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Research Article

Validity and Reliability of the Turkish Version of the Short-Form Safety Climate Scale for Healthcare Institutions: A Methodological Study

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Abstract: The Safety Climate Scale is an essential tool for understanding employees' shared perceptions of occupational safety but required adaptation for use in Turkish healthcare settings. The purpose of this study was to linguistically and culturally adapt the scale to ensure its validity and reliability and to measure healthcare workers' perceptions of safety.

A cross-sectional and methodological design was employed, collecting data from 421 healthcare workers in a hospital in Niğde, Türkiye. Data were gathered via face-to-face interviews and online methods using a two-part questionnaire, including socio-demographic data and the Turkish version of the scale. The analyses, which were carried out using SPSS 25.0 and AMOS 24.0, included descriptive statistics, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA).

For linguistic validity, the scale was translated into Turkish and back-translated to verify semantic consistency. Expert opinions and Content Validity Index (CVI) calculations confirmed content validity, retaining all items. Four items with low factor loadings were eliminated using EFA, leaving a 36-item, five-component structure. CFA validated this structure with improved model fit. The sample consisted of 72.7% participants aged 18–44, 51.3% female, and 52.5% holding associate or bachelor's degrees. Most participants (82%) worked in healthcare services, and 57.5% were shift workers.

The scale explained 83.905% of the total variance, with a Cronbach's Alpha of 0.98, indicating high reliability. These results confirm the scale's validity and reliability, providing a robust tool for evaluating safety climate in Turkish healthcare institutions.

Keywords: Healthcare Institutions, Safety Climate, Validity and Reliability, Scale Adaptation

1. Introduction

When examining current data on occupational health and safety in Türkiye, it is seen that, according to data registered with the Social Security Institution (SGK) in 2024, a total of 733,646 work accidents occurred, and 1,897 of these accidents resulted in death. This means that, on average, four workers lose their lives every day due to workplace accidents. From an international perspective, according to ILO (2019) data, approximately 300,000 workers lose their lives each year due to workplace accidents. The findings presented here underscore the significant scale of this issue within the Turkish context.

The notion of safety climate was initially conceptualized by Zohar in 1980 through research focused on industrial workplace safety, and has since been adapted to numerous sectors—especially those with high reliability requirements (Zohar, 1980). This concept holds significant importance in ensuring occupational health and safety. According to the World Health Organization (WHO), each year approximately 11 million individuals are diagnosed with occupational diseases globally, leading to around 700,000 deaths. Furthermore, the European Agency for Safety and Health at Work (OSHA) reports that within EU countries, an estimated 167,000 fatalities and 159,000 instances of work-related illness occur annually due to occupational hazards. In Europe, a worker experiences a workplace accident every five minutes, and every two hours, a worker dies as a result of such incidents. In Türkiye, 172 workplace accidents occur daily, leading to the death of four workers and the incapacitation of six others (Güven, 2012).

The term "safety climate" describes the dominant attitudes, beliefs, and perceptions of safety in a particular setting, usually a community or organization (Barling et al., 2003). It encompasses how

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individuals perceive the level of safety measures, their confidence in these measures, and their willingness to engage with safety protocols and procedures. Recent systematic reviews emphasize that a positive safety climate is consistently associated with fewer adverse events and improved safety performance across healthcare organizations (Noor Arzahan et al., 2022). Furthermore, measurement challenges remain, as conceptual inconsistencies and varying instruments limit comparability; therefore, it is crucial to use psychometrically validated tools appropriate for the given context.

Safety climate is inherently a concept that operates on multiple levels. Zohar (2003) identified two distinct layers within this construct: the psychological safety climate at the individual level, and the organizational safety climate at a broader, collective level of analysis. The psychological dimension refers to how employees personally perceive safety-related norms, priorities, and expectations in their workplace—essentially reflecting each worker's subjective evaluation of the organization's safety practices. In contrast, at the group or organizational level, when these individual perceptions are aggregated to represent the shared safety-related beliefs and attitudes of a work unit, the result is termed the organizational safety climate (Baumgartner & Homburg, 1996; Brown, 2006).

Todaro and colleagues (2023) made significant contributions to the field by meticulously designing a comprehensive safety climate scale aimed at capturing the multifaceted aspects of safety climate perceptions in organizational settings (Todaro et al., 2023). Their scale represents the outcome of extensive empirical research, grounded in theoretical frameworks from organizational psychology, industrial safety, and human factors engineering. Furthermore, the adaptability and versatility of the scale make it suitable for application across various industries and organizational contexts, emphasizing its utility as a diagnostic tool for identifying strengths and areas for improvement within safety management systems. This instrument facilitates a nuanced understanding of safety climate dynamics, offering the potential to inform evidence-based interventions aimed at fostering a safety culture and mitigating occupational hazards.

