International Journal of
Disabilities Sports and Health Sciences
e-ISSN: 2645-9094

RESEARCH ARTICLE

Development of the Workplace Work Environment Ergonomics Scale for Nurses

Ali AĞAR[1], Soner BERŞE[2] and Ezgi DİRGAR[3*]

[1]Artvin Çoruh University, Şavşat Vocational School Health Care Services Department, Artvin / Türkiye
[2]Gaziantep University, Health Science Faculty, Nursing Department, Gaziantep / Türkiye
[3]Gaziantep University, Health Science Faculty, Midwifery Department, Gaziantep / Türkiye
*Corresponding author: ezgi.dirgar@gmail.com

Abstract
This study aimed to design and validate a comprehensive scale to assess ergonomic risks in the work environment for nurses. The instrument includes five subscales: Work Area Ergonomic Risks, Occupational Health and Safety, Ergonomic Risks Related to Medical Devices, Cognitive Ergonomic Risks, and Environmental Ergonomic Risks. The development process involved expert opinions for content validity and a pilot study for surface validity, leading to a 32-item draft. An exploratory factor analysis revealed a 5-factor structure, explaining 77.804% of total variance. Items with factor loadings below 0.30 were removed, resulting in a final 28-item scale. The Cronbach's alpha for the scale was found to be 0.922, indicating high internal consistency. The results of a confirmatory factor analysis also confirmed the 5-factor structure. These findings suggest that the Workplace Ergonomics Scale for Nurses is a valid and reliable tool that can aid in identifying ergonomic risks in nursing work environments. By using this instrument, healthcare organizations can implement targeted strategies to improve workplace conditions and enhance the well-being of their nursing staff. Future research should aim to verify the scale's applicability in different countries and healthcare settings.

Keywords
Nursing Ergonomics, Workplace Safety, Risk Assessment

INTRODUCTION

Nurses constitute the largest occupational group in the health sector globally, with 27.9 million employees, representing approximately 59% of healthcare professions. They are exposed to biological, chemical, psychosocial, and physical hazards in their working lives (Nguyen, Nguyen, Hoang, Hoang, & Pham, 2022). Musculoskeletal disorders (MSDs), one of the physical hazards, are currently among the most significant work-related health issues worldwide (Yilmaz & Isik Andsoy, 2022). Nurses face various health problems related to their profession, depending on the quality of care and treatment they provide, and MSDs rank first with a prevalence of 71.9% among these problems (Nguyen et al., 2022; Soler-Font et al., 2019; Westergren, Ludvigsen, & Lindberg, 2020; Yilmaz & Isik Andsoy, 2022).

The International Labor Organization (ILO) and the World Health Organization (WHO) identify MSDs as a growing occupational epidemic. MSDs account for a substantial reduction in workforce productivity among active individuals when contrasted with other non-communicable diseases. The healthcare sector experiences economic losses due to absenteeism and missed workdays caused by MSDs. The

Received: 29 March.2023 ;**Accepted:28** May 2023; **OnlinePublished:** 17 June 2023
[1]**ORCID:** 0000-0001-8214-7441 , [2]**ORCID:**0000-0003-2771-9587 , [3]**ORCID:**0000-0001-9108-3216

How to cite this article: Ağar, A., Berşe, S. And Dirgar, E. (2023). Development of the Workplace Work Environment Ergonomics Scale for Nurses. *Int J Disabil Sports Health Sci*;2023;6(2):251-260.https://doi.org/10.33438/ijdshs.1273063

difficulties encountered by nurses not only result in diminished work motivation and job satisfaction, but also give rise to negative consequences such as leaving their jobs and early retirement (Yilmaz & Isik Andsoy, 2022).

