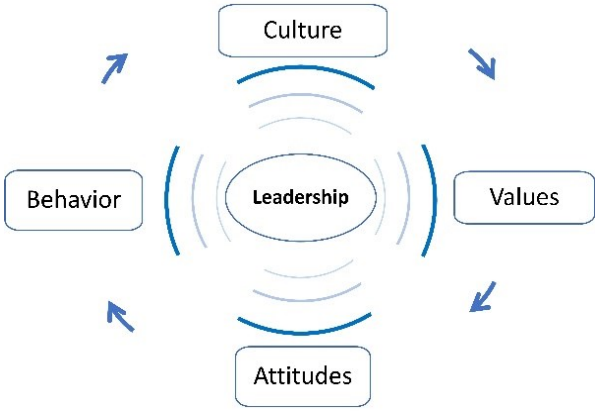

Figure 2. Adaptation to the circulating relationship of the organization.

If safety culture (Figure 3) is a long-term manifestation of safe behavior capabilities, the safety climate is a momentary image—a temporary frame on this construction, as well as managerial ability at a given time. Temporality is determined by the fragility of the climate, which—in the absence of consolidated leadership—can be damaged or improved by relatively minor influence factors prone to cause major changes in the security climate. Here can be mentioned events, subjective perceptions and informal communications, and controversial managerial decisions not sufficiently exploited or in dissonance with the results of consultation with workers. These types of influence can change one of the elements of the safety culture and have the potential to create a state of insecurity, instability, and distrust in management, damaging the safety climate [41].

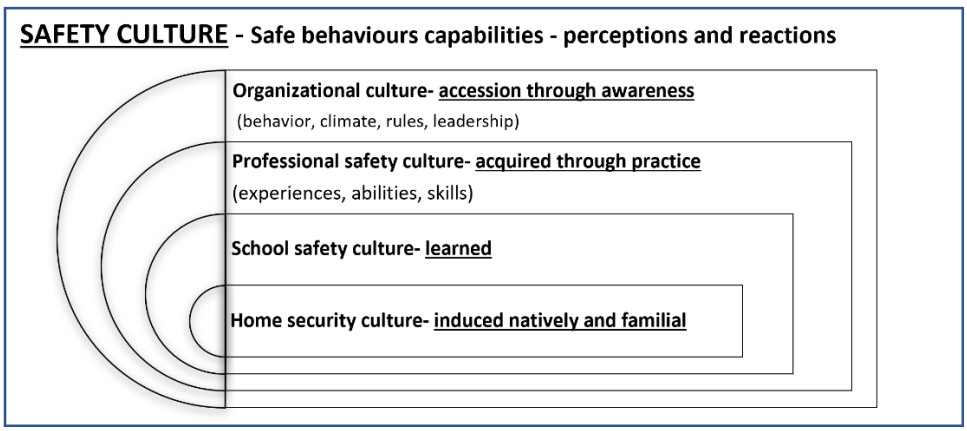

Figure 3. Safety culture construction concept [41].

Cooper [41] reveals that 80% of Loss of Primary Containments (LOPCs) are commonly caused by managerial behaviors, or their absence. In describing the common causes of incidents related to the safety of processes, research emphasizes the causality relationship of leadership with safety fiascos through the failure of adequate planning activities, the safety of operational management activities, or prevention efforts [41].

2.2. Safety Leadership and Transformational Safety Leadership

OHS is strongly influenced by safety leadership, as occupational safety leaders are responsible for generation of safe behaviors among employees. Safety leadership is a concept encompassing clear definition of safety goals, integration of safety as a key value in organizational culture, and creation of a successful occupational safety team. Safety leaders have the responsibility for the development and achievement of operational and strategic goals in terms of safety; safety leaders also provide resources, and constantly emphasize the importance of safety for employees and the organization [42]. Research in the field of safety leadership aims to identify those leadership behaviors that promote safety and build a safety climate within the organization [43]. It is not a surprise that, when leaders take an active role in promoting safety and demonstrate supportive management, organizations are more successful in obtaining workplace safety. In this context, one of the leadership styles that comes to the fore in the relationship between job safety and safety leadership is transformational leadership. This covers several processes, including idealized influence, inspiring motivation, intellectual stimulation, and individualized thinking [44].