The necessity of effective safety management strategies in enhancing occupational safety became increasingly clear in the aftermath of catastrophic events like Seveso, Chernobyl, and Bhopal (Clarke, 1999). Over time, various components have been identified as integral to the concept of safety climate. These components encompass organizational and managerial practices—such as communication effectiveness, the robustness of the safety management system, staff training, the availability of protective equipment, and employee participation in health and safety initiatives. Additionally, managerial attitudes—such as the degree to which leadership prioritizes employee well-being—are also included. Numerous studies have demonstrated that these factors serve as reliable predictors of workplace incidents and accidents, along with other occupational health and safety outcomes (Çoban, 2006; Edmondson, 1999).

Safety cultures are significantly responsible for the success of firms that operate in hazardous and chaotic environments and nonetheless demonstrate exceptional safety performance over time (Evroro, 2015; Gershon et al., 2000). These companies, also known as high-reliability firms, are "systems operating under hazardous conditions with fewer adverse events than would be expected," according to Güven (2012). These include, for instance, air traffic control systems, nuclear power reactors, and aircraft ships. Healthcare facilities have to be regarded as high-reliability organizations due to the vital nature of human health. The significance of the safety climate in this field is emphasized by this study.

Healthcare facilities are required to effectively address a range of potential hazards, including biological, physical, and chemical risks. Implementing rigorous safety protocols to minimize infection transmission and to manage hazardous substances appropriately is critically important (Hessels & Larson, 2016; Hofmann & Stetzer, 1996; Weick & Sutcliffe, 2001). Gershon and colleagues (2000) emphasized that fostering a secure and health-conscious work environment can significantly impact employees' compliance with safety procedures and strengthen their favorable perceptions regarding workplace safety.

Strong safety cultures in hospitals place a high priority on safety and include it into both team and individual routines as well as the institution's everyday operations. They also foster psychological safety—defined as the ease of interpersonal risk-taking—which empowers staff to anticipate, address, and collectively learn from issues arising in the delivery of care (Hu & Bentler, 1999).

A review of the literature indicates that comprehensive safety climate measuring tools designed specifically for medical professionals are severely lacking. By modifying the safety climate scale created by Todaro and colleagues (2023) for the healthcare industry, the current study aims to address this requirement and advance the profession by offering insights into this crucial area. In addition, empirical research has demonstrated that short-form safety climate questionnaires maintain measurement equivalence across different employment groups, offering a practical option for institutional comparisons (Summers et al., 2023). Evidence from validation studies supports the psychometric soundness of safety climate instruments in healthcare. For instance, the Safety Climate Survey has demonstrated robust factor structure and reliability in acute care settings, reinforcing its utility for cross-context adaptation (Glarcher et al., 2022).

2. Methods

2.1. Type and aim of the study

This study is a cross-sectional and methodological research. Its aim is to adapt the multidimensional and multilevel "Safety Climate Scale" developed by Todaro and colleagues (2023) for healthcare institutions and to integrate it into Turkish culture and literature.

2.2. Population and sample

For validity and reliability investigations, a sample size of at least 200 individuals and five to ten times the scale's item count is recommended (Karagöz & Ağbektaş, 2016). The study population consisted of approximately 2,000 employees working in a state hospital in Niğde province, including healthcare, administrative, technical, and cleaning service staff. Given that the Turkish version of the Safety Climate Scale comprises 40 items, the minimum required sample size was calculated to be 400. Accordingly, the study was conducted with 421 healthcare professionals selected through simple random sampling from this population.

2.3. Data collection tools

Data was gathered using a two-section questionnaire. While the second section used the Turkish-adapted version of the multidimensional and multilevel "Safety Climate Scale" that was first created by Todaro and colleagues (2023) in Italy and modified for use in healthcare facilities, the first section asked questions about the participants' sociodemographic characteristics.

Personal information form:

Five questions make up this form, which is intended to determine the participants' descriptive traits (e.g., age, gender, education level, job category, and working conditions).

The safety climate scale:

It was first developed to evaluate communication, individual involvement, safety precedence, management commitment, post-event management, training, system performance, and procedural processes, among other elements of the safety atmosphere in enterprises. The scale comes in two versions. The short form contains 40 items and 8 sub-dimensions, while the long form includes 60 items and the same 8 sub-dimensions. The Likert-type scale is used to score responses, with 1 denoting "strongly disagree" and 6 denoting "strongly agree." According to reports, the scale's sub-dimensions' Cronbach's Alpha coefficient (α) ranged from 0.84 to 0.95, indicating high reliability (Karagöz & Kösterilioğlu, 2008). The scale's total Cronbach's Alpha (α) score in this investigation was determined to be 0.98. In the Turkish version, items 14, 15, 17, and 18 are reverse-coded.