It is known that environmental, mental, personal, and working condition factors cause MSDs in nurses. Working conditions, in particular, are one of the significant factors contributing to MSDs (Nguyen et al., 2022). Nurses are known to have a high association with MSDs due to improper postures, such as lifting or positioning patients, standing for long periods, and bending or reaching (Nguyen et al., 2022). It has been found that nursing tasks performed more than 10 times a day increase the likelihood of developing work-related MSDs (Westergren et al., 2020).Additionally, nurses spend most of their time at nursing stations. Nursing stations are functional areas to coordinate patient care responsibilities, communication, and documentation of patient records (Mokarami et al., 2021). Along with this, nursing stations are a part of the monitor where patient tracking is performed by displaying data from each sensor on a computer screen for viewing patient monitor data (Webster & Weller, 2021). The location, dimensions, chair designs, furniture used, lighting, noise, and ventilation systems of these stations need to meet ergonomic requirements at an optimum level (Mokarami et al., 2021). However, due to the healthcare service job's variable structure and the need for behavioral cooperation among patients, implementing ergonomic designs is challenging (ALHazim, Al-Otaibi, & Herzallah, 2022).

Ergonomics is a multidisciplinary approach supported by three interrelated factors: physical, cognitive, and organizational. Physical factors utilize human capacity issues related to efficient and effective workplace layout and the working environment. Cognitive factors focus on mental processes related to information processing, interpretation, task analysis, human-machine interfaces, workload, and alarm philosophies and involve human senses (vision and hearing, touch, taste, smell). Organizational factors are essential for managing work responsibilities, work procedures, and communication processes (Mokarami et al., 2021). Ergonomics is also the practice of planning the job to fit the worker, rather than forcing the worker's body to fit the job. Adjusting the job activities, workstations, equipment, and tools used to fit the worker can help reduce the actual impact of the job on the worker's body and eliminate numerous potential and debilitating occupational MSDs (ALHazim et al., 2022).

Considering this background, the primary objective of the present study is to develop a valid and reliable assessment instrument that can evaluate the working environment of nurses from an ergonomic standpoint. The inspiration for creating a new scale is derived from the requirements introduced by the Occupational Health and Safety Law No. 6331, enacted in our country in 2012, and the conceptual research conducted on this subject within the past decade.

MATERIALS AND METHODS

Desing

This methodological study was conducted in a university hospital located in the Southeastern Anatolia region of Turkey between August 2022 and March 2023.

Sample

The study's population is comprised of 795 nurses working at the hospital where the research was conducted. There was no specific sampling method chosen, with the goal instead being to reach the entire population. In the literature, the sample size is sometimes determined based on the number of items in the scale being used. Studies suggest that there should be 5 or 10 observations per item (Seçer, 2013; Şencan, 2005; Yaşlıoğlu, 2017).

In this study, the draft scale consisted of 40 items, and the aim was to reach at least 200 to 400 participants. The initial sample of 389 participants was used for the exploratory factor analysis. Subsequently, for confirmatory factor analysis, 329 participants were reached. Over the course of the study, a total of 716 nurses were reached due to reasons such as being on leave, shift changes, and unwillingness to participate in the research. The participation rate was calculated as 90.06%.

Prior to the initiation of the study, ethical approval was obtained from the Non-Interventional Clinical Research Ethics Committee Presidency of Artvin Çoruh University (Date: 21.06.2022, Number: E-18457941-050.99-52839), and institutional permission was obtained from Gaziantep University Şahinbey Research and Application Hospital (Date: 01.07.2022, Number:

53892). All participating nurses were informed about the nature of the research and the data collection process, and written consent was obtained from each participant. The study adhered strictly to the principles of the Helsinki Declaration at all stages.

Scale Development Process

The process of developing the scale started with a comprehensive literature review, from which an item pool was created. A total of 40 items were prepared, drawing from the relevant literature. These 40 items were then submitted to 10 different experts, including both assessment and measurement specialists as well as subject-matter experts. The Lawshe method was employed to calculate the content validity of the items (Lawshe, 1975). In accordance with this method, an expert opinion form was developed. The objective of the scale was outlined in the form, and experts assessed the items as essential, useful but not essential, or not necessary, while also providing any suggestions they might have. Following expert feedback, 8 items with a content validity index below the threshold were eliminated, resulting in a 32-item draft scale. A pilot study was then conducted with 40 nurses using this draft scale to gather information about item comprehensibility and establish the scale's internal validity. It has been suggested that including 30 to 50 participants representative of the target population is sufficient for a pilot study (Şeker & Gençdoğan, 2014). Subsequent to the pilot study, item-total correlations and the Cronbach's alpha coefficient for the scale were computed using the SPSS analysis program. After the pilot application, an exploratory factor analysis was carried out on a larger sample (n: 389). Based on the exploratory factor analysis findings, 4 items with factor loadings below 0.30 and those assigned to a different sub-dimension were removed, resulting in a 28-item scale. A confirmatory factor analysis was then performed with a second sample (n: 329). Upon analyzing the data, the final version of the Workplace Work Environment Ergonomics Scale for Nurses was established.

