

Development of the Attitude Scale for Wasteful Behaviors Towards Nurses and Examination of Its Psychometric Properties

Hemşirelere Yönelik Savurgan Davranışlar Tutum Ölçeğinin Geliştirilmesi ve Psikometrik Özelliklerinin İncelenmesi

Seda Tuğba BAYKARA MAT¹
Ülkü BAYKAL²



¹Department of Nursing, İstanbul Beykent University, Faculty of Health Science, İstanbul, Türkiye
²Department of Nursing, İstanbul AREL University, Faculty of Health Science, İstanbul, Türkiye



ABSTRACT

Objective: This study aims to develop the "Nurses' Wasteful Behaviors Attitude Scale" as a new measurement tool to evaluate the attitudes of nurses' wasteful behaviors.

Methods: In the final phase of this three-phase study, a comprehensive literature review was conducted to create a new item pool of 52 items to minimize potential biases in the scale items and to communicate effectively with nursing professionals. Following the content validity results, a 50-item scale draft was obtained. Data were obtained online from 500 nurses between February and September 2023.

Results: The content validity index of the scale stands at 0.96. Following the exploratory factor analysis, it was determined that the scale comprises 30 items distributed across five sub-dimensions, which collectively account for 58.17% of the total variance. Moreover, the Cronbach's alpha coefficient yielded a value of .93.

Conclusion: The scale has high internal consistency, time invariance, and high fit indices. This scale can help take initiatives to prevent wasteful behaviors in the hospitals and ensure sustainability.

Keywords: Attitude Scale, Wasteful Behaviors, Nurses, Psychometric Properties, Scale Development

ÖZ

Amaç: Bu çalışma, hemşirelerin savurgan davranışlarına yönelik tutumlarını değerlendirmek amacıyla yeni bir ölçüm aracı olarak Hemşirelere Yönelik Savurgan Davranışlar Tutum Ölçeğinin geliştirilmesini amaçlamaktadır.

Yöntemler: Üç fazdan oluşan bu çalışmanın, son aşamasında, kapsamlı bir literatür taraması yapılarak, ölçek maddelerindeki olası yanlışlıkları en aza indirmek ve hemşirelik profesyonelleriyle etkili bir şekilde iletişim kurmak için 52 maddeden oluşan yeni bir madde havuzu oluşturuldu. Kapsam geçerliliği sonuçlarının ardından 50 maddelik ölçek taslağı elde edildi. Şubat-Eylül 2023 tarihleri arasında 500 hemşireden online olarak veri elde edildi.

Bulgular: Ölçeğin kapsam geçerlik indeksi 0,96'dır. Açımlayıcı faktör analizi sonucunda ölçeğin beş alt boyuta dağılmış 30 maddeden oluştuğu ve bunların toplam varyansın %58,17'sini açıkladığı belirlenmiştir. Ayrıca Cronbach alfa katsayısı .93 değerini vermiştir.

Sonuç: Ölçek yüksek iç tutarlılığa, zamanla değişmezliğe ve yüksek uyum indekslerine sahiptir. Bu ölçek, hastanelerde savurgan davranışlarının önlenmesine ve sürdürülebilirliğin sağlanmasına yönelik girişimlerde bulunulmasına yardımcı olabilir.

Anahtar Kelimeler: Tutum Ölçeği, Savurgan Davranışlar, Hemşireler, Psikometrik Özellikler, Ölçek Geliştirme

Geliş Tarihi/Received 08.03.2024
Revizyon Talebi/Revision Requested 04.09.2024
Son Revizyon/Last Revision 10.09.2024
Kabul Tarihi/Accepted 13.10.2024
Yayın Tarihi/Publication Date 14.11.2024

Sorumlu Yazar/Corresponding author:
Seda Tuğba Baykara Mat
E-mail: matsedatugba@gmail.com

Cite this article: Baykara Mat S, Baykal U. Development of the Attitude Scale for Wasteful Behaviors Towards Nurses and Examination of Its Psychometric Properties. *J Nursology*. doi: 10.17049/jnursology.1447799



Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

INTRODUCTION

Today, it is observed that health expenditures are increasing in all countries. According to the Organization for Economic Cooperation and Development (OECD) data, this increase is higher than the countries' economic growth rates.¹ Therefore, the increase in health expenditures becomes a pressure factor in countries' budgets.² The study published by the OECD revealed that 20 percent of health expenditures do not contribute to health and are spent due to wasteful behaviors.¹

Wasteful behaviors represent a significant challenge within the healthcare expenditures, posing formidable obstacles to their eradication. The *Turkey Waste Report* published in 2021 states that eliminating wasteful behaviors will open the door to new investments. The report refers to preventing wasteful behaviors by raising living standards in the country and reducing foreign dependency.³ Similarly, the tenth development plan includes regulations on wasteful behavior, revealing the issue's importance.⁴