2.4. Ethics committee approval and permissions

Ethical approval for the study was granted by the Ethics Committee of Niğde Omer Halisdemir University (Approval Date: 12.09.2023, No: 11) and the Niğde Provincial Health Directorate (Approval Date: 31.10.2023, No: E-47107193-799-228131182). Written permission for the Turkish adaptation of the scale was obtained via email correspondence with Todaro, the original developer of the scale. Informed agreement was gained from participants after they were fully informed about the study's goals and given the assurance that the data would only be used for scientific purposes. Furthermore, all participants provided voluntary consent.

2.5. Data collection

The data were gathered from participants who voluntarily consented to take part in the study, with data collection taking place between January 1, 2024, and March 31, 2024. Both face-to-face interviews and an online survey via Google Forms were used for data collection. A simple random sampling technique was applied to select the participants.

2.6. Statistical analysis

The data was analyzed using AMOS 24.0 and SPSS 25.0 software. The research population's basic characteristics were outlined using descriptive statistics. The threshold for significance was set at $p<0.05$. The Safety Climate Scale's validity was evaluated using both construct validity and content validity methods (Davis, 1992).

Two separate translators translated the original scale into Turkish to guarantee linguistic correctness. These translations were subsequently consolidated, and the scale was back-translated into the original language. Researchers compared this Turkish version with the original, assessing semantic integrity and confirming their strong similarity. The final version was reviewed for linguistic appropriateness in collaboration with a Turkish language and literature expert (Büyüköztürk, 2002).

Five experts were consulted in order to assess the Safety Climate Scale's content validity in Turkish. Each expert was asked to assess whether the items in the scale effectively measured the intended construct by choosing one of three options: "essential," "useful but not essential," or "not necessary." Items were retained if a majority of experts considered them "essential" (Karasu, 2025; Lawshe, 1975). Subsequently, the Content Validity Index (CVI) for each item was calculated to determine which items should be included in the final instrument (Karasu, 2018; Lin et al., 2016). The formula for calculating the Content Validity Index (CVI) is $CVI = N_G / (N/2) - 1$, where N is the total number of experts and N_G is the number of experts who deemed the item "essential." According to Yurdugül (2005), for the CVI to be statistically significant ($p<0.05$) with five experts, the coefficient should be 0.99 (Yurdugül, 2005).

The Turkish version of the scale was pre-tested with 10 healthcare workers who were not part of the main study sample. This pilot test aimed to identify any potential ambiguities in the questions. The results indicated that all items were clearly understood by the participants, validating the scale's relevance and applicability to the Turkish population.

Both exploratory and confirmatory factor analyses were used to assess the measure's construct validity. The Kaiser-Meyer-Olkin (KMO) test and the Bartlett's test of sphericity were employed to evaluate appropriateness for factor analysis in order to determine sample adequacy in exploratory factor analysis (EFA). After identifying and validating the scale's components using EFA, the fit of the discovered structure was tested using confirmatory factor analysis (CFA) with AMOS 24.0 (Alpar, 2012; Alpar, 2022).

To do the reliability analysis of the scale, Cronbach's Alpha coefficients were calculated for each dimension and the scale overall. Additionally, item-total correlations and the relationships between the items and their component parts were analyzed.

3. Results

The sample consisted of 72.7% participants aged 18-44, 51.3% female, and 52.5% holding an associate or bachelor's degree. Additionally, 82% of the participants worked in healthcare services, and 57.5% were employed in shift-based work. Table 1 displays the participants' comprehensive sociodemographic details.

Table 1

Participants' Sociodemographic Characteristics

Variables	Teams	n	%
Age	18-44	306	72.7
	45+	115	27.3
Gender	Female	216	51.3
	Male	205	48.7
Educational Status	Primary Education / High School	22	5.2
	Associate'sDegree/Bachelor'sDegree	221	52.5
	Graduate Degree	178	42.3
Service Class of Duty	Healthcare Services Class	345	82
	Administrative Services Class	48	11.4
	Support Services Class	22	5.2
	Day Shift	6	1.4
Work Schedule	Shift Work	179	42.5
	Primary Education / High School	242	57.5
Total		**421**	**100**

Five experts examined and decided which items should be included in the Safety Climate Scale in order to evaluate its content validity in Turkish. The Content Validity Index (CVI) calculations showed that all 40 items received a CVI greater than 0.99, confirming that all items were retained. The Turkish version of the scale was then finalized and distributed to the study sample (Karasu, 2018; Lin et al., 2016).