Pilot Study

Following expert opinions, a pilot study was conducted on a group of 40 working nurses to test the comprehensibility of the scale and prepare it for the data collection process to represent the target audience. After the pilot study, the scale was applied to the sample group. Nurses included in the pilot study were kept out of the sample. An increase in the score obtained from the scale and its sub-dimensions indicates the presence of a work environment ergonomic risk for nurses

Data Collection &Instruments

Working nurses in the hospital were informed about the study during day and night shifts, and they were asked to complete the questionnaire at a convenient time. At the end of their shifts, the completed survey forms were collected.

The data collection form consists of two sections: the demographic characteristics form for employees and the Workplace Work Environment Ergonomics Scale for Nurses (WWEEN).

Demographic Characteristics Form

The form contains a total of 10 questions regarding the demographic characteristics of nurses, such as gender, age, educational status, marital status, duration of working at the workplace, total duration of working in the profession, working pattern, weekly working hours, position at the workplace, and the department they work in.

Workplace Work Environment Ergonomics Scale for Nurses (WWEEN):The 40-item item pool for the workplace work environment ergonomics scale draft was developed by researchers by scanning the literature based on the requirements of Law No. 6331 on Occupational Health and Safety, which was accepted in our country in 2012, and conceptual studies conducted in the literature in recent years, aiming to evaluate the activities performed for ergonomic occupational health and safety of working nurses (Apple & Letvak, 2021; Mokarami et al., 2021; Polat, Boz, Çetindere, & Duran, 2021; Zakerian, Afzalinejhad, Mahmodi, & Sheibani, 2021). The scale, designed in a Likert type ranging from "1" strongly agree to "5" strongly disagree, consists of 5 subheadings: "Environmental Ergonomic Risks" with 6 items, "Work Area Ergonomic Risks" with 14 items, "Cognitive Ergonomic Risks" with 5 items, "Ergonomic Risks Related to Medical Devices" with 10 items, and "Occupational Health and Safety" with 5 items. In the sub-dimensions of the scale, cognitive ergonomic risk factors (items 23, 24, 25) and environmental ergonomic risk factors (item 1) are reverse items. Reverse items are coded as 1→5; 2→4; 3→3; 4→2; 5→1. Opinions were obtained from 10 experts, consisting of academicians and clinician nurses working in the

field, for this item pool. Using the Lawshe technique, experts were asked to indicate their opinions on the items in the scale according to a three-point rating as "(a) Appropriate", "(b) Appropriate but needs revision", and "(c) Not Appropriate" (Lawshe, 1975; Yeşilyurt & Çapraz, 2018). Additionally, they were asked to write their opinions and suggestions for each item clearly. The content validity index (CVI) for each item was calculated by dividing the number of experts who marked the "a" option by the number of experts who provided opinions for the item (Karakoç & Dönmez, 2014; Şencan, 2005). It was decided to remove items with a content validity ratio (CVR) value below 0.50 from the scale (Lawshe, 1975). After making adjustments to the items in line with the suggestions from the experts, the draft scale was reduced to 32 items.

Data Analysis

The research data were analyzed using SPSS (Statistical Package for Social Sciences) for Windows Version 25.0 (SPSS Inc. Chicago, IL, USA) and AMOS software. To establish the construct validity of the scale, Exploratory Factor Analysis (EFA) was carried out. EFA was conducted utilizing principal components analysis and varimax methods to investigate the scale's factor structure. The data's suitability for factor analysis was assessed with the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity. Item-total correlation coefficients were recalculated to evaluate the acquired data. For reliability, Cronbach's alpha coefficient was computed. Confirmatory Factor Analysis (CFA) was employed to validate the sub-dimensions uncovered by EFA.