This study uses the full-range leadership model [45]. According to this model, a leader exhibits many leadership styles, from transformational to transactional and laissez-faire styles [46]. Research in the field of safety leadership focuses on leadership behaviors that encourage and develop a safe working environment [43]. In this context, one of the leadership styles that come to the fore in the relationship between occupational safety outcomes and safety leadership is transformational safety leadership. This study is designed based on the transformational security leadership model, which comes under the full-range leadership model.

In a transformational approach based on safety leadership, the leader manages to avoid control-based safety practices (such as rewards and punishments); on the contrary, the leader develops, communicates, and inspires everyone through a vision for a safe workplace to allow members of the organization to actively participate in OHS practices. In organizations characterized by transformational leadership, members of the organization are motivated to create and maintain a safe work environment based on beliefs and values related to safe work practices rather than applying rules and policies merely to avoid punishment [47,48].

2.3. Transformational Safety Leadesrhip and Safety Climate

A safety climate is essential for the achievement of workplace safety. One of the frequently referred to definitions of safety climate belongs to Zohar [48], who defines it as "the summary of the molar (holistic-basic) perceptions that employees share about the working environment". Similarly, Neal et al. [49] define safety climate as a certain organizational climate that reflects individual perceptions of safety-related policies, procedures, and practices within the organization. Currently, the concept is defined and accepted as a "snapshot" of employees' perception of the level of workplace safety conditions [50].

The leader is seen as a key influencer of common perceptions of safety and, thus, of the safety climate [50]. However, the effect of leadership on the safety climate may vary according to different leadership styles [28]. It is noteworthy that transformational leadership has a more positive effect on safety climate than other leadership styles, affecting the perception of the safety climate [13,51–54]. For example, in a study by Zohar [27], it was found that transformational and constructive leadership had a positive effect on the safety climate, while corrective and relieving leaders had a negative impact on the safety

climate. Bilgic et al. [25] concluded that transformational leaders have a stronger impact on the safety climate than transactional leaders.

Considering this information, the first hypothesis of the research was established as follows:

H1. *Transformational safety leadership is positively correlated with the safety climate.*

2.4. Transformational Safety Leadership and Safe Behavior

There is no consensus on how to measure safety as an output of organizations [50,55]. Although different tools are used to measure safety performance [56], one of the most widely used measurement tool is the safe behavior of employees. Starting from the fact that safety manifests at three levels (reactive, compliant, and generating), positive outcomes in terms of safety behavior can be found both when the organization emphasizes compliance and when it reaches a maturity level at which safety is achieved through active participation and innovation [57]. The research of Neal and Griffin proposed a model of safety performance that distinguishes the two dimensions of safety behavior, "safety compliance" and "safety engagement" [15]. On the one hand, the term safety compliance is used to describe essential activities that individuals must perform to ensure workplace safety. These behaviors include adhering to standard operating procedures and wearing personal protective equipment. On the other hand, the term safety engagement is used to describe behaviors that do not directly contribute to an individual's safety but support fostering an environment that enhances workplace safety. These behaviors include activities such as participating in voluntary safety activities, helping colleagues with safety-related matters, and attending safety meetings [15]. Coming back to the three levels of safety manifestation, safety compliance pertains to the second level, while safety engagement conducts towards generating stage. The least desired level, reactive, implies responses to safety flaws, especially when accidents and occupational disorders occur [57,58]. Transformational safety leadership is oriented towards the generating stage, aiming to create a system with embedded safety practices (behaviors).