To assess the idea validity, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted on the collected data. According to the Kaiser-Meyer-Olkin (KMO) coefficient, which was 0.80, the data was suitable for factor analysis. According to Neal and colleagues (2000), Bartlett's test confirmed that the sample size was sufficient for factor analysis with a chi-square value of 32,792.752 and a p value of 0.000.

EFA, conducted using principal component analysis, identified a structure comprising five factors and 36 items. The total explained variance of this structure was determined to be 83.905%. Items with factor loadings below 0.30 or that loaded on multiple factors were excluded from the scale. Consequently, four items were removed (Öven & Pekdemir, 2005). Table 2 displays the EFA's comprehensive findings.

Table 2

Turkish Version of the Safety Climate Scale and Exploratory Factor Analysis Results

Items	Loading Coefficients of Items on Factors					Variance Description Percentage
	1	2	3	4	5	
S2	0.79					%65.556
S3	0.82					
S4	0.90					
S5	0.64					
S6	0.31					
S7	0.67					
S8	0.57					
S9	0.58					
S10	0.70					
S12		0.35				%5.955
S14		0.44				
S15		0.39				
S17		0.97				
S18		0.78				
S19			0.56			%4.638
S20			0.82			
S21			0.93			
S22			0.90			
S23			0.42			
S24			0.36			
S25			0.94			
S26			0.90			
S27			0.62			
S28			0.44			
S29				0.32		%4.076
S30				0.43		
S31				0.50		
S32				0.77		
S33				0.33		
S34				0.48		
S35				0.55		
S36				0.77		
S37					0.56	%3.680
S38					0.46	
S39					0.75	
S40					0.83	
Percentage of Total Variance Explained						%83.905

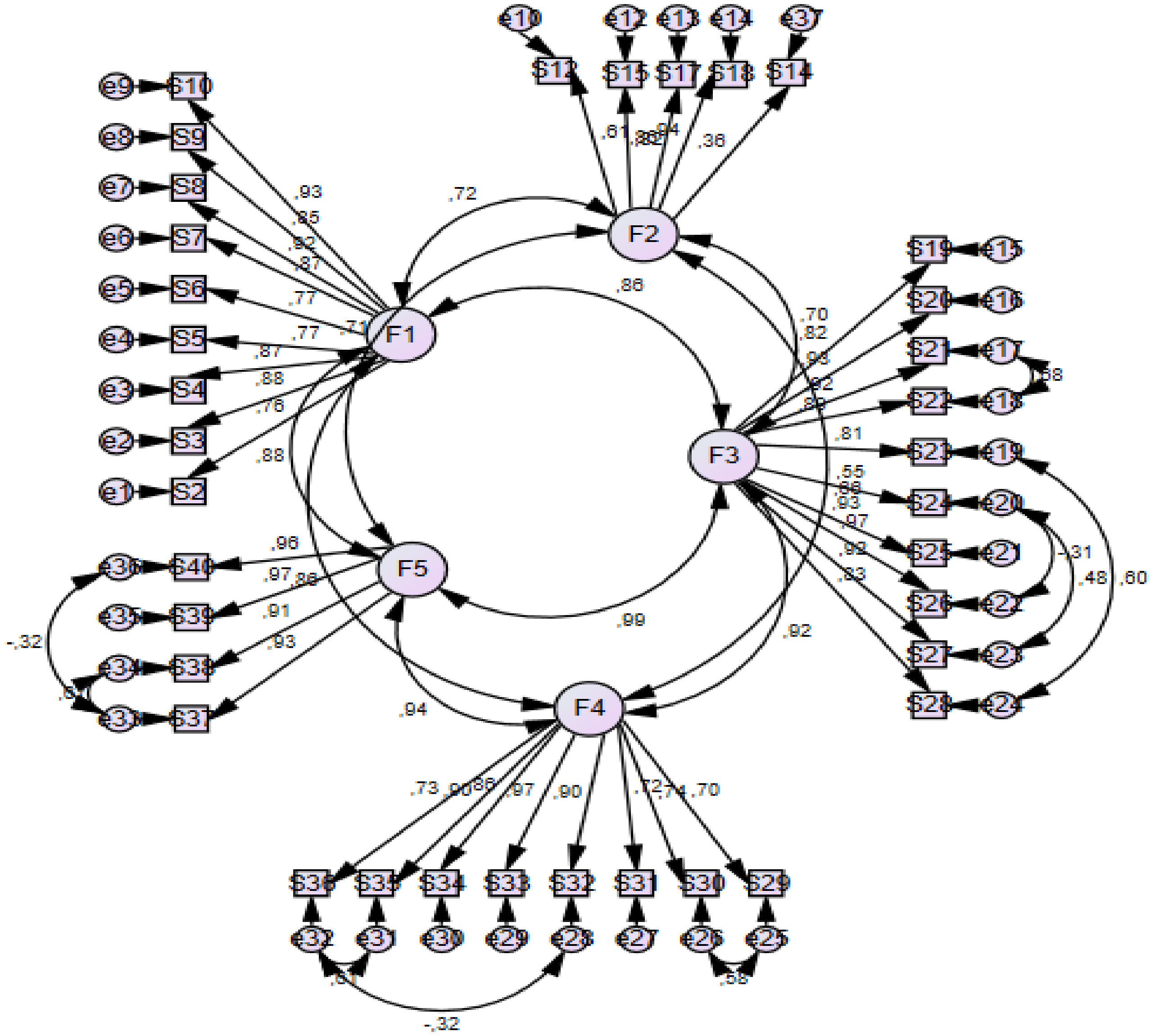
Kaiser-Meyer-Olkin: 0,800
Barlett's Test of Sphericity Chi-Square: 32792,752
df: 630
p: 0,000