RESULTS

Results on Content Validity Based on Expert Opinions

Utilizing Lawshe's technique, the content validity ratio was calculated based on the opinions of 10 experts. The content validity index is calculated by dividing the number of experts who marked the obligatory option for each item by the total number of experts (Lawshe,1975; Gilbert, 2016). The acceptable content validity ratio for each item was determined to be 0.62, and it was decided to remove 8 items from the scale that were below this value (Costello et al; Lawshe, 1975). The content validity ratios of the remaining items were calculated to be 0.91. Following the recommendations of the experts, revisions were made to the items, and the draft scale was composed of 32 items.

Results on Surface Validity Related to the Pilot Study

Following the analysis of the pilot study conducted with 40 students, the Cronbach's alpha value was found to be considerably high, at 0.901. It was determined that all items in the draft scale were understandable through the pilot study.

Results Related to Participants

The research was conducted in two stages. In the first stage, 73.9% of the participants were female, 77.3% were graduates, 57.9% were married, 40.8% had been working for 1 to 5 years, 59.4% were daytime shift workers, and 49.6% were working in the service. In the second stage, 73.3% of the participants were female, 77.5% were graduates, 58.4% were married, 40.7% had been working for 1 to 5 years, 44.7% were daytime shift workers, and 49.8% were working in the service.

Results on Validity and Reliability Analysis

As seen in Table 2, the Workplace Ergonomics Scale for Nurses consists of 5 subdimensions. An exploratory factor analysis (EFA) was conducted to reveal the factor pattern of the scale. Before conducting the EFA, the Kaiser-Meyer-Olkin (KMO) test was applied to evaluate the adequacy of the sample size. The analysis revealed that the KMO value was 0.890. In accordance with this finding, it was concluded that the sample size was adequate for conducting factor analysis (Büyüköztürk, 2018). Moreover, when examining the results of the Bartlett sphericity test, it was found that the obtained chi-square value was appropriate ($x2(378) = 11043.896$; $p=0.000$). In this regard, it was accepted that the data came from a multivariate normal distribution.

After confirming the suitability of the data for factor analysis, EFA was conducted using the principal components analysis (PCA) and Varimax rotation method to examine the factor structure of the scale.

The construct validity of the 32-item Workplace Ergonomics Scale for Nurses used in the study was calculated using EFA. Four items with factor loadings below 0.30 were removed from the scale (Costello et al., 2005). Additionally, it was observed that the scale consists of 5 subdimensions.

Table 1. Demographic characteristics

	Data Set 1		Data Set 2	
Gender	**n (387)**	**%**	**n (329)**	**%**
Female	286	73.9	241	73.3
Male	101	26.1	88	26.7
Educational Level				
High School	21	5.5	20	5.9
Associate's Degree	23	5.9	16	4.9
Bachelor's Degree	299	77.3	255	77.5
Graduate Degree (Master/PhD	44	11.4	38	11.7
Marital Status				
Not specified	37	9.6	33	10
Married	224	57.9	192	58.4
Single	126	32.6	104	31.6
Lenght ofEmployment				
Less than 1 year	59	15.3	53	16.1
1-5 years	158	40.8	134	40.7
6-10 years	77	19.9	65	19.8
11-15 years	67	17.3	59	17.9
16 years and above	23	5.9	15	4.6
Employment Type				
40 hours or less	65	16.8	130	38.6
40-48 hours	230	59.4	147	44.7
More than 48 hours	89	23	52	15.8
Work Unit				
Ward	192	49.6	164	49.8
Intensive Care Unit (ICU)	51	13.2	46	14
Emergency Department	65	16.8	58	17.6
Operating Room	6	1.6	6	1.8
Outpatient Clinic	39	10.1	27	8.2
Other	34	8.8	28	8.5

The first subdimension, "work area ergonomic risk factors (F1)," consists of 9 items. The factor loadings of the items are distributed between 0.846 and 0.745. The second subdimension, "occupational health and safety (F2)," consists of 5 items, and the factor loadings of the items vary between 0.968 and 0.935. The third subdimension, "medical equipment-related factors (F3)," has factor loadings ranging between 0.854 and 0.824 and consists of 5 items. The fourth subdimension, "cognitive ergonomic risk factors (F4)," consists of 3 items, with factor loadings ranging between 0.984 and 0.981. The fifth subdimension, "environmental ergonomic risk factors (F5)," consists of 6 items, and the factor loadings of the items vary between 0.747 and 0.443.