The literature indicates that wasteful behaviors, often learned and persistent, increase health resource consumption and hinder efficient, high-quality service delivery.⁵ Such unconscious resource use is a global issue, prevalent in health and other sectors.⁶ Notably, wealthy countries, home to one-fifth of the population, consume a large share of resources, with wasteful behaviors becoming more widespread.⁷ Efficient resource use in hospitals is viewed as a key step in minimizing their environmental impact.⁸

When recent studies on healthcare systems are examined, it is noted that wasteful behaviors are challenging to identify clearly but are deeply entrenched. Similarly, when the health expenditures of the European Union countries are examined, it is revealed that wastefulness is \$760 and \$935 billion.⁹ By nature, hospitals strive to be cost-effective and efficient while providing high-quality services. However, the cost of providing healthcare services on a global scale is increasing.¹⁰

In a report published in September 2021 by *Health Care Without Harm*, the healthcare sector was likened to the fifth largest country on the planet in terms of carbon emissions when disposable materials and medical waste are considered. In the same report, it is estimated that the negative impacts of healthcare services will nearly triple by 2050. The report, which reveals the global impacts of health expenditures, states that it is imperative to explore different ways of delivering health care services.¹¹ Similarly, it is stated that hospitals constitute the highest proportion,

with a share of 49.5% among the health institutions used to purchase health products and services.¹²

Health expenditures contribute to negative local and global impacts. Raising health professionals' awareness of wasteful behaviors is essential in addressing this issue.¹³ Recently, lean management practices have been introduced to reduce unnecessary and repetitive procedures.¹⁴ However, understanding attitudes toward waste is necessary before implementing these techniques.¹⁵ Nurses are crucial for resource efficiency, waste reduction, and hospital effectiveness, making their awareness and leadership vital for healthcare sustainability.

When the literature on the subject is examined, although evidence of wasteful behaviors has been documented, no measurement tool will reveal what wasteful attitudes and behaviors are, how to eliminate them, and the attitudes of nurses toward wasteful behaviors in hospitals.¹⁶

AIM

This study was developed for nurses working in hospitals to determine their attitudes toward wasteful behaviors.

Research Question

The study aimed to address the question,

- Is the NWBAS a valid and reliable measurement tool for assessing wasteful behaviors among nurses?

METHODS

Design

This methodological study aimed to develop a new instrument tool, the Nurses Wasteful Behaviors Attitude Scale (NWBAS), to assess nurses' attitudes toward wasteful behaviors. The stages of the study are detailed in Figure 1.

Place and Time of the Study: It was conducted between December 2021 and September 2023 with nurses working in hospitals in Istanbul.

Population and Sample of the Study: The study population consisted of nurses employed in the specified hospitals during the period of 2021-2023. The individual-item ratio was considered when calculating the sample size.^{17,18} Based on this ratio, a sample size equivalent to 5-20 times the number of items was established. Without any sampling method, 500 nurses who volunteered to participate in the study and completed the research form completely participated in the study.

Different sample groups were studied at each stage of the study to increase the evidential value of the results. The 50-

item scale draft was applied to 20 nurses during the pilot study. In the validity and reliability phase of the scale, the EFA, CFA, and internal consistency phases were completed with 250 and 250 nurses, and the test-retest phase was completed with 30 nurses.