One of the key factors influencing the safe behavior of employees is safety leadership. Studies show that transformational leadership in safety leadership has a positive effect on the safe behavior of employees [25,59]. For example, Mullen et al. [47] found in their study that transformational leadership has a positive effect on both dimensions (safety compliance and safety participation) of employees' safe behavior in young and adult participants. Hofmann and Morgeson [60] focused on leadership behaviors and safety behaviors. They observed that employees who perceive a high-quality relationship with their superiors are more likely to voice their safety concerns and are more committed to safety within the organization, and therefore fewer occupational accidents occur. In another study by Jiang and Probst [61], it was found that transformational leadership strengthens the relationship between safety knowledge and safety engagement. Additionally, under high transformational leadership, employees with high safety motivation exhibited high levels of safety engagement behavior. Furthermore, employees who are inspired and encouraged by their transformational leaders are more likely to help others and create a safe work environment. While the effects of different safety leadership behaviors on employees' safety behaviors have been examined in earlier studies, this research focused on transformational leadership behavior since Zhao et al. [62], as revealed in their meta-analysis, showed that transformational safety leadership has a stronger effect on safety participation of employees than other leadership types.

Based on the above argumentation, the second hypothesis of the research is:

H2. *Transformational safety leadership is positively correlated with safe behavior.*

2.5. Safety Climate and Safe Behaviour

Since the 1980s, when the concept of safety climate was first used, many researchers have examined the effect of safety climate on safety behaviour revealing that safety climate

relates to a reduced number of work accidents [20]. For example, in a meta-analysis study conducted by Clarke [63], it was determined that the safety climate is in a strong positive relationship with the two dimensions of safe behaviour: safety compliance and participation in safety. In addition, results of similar studies concluded that there is a positive relationship between employee perceptions of the occupational safety climate and their safe behaviours [16,17,19,20,64–69]. More recently, in the context of the COVID-19 pandemic, workplace safety climate has developed a new dimension related to organizational initiatives targeted towards preventing infection with SARS-CoV-2; consequently, it has been found that a workplace climate perceived as safe in terms of both injuries and infectious diseases prevention reduces employees' disengagement and enhances safe behaviours [70].

Based on the above discussion, the third hypothesis of the research is as follows:

H3. *The safety climate is positively correlated with safe behaviour.*

2.6. Mediation Role of Safety Climate in the Relationship between Transformational Safety Leadership and Safe Behaviour

Studies on safety climate show that both individual and organizational factors have a mediating role in outcomes related to occupational safety [27]. In these pieces of research, it is seen that the safety climate has a mediating role that contributes positively to the occupational safety outputs and the safety performance of the organizations in general. For these reasons, it is expected that the safety climate will have a positive mediating role in the effect of transformational leadership on the safe behaviours of employees.

Leaders adopting a transformational leadership style encourage their employees to raise their safety concerns without fear of retaliation and constant reminders regarding job security. This positively impacts employees' perceptions of safe climate and safe behaviour [71]. Therefore, it is stated that a positive perception of safety leadership will be associated with a positive perception of safety climate, which in turn will be positively related to safe behaviour.

Transformational leadership is positively related to both perceived safety climate and safety participation [72]; the results also showed that the perceived safety climate partially mediated the effect of leadership on safety engagement. Among other conclusions, Zohar reveals that safety climate has a mediating role in the effect of transformational leadership on occupational injuries [27]. In their study, Wu et al. found that the safety climate partially mediated the relationship between safety leadership and safety performance, while development of safety strategic goals (mid- and long-term objectives) are essential in the improvement of safety climate, with impact on organizational safety performance [28]. These findings are supported by Barling et al. [44], highlighting the mediating effect of the safety climate on the relationship between transformational leadership and safe behaviour by analysing safety-related events. Transformational leadership is vital for successful achievement of a safety climate, as behaviours characterizing transformational leadership reflect active interactions with employees to facilitate safety promotion; this, in turn, generates safe behaviours among employees, ensuring desired safety outcomes [28,50,72,73].

Consequently, the fourth hypothesis of the research has been formulated:

H4. *The safety climate mediates the relationship between transformational safety leadership and safe behaviour.*

By connecting the four hypotheses stated, the research model is obtained (Figure 4).