As seen in Table 3, the explained variance of the scale was calculated to be 77.804% and the eigenvalue was found to be 10.679 as a result of the analyses. Additionally, the total Cronbach's alpha value of the scale was determined to be 0.922.

As seen in Figure 1, the scale consists of five sub-dimensions according to the results of the confirmatory factor analysis.Based on the confirmatory factor analysis, the structural equation modeling results of the scale were found to be significant at the $p \leq 0.001$ level, and all items and the multifactorial scale structure were related. When looking at the goodness of fit indices for the Nurses' Workplace Ergonomics Scale; it was determined to show acceptable fit with $\chi 2 = 3.866$, RMSEA = 0.078, and CFI = 0.922 ($p \leq 0.001$).

Table 2: Results of exploratory factor analysis of study participants

Scale Items	Workplace Ergonomic Risk Factors	Occupational Health and Safety	Medical Device-Related Factors	Cognitive Ergonomic Risk Factors	Environmental Ergonomic Risk Factors
Item1	0.846				
Item2	0.839				
Item3	0.835				
Item4	0.818				
Item5	0.818				
Item6	0.791				
Item7	0.765				
Item8	0.753				
Item9	0.745				
Item10		0.968			
Item11		0.964			
Item12		0.962			
Item13		0.958			
Item14		0.935			
Item15			0.854		
Item16			0.849		
Item17			0.847		
Item18			0.840		
Item19			0.824		
Item20				0.984	
Item21				0.982	
Item22				0.981	
Item23					0.747
Item24					0.733
Item25					0.724
Item26					0.707
Item27					0.522
Item28					0.443

Table 3: Variance analysis and reliability results

Factors	Variance (%)	Eigenvalue (λ)	Cronbach's Alpha (α)
Workplace Ergonomic Risk Factors	24.320	10.679	0.821
Occupational Health and Safety	17.321	4.427	0.945
Medical Device-Related Factors	14.653	2.921	0.693
Cognitive Ergonomic Risk Factors	10.793	2.007	0.946
Environmental Ergonomic Risk Factors	10.716	1.751	0.905
Total Explained Variance	77.804	21.785	0.922