The normality, skewness, and kurtosis values of the data were assessed using the Kolmogorov-Smirnov test. According to Tabachnick and Fidell (2013), data are considered normally distributed if the skewness and kurtosis values fall between -1.5 and +1.5. The Kolmogorov-Smirnov test revealed that the data in this investigation were normally distributed, with a p-value better than 0.05 and skewness and kurtosis values ranging from -0.200 to 1.291 (Özata & Altunkan, 2010).

The 36-item, five-factor structure obtained from the EFA was subjected to CFA. The first-level CFA revealed that the model fit indices were not at acceptable levels. Consequently, modifications were applied, and variables that reduced model fit were identified. New covariances were created for residuals with high covariance values. Figure 1 shows the CFA route diagram for the model.

Figure 1

Confirmatory Factor Analysis Link Diagram of the Safety Climate Scale (Standard Coefficients)



Following these modifications, the fit indices were determined as follows: chi-square test value = 4.428, RMSEA=0.041, RMR=0.074, CFI=0.907, IFI=0.918, GFI=0.920, and TLI=0.836. While RMSEA and the p value indicated excellent fit, the other indices demonstrated appropriate fit (Table 3). These indices met the acceptable thresholds in the literature, and the 36-item, five-factor structure of the Safety Climate Scale was validated.

Table 3

Turkish Version of the Safety Climate Scale and Exploratory Factor Analysis Results

Fit Indices	Perfect Fit	Appropriate	Measure of Model Fit	Model Fit
χ^2/SD	≤3	≤5	4.428	Appropriate fit
RMSEA	≤0.05	≤ 0.08	0.041	Perfect fit
RMR	≤ 0.05	≤ 0.08	0.074	Appropriate fit
CFI	≥0.95	≥0.90	0.907	Appropriate fit
IFI	≥0.95	≥0.90	0.918	Appropriate fit
GFI	≥0.95	≥0.90	0.920	Appropriate fit
TLI	≥0.95	≥0.80	0.836	Appropriate fit
p	<0.05	<0.05	0.000	Perfect fit

* In structural equation modeling, the Root Mean Square Error of Approximation, or RMSEA, is a metric used to evaluate model fit. The average residual error in the model is shown by RMR (Root Mean Square Residual). The suggested model's fit is evaluated against that of a baseline independent model using the Comparative Fit Index, or CFI. The Goodness-of-Fit Index, or GFI, assesses how well the model reproduces the data that was observed. The Tucker-Lewis Index, or TLI, compares the suggested model to a null model in order to determine the relative fit. The discrepancy between the number of estimated parameters and the number of observed data points is known as the SD (Degrees of Freedom). Finally, IFI (Incremental Fit Index) evaluates the improvement in model fit over the baseline model.
* The criteria used to evaluate the goodness of fit indices were based on the works of Baumgartner & Homburg (1996), Brown (2006), Hooper et al. (2008), Hu & Bentler (1999), Raykov & Marcoulides (2008), Kline (2005), Tabachnick & Fidell (2013), and Thompson (2004).

Table 4 provides the standardized regression coefficients and results of the reliability analysis for the Safety Climate Scale. Item analysis, conducted to examine the contribution of each item to the scale, identified no significant changes in total mean scores and variances when any item was removed (Özata & Altunkan, 2010). The Cronbach's Alpha values after item removal remained below the overall scale's Cronbach's Alpha value (<0.984), indicating that all items performed well within the scale.

The overall reliability coefficient of the Cronbach's Alpha scale was 0.984. When examining the sub-dimensions, reliability coefficients were calculated as 0.956 for Dimension 1 (Communication), 0.841 for Dimension 2 (Safety Priority), 0.966 for Dimension 3 (Safety Management), 0.944 for Dimension 4 (Training), and 0.973 for Dimension 5 (System Performance). These findings indicate that the scale is highly reliable both overall and across sub-dimensions.