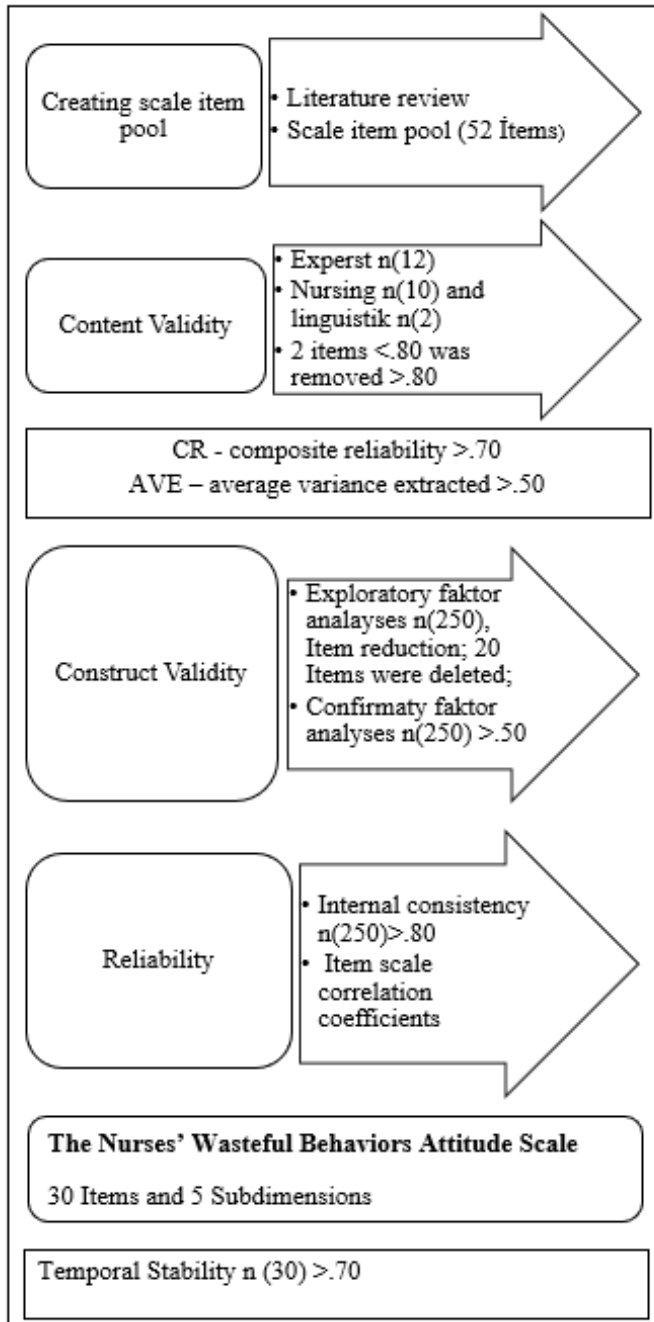


Figure 1: Stages of developing “The Nurses’ Wasteful Behaviors Attitude Scale”

Working group

The personal and professional characteristics of the nurses in the quantitative phase of the study are as follows: The majority of participants were female (74.8%), with approximately half of them being married (55.0%) and

holding a licence degree (70.2%). Analysis of the participants' mean age revealed that 19.4% were aged 30 or below, 45.8% were between 31 and 40 years old, and 34.8% were over 40 years old. A significant proportion of participants (42.7%) were employed at the university hospital, with 80.2% working as service nurses. Additionally, participants' socio-economic levels were predominantly categorized as medium (43.7%) and low (38.0%).

Data Collection Tools: In data collection, “*Personal Information Form*” and “*NWBAS*” draft were used.

Personal Information Form: In this form, answers were sought to 7 questions questioning the age, gender, marital status, socio-economic level, education level, institution, and position of the participants.

Nurses Wasteful Behaviors Attitude Scale (NWBAS) Draft: In the scale study, which was developed by Mat in 2020 and created in his doctoral dissertation, the scale item pool was created in line with the data of individual in-depth interviews conducted with 60 healthcare professionals for at least 40 minutes. The new draft created after expert opinion consists of 52 items.

Creation of item and item pool

The NWBAS was developed through a comprehensive three-phase mixed-methods approach.

Phase 1. A Qualitative Investigation of the Opinions of Healthcare Workers on Waste in Hospitals

Initially, a qualitative inquiry was conducted across three distinct hospital settings to capture diverse viewpoints. This involved conducting in-depth interviews with 60 healthcare professionals employed in a university hospital, a state hospital, and a private hospital between May and September 2019, allowing for a thorough exploration of their attitudes towards wasteful behaviors. The data was used to develop a draft scale measuring wasteful attitudes.

Phase 2. Healthcare Workers on Waste in Hospitals and Development of the Attitude Scale

In the next stage, the draft scale obtained in January-March 2020 was applied to 408 health professionals in the same sample.¹⁹ As a result of exploratory factor analysis, a scale consisting of 5 factors and 24 items was obtained. The results were published as a doctoral thesis study of "A Qualitative Investigation of the Opinions of Healthcare Workers on Waste in Hospitals and Development of the Attitude Scale on Waste" conducted by Mat as a doctoral thesis study in 2020²⁰. In the final stage of the study, the first version of the 24-item scale was created by supporting current literature information.

Phase 3. Development of the Attitude Scale for Wasteful Behaviors Towards Nurses

In the final stage, the new version of the scale, developed with healthcare professionals and focused on the nurse sample, was developed by conducting a comprehensive literature review. The aim was to create an item pool independent of the dominant perspectives of researchers in qualitative research and working with nurses. At the end of the study, the draft, consisting of 52 items, was evaluated by 12 expert opinions. After content validity, a draft scale consisting of 50 items was created. The draft obtained in February-September 2023 was applied to a different sample of 500 people, consisting only of nurses. New ethics committee approval was obtained for the new version of the scale.