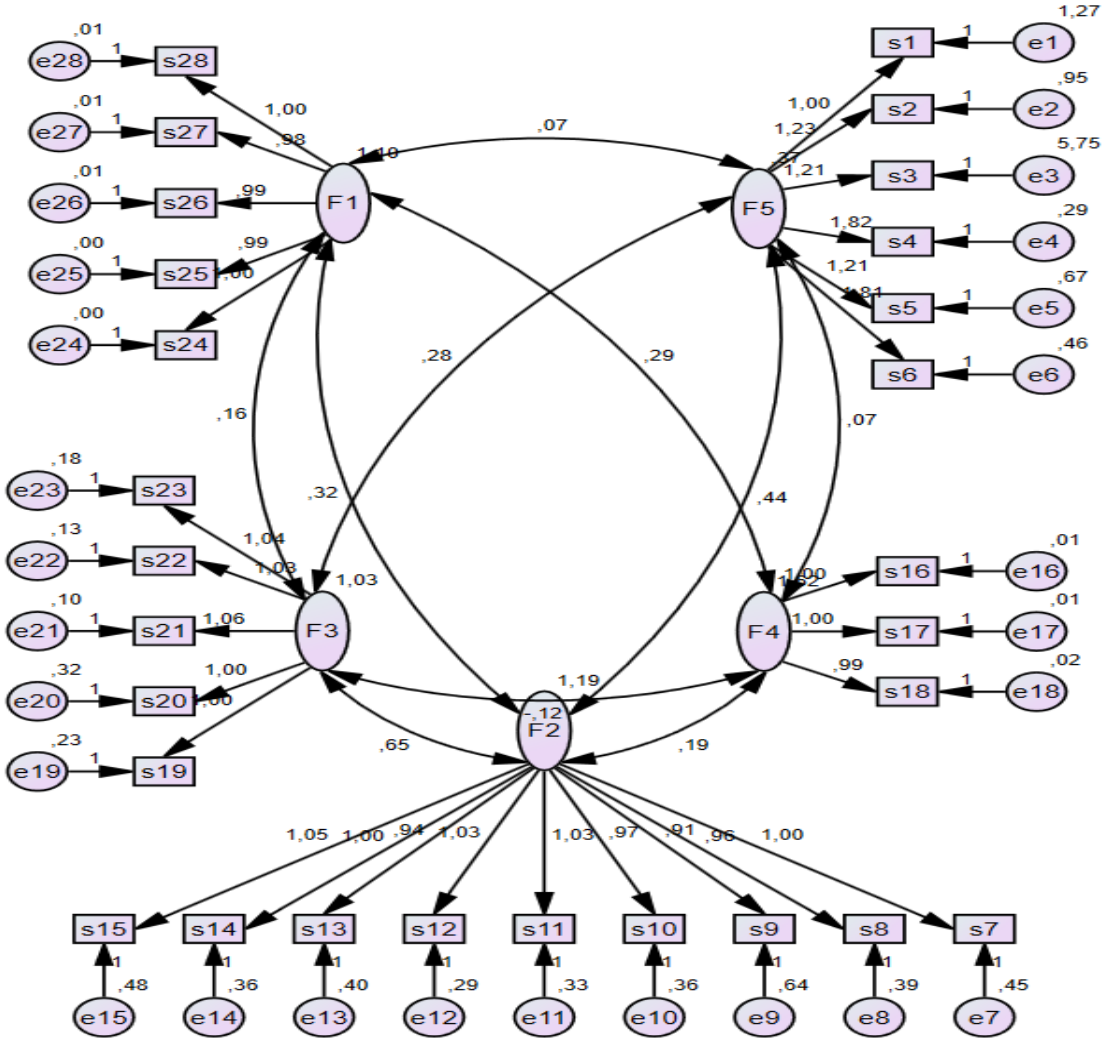

Figure 1. Scale path diagram

DISCUSSION

This study was developed to evaluate workplace ergonomics for nurses. Similar studies in the literature are very limited (ALHazim et al., 2022; Apple & Letvak, 2021; Mokarami et al., 2021; Polat et al., 2021; Webster & Weller, 2021; Yilmaz & Isik Andsoy, 2022). Moreover, there is no measuring tool to evaluate the work environment of nurses. This developed scale meets expectations in terms of filling the gap in the literature and guiding further studies.

The Nurses' Workplace Ergonomics Scale consists of 28 items and is formed from 5 sub-dimensions. These 5 sub-dimensions are "work area ergonomic risk factors (F1)", "occupational health and safety (F2)", "medical equipment-related factors (F3)", "cognitive ergonomic risk factors (F4)", and "environmental ergonomic risk factors (F5)". The Cronbach's alpha values, which are measures of internal consistency for the sub-dimensions of the scale, were calculated as follows: 0.821 for "work area ergonomic risk factors (F1)", 0.945 for "occupational health and safety (F2)", 0.946 for "medical equipment-related factors (F3)", 0.802 for "cognitive ergonomic risk factors (F4)", and 0.905 for "environmental ergonomic risk factors (F5)". The total Cronbach's alpha for the entire Nurses' Workplace Ergonomics Scale was found to be a very high 0.922, indicating a strong degree of reliability and internal consistency.The scale sub-dimensions are consistent with each other. In his study, Kılıç stated that a Cronbach's alpha value between 0.810 and 1.000 indicates high reliability, and between 0.610 and 0.800 indicates moderate reliability (Kılıç, 2016). In this study, F1, F2, F4, and F5 dimensions have high reliability, and F3 dimension has moderate reliability. Additionally, the total

score of the scale can be considered to have high reliability.

In this study, it was found that there are 5 components with eigenvalues over 1 after the factor analysis of the 28-item scale. It is considered sufficient for the explained total variance to be between 40-60%. An explained variance between 50-75% indicates that the analysis is valid and robust. In this study, the contribution of the components to the total variance is 77.804%, which indicates that the scale is valid and robust. When looking at the contributions of the sub-dimensions of the developed scale to the total variance, it was seen that the "work area ergonomic risk factors sub-dimension" contributed 24.320%, "occupational health and safety sub-dimension" contributed 17.321%, "medical equipment-related factors sub-dimension" contributed 14.653%, "cognitive ergonomic risk factors sub-dimension" contributed 10.793%, and "environmental risk factors sub-dimension" contributed 10.716%.