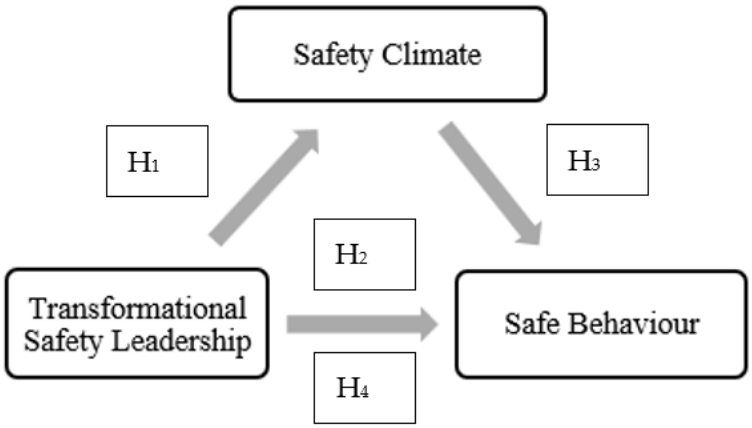

Figure 4. Research model.

3. Research Methodology

This section provides information on the method, sample, data collection tools, and data analysis.

Preacher and Hayes [74] offer an overview of how simple and multiple mediation can be used to investigate indirect processes, as well as methods via which to contrast two or more mediators within a single model. The more robust technique proposed by Preacher and Hayes uses the path analysis approach and produces a bias-corrected 95% bootstrap confidence interval (CI) for the indirect relationship, based on 5000 bootstrap resamples [75]. The regression coefficient for the indirect effect represents the change in Y for each unit change in X that is mediated by M (mediating variable). There are two ways to estimate the indirect coefficient: Bootstrap methods and the Monte Carlo method. Bootstrapping, which is used in this study, is a nonparametric resampling procedure and an additional method advocated for testing mediation that does not impose the assumption of normality of the sampling distribution. The method can be applied to small sample sizes with more confidence [74,76].

3.1. Research Sample

The targeted research population consisted of 3000 employees working in two manufacturing plants in Turkey and Romania. Firstly, the aim of the research was explained to all employees face-to-face and then the questionnaire was distributed to blue-collar employees on a voluntary basis and responses collected via ballot-boxes to avoid social desirability bias. A blue-collar worker is a working-class person who performs manual labour. Questionnaires were collected during working hours from 25 October 2021 to 7 November 2021. The collection of the questionnaires in Turkey was carried out by the researchers in Turkey, and the collection of the questionnaire in Romania was carried out by the researchers in Romania. Due to prior organization and scheduling of collection of the survey responses, the surveys were distributed at fixed locations and collection was possible in a very brief timeframe. 250 questionnaires were distributed to the participants in Turkey, and 195 of the questionnaires were returned (return rate of 78%). 150 questionnaires were applied to the participants in Romania, and 105 of the questionnaires were returned (return rate of 70%). When the questionnaires were examined at the data entry stage, 13 questionnaires were identified as incorrect or incomplete, and these questionnaires were excluded from the evaluation. Therefore, the analyses were performed using 287 valid questionnaires. Questionnaire distribution was preceded by obtaining the ethics committee reports from the university and permissions to perform the research in the relevant organization. For data collection, the convenience sampling technique was preferred, with the aim of conducting the research with all employees without using any sampling technique. The convenience sampling technique is preferred since it is simple, less time-consuming, and less costly to implement [77].

In terms of demographic characteristics, nationality, education level, work experience and age of the research population were analysed. Therefore, Table 1 presents the structure of research population by the aforementioned demographic characteristics. 186 (64.8%) Turkish and 101 (35.2%) Romanian employees took part in the research. The majority of employees participating in the study were graduates of primary school and high school. Work experience varies between 1 and 42 years, the average being 6 years (±5.26). Finally, the ages of the participants ranged from 19 to 58 years, with an average age of 36 (±8.45).

Table 1. Distribution of research sample by nationality, education level, work experience and age.

Demographic Characteristic		Number	%
Nationality	Turkish	186	64.8
	Romanian	101	35.2
Education	Primary school	140	48.7
	High school	109	38.0
	University	38	13.2
Work experience	Junior (0–3 years)	100	34.8
	Mature (4–10 years)	144	50.2
	Senior (11+ years)	43	15
Age	18 to 30 years	94	32.8
	31 to 40 years	106	36.9
	41+ years	87	30.3

3.2. Data Collection Tools

As previously mentioned, a questionnaire was used as data collection technique in the research. The first part of the questionnaire consisted of questions aimed at identifying demographic characteristics of the participants (nationality, level of education, experience, and age). The second part of the questionnaire consisted of questions based on three instruments: the safety climate scale, the safe behaviour scale, and the transformational leadership scale (See Appendix A).