Table 4

Reliability of the Safety Climate Scale

Items	Standardized Regression Coefficients	Item-Total Correlations	Reliability Coefficient when Item Deleted
S2	0,762	0,674	0,984
S3	0,879	0,808	0,983
S4	0,871	0,784	0,983
S5	0,768	0,836	0,983
S6	0,774	0,768	0,983
S7	0,872	0,828	0,983
S8	0,917	0,866	0,983
S9	0,847	0,757	0,983
S10	0,930	0,857	0,983

Table 4 (Continued)

S12	0,611	0,666	0,984
S14	0,361	0,136	0,985
S15	0,821	0,797	0,983
S17	0,862	0,584	0,984
S18	0,940	0,683	0,984
S19	0,816	0,817	0,983
S20	0,926	0,887	0,983
S21	0,921	0,892	0,983
S22	0,887	0,860	0,983
S23	0,806	0,814	0,983
S24	0,548	0,574	0,984
S25	0,931	0,878	0,983
S26	0,974	0,925	0,983
S27	0,918	0,918	0,983
S28	0,829	0,803	0,983
S29	0,701	0,716	0,983
S30	0,738	0,671	0,984
S31	0,719	0,622	0,984
S32	0,901	0,865	0,983
S33	0,973	0,914	0,983
S34	0,857	0,819	0,983
S35	0,901	0,851	0,983
S36	0,728	0,655	0,984
S37	0,933	0,921	0,983
S38	0,913	0,916	0,983
S39	0,969	0,932	0,983
S40	0,959	0,922	0,983

Overall Cronbach's Alpha Coefficient: 0.984
Cronbach's Alpha Coefficients of Subdimensions:
1: 0.956 **4:** 0.944
2: 0.841 **5:** 0.973
3: 0.966

4. Discussion

The investigation of "what is measured and to what extent it is measured" and "to what extent it accurately assesses the characteristic it is designed to evaluate" pertains to the validity measure of a developed or adapted measurement tool. High-quality measurement tools are characterized by two primary features: validity and reliability (Özdamar, 2016). Validity refers to a scale's ability to measure the desired phenomenon. Conversely, reliability pertains to the degree of consistency among all items in the measurement tool and their ability to produce similar results upon repeated applications (Polovich & Clark, 2012).

As mentioned earlier, the content validity of the generated scale was assessed using the Cronbach's Alpha coefficient and the Content Validity Index (CVI). The internal consistency and homogeneity of the scale's items are reflected in Cronbach's Alpha. Higher values are preferable since a higher Cronbach's Alpha denotes better consistency among the items. This coefficient has a range of 0 to 1. For Likert-type scales, an Alpha value closer to 1 is preferred. Values above 0.50 are considered acceptable for confirming the internal consistency of a scale (Raykov & Marcoulides, 2008).

Before conducting factor analysis, it is essential to first assess the appropriateness of the data for this type of analysis. This begins with the creation of a correlation matrix to identify variables that show strong correlations, as these are typically grouped under a single factor. The data is then subjected to Bartlett's test to determine its suitability for factor analysis; a p-value of less than 0.05 indicates that the data is appropriate. Lastly, sample adequacy is evaluated using the Kaiser-Meyer-Olkin (KMO) test, where a value close to 1 is expected. As per the existing research, KMO values that fall below 0.50 are deemed undesirable, whereas 0.50 denotes poor adequacy, 0.60 mild, 0.70 beneficial, 0.80 above average, to 0.90 or more denotes excellent adequacy (Öven & Pekdemir, 2005).

Both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to assess the scale's structural validity. Factor analysis is an advanced multivariate statistical method that examines the relationships between variables to provide a more compact representation of the data (Reason, 2000). Consolidating a large number of variables, determining if they can be categorized into factors, and allocating particular items from the scale to the pertinent component variables are the primary goals of factor analysis. This approach enables researchers to highlight the importance of the factors by examining which components should be included in the consolidated factors (Roberts, 1990).

In the next phase, EFA was conducted to identify the factors. EFA organizes a substantial set of variables into different categories, maximizing interrelations within each category while minimizing interrelations between different categories, ultimately transforming these categories into new variables through minimized interrelations among variables within each category. The variables obtained from this procedure are referred to as factors. This methodological approach strives to reduce the total number of variables while simultaneously producing new structures based on interrelations among variables (Öven & Pekdemir, 2005). A rotated factor matrix is subsequently created. In this context, the assignment of each independent variable to a specific factor is determined by examining correlation coefficients or factor loadings. Researchers may also apply rotation techniques to factors within the analysis. It is crucial to remember that component rotation has no effect on the solution's fundamental mathematical characteristics. Following the rotation of axes, the loading of variables within a particular factor increases, while their loadings in other factors decrease. This process helps identify variables with strong correlations to the factors, improving the interpretability of the factors themselves (Polovich & Clark, 2012). Among the various rotation methods, varimax, quartimax, and equamax are the most widely used. In the final step, the identified factors are named, with specific labels assigned to each factor (Schneider et al., 2013).