In the research, confirmatory factor analysis, one of the structural equation models (SEM), is used to confirm the explanatory factor analysis and to provide some fit indices for the suitability of the data obtained for the developed model. SEM is a multivariate analysis method that calculates the difference between the observed and latent matrix based on a specific theory. After applying the confirmatory factor analysis model, goodness of fit values are interpreted as acceptable and excellent fit values. Some modifications can be applied to the model to achieve these goodness of fit values. In this study, the $\chi 2/df$ ratio of the scale in the DFA analysis being below 3 indicates that the scale has excellent fit, and between 3 and 5 indicates that it has acceptable fit (Harrington, 2009). The $\chi 2/df$ ratio of the developed scale is 3.86, which indicates acceptable fit.

The comparative fit index (CFI), like the chi-square value, is sensitive to sampling. However, it is less affected by sample size compared to other indices and chi-square. The main purpose of the index is to compare the fit function of the customized model with the fit function obtained from another model taken as the basis. A CFI of 0. 95 and above is considered an excellent fit index, while 0.85 and above is considered a good fit value. In this study, the CFI value was calculated as 0.922, indicating a good fit.

The root mean square error of approximation (RMSEA) has a different calculation system than other goodness of fit values. With values ranging from 0 to 1, RMSEA indicates a minimum error between observed and generated matrices as it approaches zero. This value, which is highly sensitive to sample size, shows weak fit for 0.10 and above, acceptable fit for between 0.06 and 0.08, and good fit for 0.05 and below (Seçer, 2013). The RMSEA value of this scale was 0.078, indicating good fit

After the modifications made on the scale, most of the goodness of fit values obtained were in the good fit value ranges, while some were in the acceptable value ranges. According to the output of the DFA modeling, it was confirmed that the sub-dimensions and items of the model were significant.

Conclusion

In light of the conducted research, the successful development of the "Nurses' Workplace Ergonomics Scale" stands out as a key finding. The validity and reliability of this tool, coupled with strong internal consistency amongst its items, highlight its potential as a quantitative measure of the ergonomic landscape in nursing workplaces. Further, its encapsulation of five distinct sub-dimensions illuminates various facets of workplace ergonomics, offering a nuanced understanding that can inform future improvements in the sector. This study's pivotal contribution to healthcare management lies in its provision of a mechanism for in-depth exploration of ergonomic challenges present in nursing environments. By encompassing a broad spectrum of factors – including work area ergonomic risk factors, occupational health and safety concerns, the role of medical equipment, cognitive ergonomic risks, and environmental ergonomic factors – this scale provides a comprehensive lens through which to view and assess nursing workspaces. Furthermore, the role of the "Nurses' Workplace Ergonomics Scale" extends beyond mere assessment. It serves as a roadmap for implementing targeted interventions and proactive measures, aimed at mitigating chronic ergonomic issues and enhancing the health, productivity, and satisfaction of the nursing workforce.

In conclusion, the "Nurses' Workplace Ergonomics Scale" represents a significant milestone in healthcare research, offering a scientifically robust instrument for improving both

nursing workplaces and, ultimately, patient care outcomes. As its application spreads across diverse nursing environments, it is anticipated to become a cornerstone in the ongoing quest for healthier, more ergonomic, and effective healthcare settings.

Ethical Aspects of the Research

Before initiating the study, ethical clearance was granted from the Non-Interventional Clinical Research Ethics Committee at Artvin Coruh University (Approval Date: 21.06.2022, Approval Number: E-18457941-050.99-52839). Subsequent to obtaining ethical approval, we procured institutional authorization from Gaziantep University Sahinbey Research and Application Hospital (Approval Date: 01.07.2022, Approval Number: 53892) for conducting the research. Participating nurses were thoroughly informed regarding the research purpose and data collection methodology, and their explicit written consent was obtained. The study's entirety was conducted while steadfastly adhering to the principles enshrined in the Declaration of Helsinki.

Declaration of Conflicting Interests

All authors declare no conflicts of interest.

Funding

The author(s) received no financial supportfor the research, authorship and/or publication ofthis article.