The 'Safety Climate Scale' developed by Hahn and Murphy [78] was used to determine the perceptions of participants on the occupational safety climate environment. The scale is composed of six items and a single factor (e.g., 'I feel free to report safety problems where I work'). As a result of the analysis, the internal consistency of the scale was determined to be good (Cronbach's Alpha = 0.86). The scale via which the measurement was made was a 5-point Likert-type scale evaluation (1: strongly disagree, 5: strongly agree). The increase in the participants' scores on the relevant scale indicates an increase in the perception of occupational safety climate.

To measure safe behaviours in the workplace, the 'Safe Behaviour Scale' was used. The scale consists of six items (e.g., we use all the necessary safety equipment to do our job) and was developed by Neal et al. [49]. As a result of the analysis, the internal consistency of the scale was determined to be excellent (Cronbach's Alpha = 0.90). The Safe Behaviour Scale was based on a 5-point Likert-type scale evaluation (1: strongly disagree, 5: strongly agree). The increase in the scores of the participants on the relevant scale indicates an increase in the level of safe behaviour at work.

To determine the perception of transformational safety leadership in the workplace, the 'Transformational Safety Leadership Scale' was used. The 10-items scale was developed by Kelloway et al. [51]; for exemplification purposes, an item of the Transformational Safety Leadership Scale could be the following: "would listen to my concerns about safety on the job". As a result of the analysis, the internal consistency of the scale was determined to be excellent (Cronbach's Alpha = 0.94). The scale used a 5-point Likert-type scale evaluation (1: strongly disagree, 5: strongly agree). The increase in the participant scores on the relevant scale indicates an increase in the perception of transformational leadership in workplace safety.

3.3. Data Analysis

The SPSS 21 program was used to analyses the data. First, the Kolmogorov-Smirnov test was applied to determine whether the data used in the investigation showed a normal distribution. After the analysis, it was seen that the variables did not normally distribute ($p < 0.05$), so the SPSS plugin developed by Preacher and Hayes [74,79,80] was used; 5000 bootstrapping sequences were used to estimate the mediation effect, and the bias-corrected percentile method was used to determine the 95% confidence interval.

4. Results

Before testing the hypotheses, it is important to show a statistical comparison of the safety climate, transformational safety leadership and safe behaviour in the two countries. Since variables are not normally distributed, a Mann-Whitney U test was performed to analyse the national differences for the relevant variables. Table 2 shows the nationality comparison analysis results.

Table 2. Nationality group comparison analysis results.

Variables	Nationality	Mean ± SD	Z [1]	*p*
Safety climate	Turkish Romanian	3.67 ± 1.11 3.74 ± 0.84	−0.574	0.566
Transformational safety leadership	Turkish Romanian	3.45 ± 1.10 3.64 ± 0.80	−0.949	0.343
Safe behaviour	Turkish Romanian	3.76 ± 0.99 3.87 ± 0.82	−0.481	0.631

[1] Mann-Whitney U test results.

According to Table 2, it is concluded that there are no statistically significant differences between safety climate, transformational safety leadership and the safe behaviour of Turkish and Romanian employees ($p > 0.05$). From this point of view, the safety climate, transformational safety leadership and safe behaviour perceptions of the two countries are statistically similar.

Table 3 shows the descriptive statistics for the variables and the correlation results between these variables. As per these results, the mean values are: safety climate, 3.70 (±1.02); transformational safety leadership, 3.52 (±1.01); and safe behaviour variable, 3.80 (±0.94), respectively. When the correlations between the variables were examined, it was observed that there was a strong and significant relationship between the safety climate and transformational safety leadership (r = 0.716; $p < 0.01$), moderately strong and significant relationship between the safety climate and safe behaviour (r = 0.683; $p < 0.01$), and a moderately strong and significant relationship between transformational safety leadership and safe behaviour (r = 0.669; $p < 0.01$). On the other hand, since the inter-correlations between the variables are below 0.90, it is seen that there is no common method variance [81].