In the third phase, Confirmatory Factor Analysis (CFA) was performed. CFA is used to validate the model within a predefined structure and is commonly applied in scale development and validity evaluations. It assesses whether the variables underlying the factors identified in Exploratory Factor Analysis (EFA) are suitable (Yıldız, 2008). Data is used to evaluate theoretical frameworks empirically in structural equation modeling. According to Öven and Pekdemir (2005), CFA is mostly used in scale development and validity tests to confirm the precision of a predetermined model.

Fit indices are used to assess how effectively predefined models explain the data. A variety of fit indices are available to evaluate model fit. These indices evaluate how well the statistics obtained from the sample data match the parameters of the suggested models. According to Özdamar (2016), a model is considered inappropriate if it does not match the data.

The analyses successfully identified components that aligned with the primary research objectives. A credible and trustworthy measurement instrument was created using EFA and CFA.

The results of the study's EFA and CFA indicated that the developed scale consisted of five dimensions and thirty-six items. The first dimension focuses on communication, the second dimension focuses on security priority, the third dimension focuses on security management, the fourth dimension focuses on training, and the fifth dimension focuses on system performance. After applying CFA to the data, the final scale model showed acceptable fit indices, providing a valid and reliable measurement tool to the literature (Appendix 1).

An important methodological finding of this study concerns the factor structure of the Turkish version of the Safety Climate Scale. While the original short form comprised eight dimensions, exploratory factor analysis indicated a five-factor solution in the Turkish healthcare context. This reduction is consistent with the process of cross-cultural adaptation, where certain dimensions may converge due to contextual and cultural differences (Beaton et al., 2000; Hambleton et al., 2005). Specifically, the original dimensions of post-event management, procedural processes, and individual involvement did not emerge as distinct factors. Instead, their items loaded onto broader dimensions such as "Communication" and "Safety Management," suggesting that these constructs are perceived in a more integrated manner by Turkish healthcare workers. New factor labels were therefore assigned to reflect this empirically derived structure while maintaining conceptual consistency with the original scale. This outcome highlights the importance of considering cultural and organizational specificities in measurement adaptation, rather than expecting full replication of the original dimensionality.

Recent large-scale studies have shown that stronger teamwork and safety climate perceptions are associated not only with fewer safety incidents but also with reduced physician burnout, highlighting the broader organizational benefits of cultivating a positive safety climate (Rotenstein et al., 2024). Moreover, evidence from psychosocial safety climate research suggests that supportive climates buffer the negative effects of work demands and enhance both employee well-being and patient safety outcomes (Amoadu et al., 2025).

5. Conclusion

The Safety Climate Scale, created by Todaro and colleagues (2023) was modified for use in healthcare organizations in this study based on its Turkish validity and reliability. In exploratory factor analysis, the scale's structural validity explains 83.905% of the variation, and all of its items exhibit comprehensive validity. With 36 items and 5 categories, the Turkish version of the measure is a trustworthy 6-point Likert-type scale. Since there is no neutral choice on the 6-point Likert scale, participants are encouraged to skew toward one side. This characteristic could help spot more obvious patterns.

The scale can serve as an accurate and reliable instrument for evaluating safety conditions in healthcare institutions. It can also be used to assess employees' perceptions of the safety climate and investigate factors that could enhance the safety climate. To date, no measurement tool designed or adapted into Turkish to assess this aspect within Türkiye has been published.

It is recommended that the Safety Climate Scale, introduced into Turkish with this study, be used in future research or training initiatives to evaluate employees' perceptions of the safety climate at regular intervals. Furthermore, it is suggested that institutional managers take proactive measures in problematic areas identified through such evaluations.

5.1. Limitations of the study

There are various restrictions on this study. Because the sample is limited to healthcare facilities in a particular area, the results cannot be applied to other industries or regions. Perceptions of the safety climate cannot be tracked over time due to the cross-sectional design. The validity of responses may be impacted by social desirability bias in self-reported data. While the scale's Turkish version demonstrated validity and reliability, modifications made during the confirmatory factor analysis might affect its application in different samples. Additionally, cultural factors and the scale's long-term reliability remain unexplored. Future studies should address these limitations by incorporating longitudinal designs, diverse samples, and cultural validations.