Author Contributions

Study Design, SB and AA; DataCollection, SB; Data Interpretation, SBandED; Manuscript Preparation, SB and ED; Literature Search, SB and AA. All authors haveread and agreed to the published version of themanuscript.

Acknowledment

The researcher would like to thank to who help in the collection of data.

REFERENCES

Hazim, S.S., Al-Otaibi, S.T., & Herzallah, N.H. (2022). Knowledge, Attitudes, and Practices Regarding Ergonomic Hazards Among Healthcare Workers in a Saudi Government Hospital. *Journal of Multidisciplinary Healthcare*, 1771-1778.

Apple, B., & Letvak, S. (2021). Ergonomic Challenges in the Perioperative Setting. *AORN Journal*, 113(4), 339-348.

Harrington, D. (2009). *Confirmatory Factor Analysis*. Oxford University Press.

Costello, A.B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical assessment, research, and evaluation*, 10(1), 7.

Karakoç, A.G.D.F.Y., & Dönmez, L. (2014). Fundamental Principles in Scale Development Studies. *World of Medical Education*, 13(40), 39-49.

Kılıç, S. (2016). *Cronbach's Alpha Reliability Coefficient.* Journal of Mood Disorders.

Lawshe, C.H. (1975). A Quantitative Approach to Content Validity. *Personnel Psychology*, 28(4), 563-575.

Mokarami, H., Eskandari, S., Cousins, R., Salesi, M., Kazemi, R., Razeghi, M., & Choobineh, A. (2021). Development and Validation of a Nurse Station Ergonomics Assessment (NSEA) Tool. *BMC Nursing*, 20(1), 1-12.

Nguyen, T.T., Nguyen, T.H., Hoang, D.L., Hoang, T.G., & Pham, M. K. (2022). Effectiveness of Interventions to Prevent Musculoskeletal Disorders Among District Hospital Nurses in Vietnam. *BioMed Research International*, 2022.

Polat, F., Boz, D., Çetindere, F.A., & Duran, C. (2021). *Workplace Ergonomics Scale*.

Seçer, İ. (2013). P*ractical Data Analysis with SPSS and LISREL*: Analysis and Reporting.

Soler-Font, M., Ramada, J. M., van Zon, S. K., Almansa, J., Bültmann, U., Serra, C., & ISR Team (2019). Multifaceted Intervention for the Prevention and Management of Musculoskeletal Pain in Nursing Staff: Results of a Cluster Randomized Controlled Trial. *PLoS One*, 14(11), e0225198.

Şeker, H., & Gençdoğan, B. (2014). *Development of Psychology and Measurement Tool in Education*. Istanbul: Nobel Publishing.

Şencan, H. (2005). *Reliability and Validity in Social and Behavioral Measurements.* Ankara: Seçkin Publishing.

Webster, C.S., & Weller, J.M. (2021). Data Visualization and Cognitive Ergonomics in Anaesthesia and Healthcare. *British Journal of Anaesthesia*, 126(5), 913-915.

Westergren, E., Ludvigsen, M. S., & Lindberg, M. (2020). Associations Between Materials Used and Work-Related Musculoskeletal Hand Complaints Among Haemodialysis Nurses. *Journal of Renal Care*, 46(3), 185-192.

Yaşlıoğlu, M. M. (2017). Factor Analysis and Validity in Social Sciences: The Usage of Exploratory and Confirmatory Factor Analysis. *İstanbul University Business Faculty Journal*, 46, 74-85.

Yeşilyurt, S., & Çapraz, C. (2018). A Road Map for the Content Validity Used in Scale Development Studies. Erzincan University *Journal of Education Faculty*, 20(1), 251-264.

Yilmaz, T., & Isik Andsoy, I. (2022). Musculoskeletal System Disorders Among Surgical Nurses Related to the Health Industry in Northwestern Turkey: A Cross-Sectional Study. *International Journal of Occupational Safety and Ergonomics*, 28(4), 2119-2124.

Zakerian, S. A., Afzalinejhad, M., Mahmodi, M., & Sheibani, N. (2021). Determining the Efficiency of Ergonomic Belt During Patient Handling and its Effect on Reducing Musculoskeletal Disorders in Nurses. *SAGE Open Nursing*, 7, 23779608211057939.