Table 3. Descriptive statistics of variables and results of the correlation analysis results.

Variables	Number of Items	Mean ± SD	Correlations	
			SC	TSL
Safety climate (SC)	6	3.70 ± 1.02	-	
Transformational safety leadership (TSL)	10	3.52 ± 1.01	0.716 [1]	-
Safe behaviour (SB)	6	3.80 ± 0.94	0.683 [1]	0.669 [1]

[1] $p < 0.01$.

The results of the mediation model established in the research are shown in Table 4.

Table 4. Results of the mediation model.

Indirect Effect Estimation	Indirect Effect Coefficient	Standard Error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Safety climate	0.1930	0.0775	0.0825	0.3684

F = 122.43; p = 0.00; Sobel Z = 5.3335; p = 0.00.

The model constructed according to Table 4 is significant (F = 122.43; p = 0.00). Furthermore, since the lower and upper confidence intervals in the established mediation model do not cover zero value [74,77,79,80,82,83], the mediation effect can be considered significant (Lower = 0.0825; Upper = 0.3684; Sobel Z = 5.3335; p = 0.00). Furthermore, in the Preacher and Hayes' mediation model, the explanatory power of the model will decrease due to measurement errors. In this case, the significance of the confidence intervals and standard errors of the residuals are evaluated for the significance of the model rather than the statistical interpretation of R^2 [84]. So, when using the bootstrapping resampling method, report percentile, bias-corrected, and acceleration confidence interval were considered to obtain the most robust results for assessment of mediator and indirect effect. In this study, only the bias corrected confidence interval results were included, as the results of the analysis were supported by the three results' reports.

As per Figure 5, Hypothesis H1 was validated and transformational leadership had a positive effect on the safety climate (β = 0.6457; t = 13.97). According to the results, a one-unit increase in transformational leadership increases the perception of a safe environment by 0.65 units. The analysis also confirmed Hypothesis H2, as transformational leadership positively affects safe behaviour (β = 0.5876; t = 13.78). Accordingly, the employees' perceptions of transformational leadership increase employees' safe behaviour tendencies by 0.59 units. Another finding confirming Hypothesis H3 is that the safety climate positively affects safe behaviour (β = 0.2989; t = 5.77). Consequently, an increase in the perception of safety climate increases employees' probability of safe behaviour by 0.30 units. When all the results obtained were evaluated, transformational leadership was found to improve the climate of safety and safe behaviour. This leads to the conclusion that the safety climate also improves safe behaviour. Finally, it was observed that the safety climate had a partial mediating role between transformational leadership and safe behaviour (β′ = 0.3946; t = 7.52; Sobel Z = 5.3335; p = 0.00) (Hypothesis H4). Consequently, the safety climate has a partial mediating role in the relationship between transformational leadership and safe behaviour (See Table 5). Furthermore, there is no multicollinearity problem since the correlation values between variables is below 0.80 and the VIF values below 2 [79,84,85]. In other words, transformational leadership affects the safety climate, which in turn affects employees' safe behaviour.

Table 5. Results of hypotheses testing.

Relationship	β	SE	t-Value	Hypothesis	Decision
TSL → SC	0.6457	0.0462	13.97	H1	Supported
TSL → SB	0.5876	0.0426	13.78	H2	Supported
SC → SB	0.2989	0.0518	5.77	H3	Supported
TSL → SC → SB	0.3946	0.0524	7.52	H4	Partially supported