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Safety Climate Scale for Healthcare Institutions.

***Safety Climate Scale for Healthcare Institutions.**		**Strongly Disagree**	**Disagree**	**Slightly Disagree**	**Slightly Agree**	**I Agree**	**Completely Agree**
2	My organization encourages the sharing of experiences related to safety issues among employees.	1	2	3	4	5	6
3	Our supervisor discusses with us how to improve safety performance.	1	2	3	4	5	6
4	Our supervisor provides explanations to ensure that we work safely.	1	2	3	4	5	6
5	Colleagues exchange ideas on how to work in accordance with safety procedures.	1	2	3	4	5	6
6	They openly discuss safety issues with colleagues, supervisors and managers.	1	2	3	4	5	6
7	In my organization, management believes that employee involvement is necessary to improve safety performance.	1	2	3	4	5	6
8	In my organization, management regularly consults with employees about safety issues in the workplace.	1	2	3	4	5	6
9	Our supervisor involves us in decisions about improving safety performance.	1	2	3	4	5	6
10	Our supervisor considers and implements my ideas on how to improve safety performance and prevent risks.	1	2	3	4	5	6
12	My colleagues are committed to identifying problems related to safety issues and proposing solutions.	1	2	3	4	5	6
14	In my organization, sometimes business objectives conflict with safety	1	2	3	4	5	6
15	In intense working conditions, our supervisor does not care about safety	1	2	3	4	5	6
17	Sometimes my colleagues overlook safety procedures while working under intense working conditions.	1	2	3	4	5	6
18	Sometimes my colleagues do not report dangerous situations because there is no time to stop work.	1	2	3	4	5	6
19	My organization is committed to continuously improving the security performance of each department.	1	2	3	4	5	6
20	My organization considers security issues when setting long and short-term goals.	1	2	3	4	5	6
21	Our supervisor regularly checks that we are following safety procedures.	1	2	3	4	5	6
22	Through his/her behavior, the supervisor demonstrates his/her commitment to improving safety issues in the workplace.	1	2	3	4	5	6
23	When there is a dangerous situation, my colleagues intervene to stop activities that do not comply with safety procedures.	1	2	3	4	5	6
24	In our work group, we try to eliminate the risk of harm to people and prevent accidents.	1	2	3	4	5	6
25	In my organization, corrective measures resulting from safety incident investigations are implemented immediately.	1	2	3	4	5	6
26	When a near miss, accident or unsafe situation is reported, my organization responds quickly to resolve the issues.	1	2	3	4	5	6
27	Our supervisor asks us to report any security issues so that he or she can resolve them or report them to the relevant authorities.	1	2	3	4	5	6
28	Our supervisor acts quickly to rectify security issues.	1	2	3	4	5	6
29	My colleagues always report dangerous situations when they see them.	1	2	3	4	5	6
30	My colleagues know what to do and who to report to when they recognize a hazard in the workplace.	1	2	3	4	5	6

31	I have received adequate training to perform my work-related tasks properly and safely in the organization where I work.	1	2	3	4	5	6
32	In my organization, training activities are effective in promoting safe behaviors.	1	2	3	4	5	6
33	Our supervisor supports employees to participate in workplace safety training.	1	2	3	4	5	6

Continued

34	Our supervisor ensures that we receive adequate training on safety issues to prepare us to manage emergencies.	1	2	3	4	5	6
35	My colleagues have the safety requirements specified in the procedures.	1	2	3	4	5	6
36	My colleagues have the skills needed to complete their tasks effectively while taking safety issues into account.	1	2	3	4	5	6
37	In my organization, potential impacts on security performance that may result from organizational changes are always assessed.	1	2	3	4	5	6
38	The management system implemented by my organization is effective in preventing serious accidents and managing risks.	1	2	3	4	5	6
39	In my organization, safety procedures and operational instructions are also useful and effective in emergency situations.	1	2	3	4	5	6
40	The existing security procedures in my organization contain all the information I need to manage the security risks related to my role.	1	2	3	4	5	6

* Items 1-11-13-16 in the original form of the scale were excluded from the Turkish version of the scale as a result of the analysis. The Turkish version of the Safety Climate Scale for Healthcare Institutions consists of 5 sub-dimensions and 36 items on a 6-point Likert scale.

1. “Communication” Dimension: Items 2-3-4-5-6-7-8-9-10
2. “Security Priority” Dimension: Items 12-14-15-17-18
3. “Security Management” Dimension: Items 19-20-21-22-23-24-25-26-27-28
4. “Education” Dimension: Items 29-30-31-32-33-34-35-36
5. “System Performance” Dimension: Items 37-38-39-40

**Items 14-15-17-18 are reverse coded items.