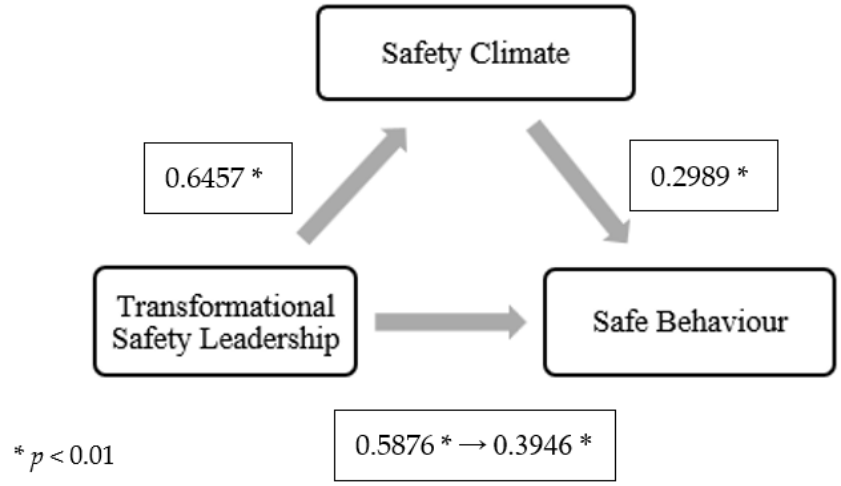

Figure 5. Model results.

5. Discussion

OHS is vital for proper working conditions and a high employee retention rate [84]. Not only are these safe behaviours a means of ensuring workplace wellbeing, but transformational safety leadership enables the achievement of corporate sustainability goals. Research results show that transformational safety leadership is positively related to both safety climate and safe behaviour. Leaders who are concerned about the safety and well-being of their employees and who support their values and beliefs about the importance of safety will generate the manifestation of safer behaviours among employees. This result is supported by the literature showing that transformational leadership positively contributes to safe behaviours [44,55,56]. In addition, transformational leadership is the proven means of creating a safety climate in the organization, positively affecting employees' perceptions of the workplace safety climate [13,25,27,48–51].

The human being is regarded as a key factor in generating accidents on account of errors and slips in compliance with protocols, procedures, and OHS regulations. Finding possible methods to influence and determine a reduced rate of accidents caused by human errors is of high interest considering the significant number of fatal accidents still occurring worldwide. From this point of view, research on connections between safety climate and safe behaviour have the potential to answer the question of how to generate safe behaviours without using coercive measures against employees [20,59–61,64]. A positive psychosocial climate leads to improved safety culture, enhancing safety performance [85]. Therefore, transformational safety leadership should be harvested in organizations to encourage the development of a safety climate as part of the organizational culture. These results are very important considering the role played by employees' safe behaviour in the reduction of work-related accidents.

As per the research performed in this study, all four hypotheses proved to be relevant, the proposed methodology being consistent with similar studies [80]. The effectiveness of leadership, punctually measured within the concept of safety climate, can be consistently monitored, streamlined, and strengthened by transposing the results of the study within the concept of safety culture. This unitarily contains both managerial, as well as cultural and normative, influence factors. The holistic and integrated approach is possible through strategic policies concerning total safety management (TSM), Zero Accident vision, or total quality management (TQM). In the current epidemiological context, the approach must maintain a consistent strategic and synergistic balance between workplace safety and health binomial.

5.1. Theoretical and Practical Implications

The current research contributes to examining the relationship between safety leadership and safe behaviour. In the studies conducted on this subject, it is seen that the mediating effect of the safety climate in the effect of different types of safety leadership on safety performance indicators is examined based on different variables. For example, Wu et al. examined the mediating effect of safety climate on the effect of three-dimensional (safety coaching, safety caring, and safety controlling) leadership on safety performance [28]. Zhao et al. focused on the effect of transformational leadership on safety participation, which is a dimension of safe behaviour [62]. The current research contributes to the literature by focusing on transformational leadership on the one hand, and the safe behaviour of employees, including direct safety compliance, on the other. As a result, it is thought that the variables discussed in the research contribute to the theories to be developed in the field of occupational safety.

This research has practical implications for managers and experts working in the field of occupational safety, who are involved in the prevention of occupational accidents. Research findings show that it is important for managers and experts who want to increase the safe behaviour of employees to exhibit transformational safety leadership. Accordingly, transformational safety leadership will lead to a more positive perception of the safety climate by employees and ultimately to safer behaviours and lower work accidents. At this point, it is recommended that organizations pay attention to the employees that they will assign in the field of occupational safety to ensure suitability for a transformational leadership style. This research also has important implications for policymakers who work to prevent occupational accidents. The results of the research show that the leadership perceptions of the employees and the perceptions of the safety climate are important in promoting the safer behaviours of employees. Considering the human and economic losses caused by occupational accidents, it would be beneficial to consider this point in the studies carried out on a national scale to prevent occupational accidents.

5.2. Limitations

The present research had certain limitations referring to self-reporting, geographical, sectoral, and analysis constraints. The first limitation of the study is that the research data was collected based on the participants' self-reports and perceptions. Therefore, some of the obtained data may contain bias due to the participants' reluctance to report their true perceptions. In addition, the research was carried out with employees in the manufacturing sector, particularly employees operating in two manufacturing plants in an urban area in Turkey and Romania. Implementation of the research methodology in different cities/countries and sectors will reveal the different dimensions of the problem for a more general and comprehensive perspective on this matter. In addition, the mediation hypothesis—which is the subject of the analysis—was validated using the Preacher and Hayes plugin in the SPSS package program. It can be thought that the results may differ if alternative software solutions would be used (e.g., Lisrel, SmartPLS).

5.3. Future Research Directions

This research focuses on transformational safety leadership, safety climate, and safe behaviour. As stated in Manjula and De Silva's research, many personal and organizational factors can be effective in the safe behaviour of employees [86]. Examining the mediating effects of personal and organizational factors other than the safety climate in future research will make significant contributions to revealing all aspects of the subject [87–89]. In this study, research hypotheses were tested on a sample that included only manufacturing workers. Future research on this subject in other sectors will contribute to the full disclosure of all aspects of the picture [90].

6. Conclusions

Occupational accidents are one of the most important problems of today's working life due to the human and economic losses they cause. The results of the research show that transformational safety leadership and safety climate perceptions of employees are important in increasing safe behaviours, which are an important part of preventing occupational accidents. These results show that, besides the technical and legal regulations made to prevent occupational accidents, regulations that will improve the perception and attitudes of employees are important. These results are consistent with evidence in the literature [90–92].

Finally, occupational health and safety does not refer exclusively to the absence of accidents and occupational disorders, but it is a way of managing the organization and strategy with implications in the field of sustainability [93,94]. Raising awareness of the implications of risk prevention [87] and consistent efforts towards praising achievements regarding safety compliance are small steps in a long journey aiming at truly safe workplaces [95,96].

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Institutional Review Board Statement: This study was carried out according to the guidelines of the Declaration of Helsinki and approved by the Research Ethics Committee from the Karadeniz Technical University (approval No. E-82554930-050.02.04-124354/22.04.2021). All participants were preliminarily informed about the planned measurements and provided consent prior to the experiments. All procedures and protocols were approved by both companies (in Turkey and Romania), which provided the case study, and the Research Ethics Committee from the Karadeniz Technical University.

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Appendix A

Table A1. Survey form.

Transformational Leadership Scale
1. Express satisfaction when I perform my job safely.
2. Makes sure that we receive appropriate rewards for achieving safety targets on the job.
3. Provides continuous encouragement to do our jobs more safely.
4. Shows determination to maintain a safe work environment.
5. Suggests new ways of doing our jobs more safely.
6. Encourages me to express my ideas and opinion about safety at work.
7. Talks about his/her values and beliefs of the importance of safety.
8. Behaves in a way that displays a commitment to a safe workplace.
9. Spends time showing me the safest way to do things at work.
10. Would listen to my concerns about safety on the job.

Table A1. *Cont.*

Safety Climate Scale
1. New employees learn quickly that they are expected to follow good health and safety practices.
2. Employees are told when they do not follow good health and safety practices.
3. Workers and management work together to ensure the safest possible conditions.
4. There are no major shortcuts taken when worker health and safety are at stake.
5. The health and safety of workers is a high priority with management where I work.
6. I feel free to report safety problems where I work.
Safety Behaviour Scale
1. I use all the necessary safety equipment to do my job.
2. I use the correct safety procedures for carrying out my job.
3. I ensure the highest levels of safety when I carry out my job.
4. I promote the safety program within the organization.
5. I put in extra effort to improve the safety of the workplace.
6. I voluntarily carry out tasks or activities that help to improve workplace safety.

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