Data Collection

After obtaining the necessary permissions, the data collection process was conducted using an online platform, specifically Google Forms. Participants were provided with a survey or interview form that did not contain personal information and measures were taken to ensure their privacy. The link to the form was distributed through email, social media, and other communication channels. Prior to completing the form, participants were informed about the purpose and significance of the research, emphasizing that their participation was voluntary. The form consisted of clear and understandable questions, with instructions provided for accurate responses. Support channels were provided for participants in case of any issues. Throughout the data collection process, the confidentiality and data security of participants were ensured, and measures were taken to comply with relevant legal regulations regarding the protection and processing of personal data. Aside from the participants involved in the test-retest phase, 30 nurses were tasked with physically distributing and collecting questionnaire forms twice, separated by a 2-week interval. Uniqueness was ensured by assigning numbers to the questionnaire forms of the 30 nurses providing the data.

The research was previously presented at a conference under the title "Development and Validation Study of the Attitude Scale Towards Waste in Healthcare Workers." However, based on suggestions indicating that the sample predominantly consisted of nurses, the scale was revised to specifically measure the attitudes of nurses. Consequently, 3 non-nurse healthcare personnel were removed from the sample. This change required the renewal of ethical committee approval.

Statistical Analysis of Data

The data acquired from the study underwent analysis

utilizing SPSS (Statistical Package for Social Sciences) for Windows 22.0 and AMOS 25 software. Descriptive statistics, encompassing numbers, percentages, means, and standard deviations, were employed to scrutinize the demographic characteristics of the participants. Correlations, specifically the Pearson moment correlation, and psychometric tests, including content validity ratio and item-total correlation, were conducted.

To evaluate the content validity of the scale items, the Item-Content Validity Ratio (I-CVR) and Scale-Content Validity Index (S-CVI) were computed, following the categorization proposed by Davis (1992)²⁰. Before delving into reliability and validity assessments, Kurtosis and Skewness values were examined to confirm the normal distribution of scale items.²¹

Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were executed to illuminate the construct validity of the scale. Convergent and discriminant validity were assessed through the calculation of Average Variance Extracted (AVE), Composite Reliability (CR), the square root of AVE, and sub-dimension correlations. Additionally, item analysis and retest analysis, specifically the Intraclass Correlation Coefficient (ICC), were performed.

Construct validity

The scales each target distinct conceptual frameworks, including knowledge, attitude, and behavior. In this research, the construct validity of the scale was assessed through EFA with one sample group (n: 250) and CFA with another sample group (n: 250).²² The suitability of the scale items was determined using the Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett's test. During the EFA phase, items with factor loadings below 0.50 and those loading on multiple dimensions were eliminated from the scale.²³

The Cronbach's alpha coefficient was computed to assess both the item-total correlation coefficient and the internal consistency coefficient of the items across the various dimensions of the scale. During the calculation of the Cronbach's alpha value, 20 items that did not align well with their respective dimensions were excluded.^{24, 25} Additionally, the Comparative Fit Index (CFI) in CFA was utilized to scrutinize the relationships between the dimensions and constructs of the scale draft. Moreover, the convergent and discriminant validity of the scale were assessed.

Ethical considerations

Ethical approval for the final phase was obtained from Istanbul Beykent University Scientific Research for Social and Human Sciences and Publication Ethics Board

(Approval Number: 152, Date: 02/12/2021), and additional approval was obtained after the title revision (Approval Number: 520, Date: 06/03/2024). The ethical clearance encompasses all stages of the study. Participants were provided detailed information about the study's content and provided consent by signing informed consent forms.

RESULTS

Content validity and the pilot scheme

The new draft scale underwent evaluation by 12 experts in the field of nursing management, comprising one professor, two associate professors, seven nurse specialists with doctoral degrees, and two linguists. These experts assessed the scale items' appropriateness, simplicity, clarity, and uniqueness concerning the intended measurement. The content validity index (CVI) was utilized for this assessment, where items were rated on a scale of 1 to 4: 1 = inappropriate, 2 = appropriate but in need of revision, 3 = appropriate but subject to change, and 4 = appropriate. The goal was to achieve a content validity index of at least 0.80, successfully attained in this study with a CVI > 0.80.²⁵ Two items with CVI < 0.80 were removed from the draft scale during the evaluation process, resulting in a final scale comprising 50 items.

Subsequently, the finalized draft scale was distributed to 20 nurses possessing similar socio-demographic characteristics for pilot testing in a virtual environment. These individuals evaluated the scale items in simplicity, clarity, comprehensibility, and originality. Since all participants provided positive feedback during this phase, no changes were necessary for the items.²⁵

Before reliability and validity, the Kurtosis and Skewness values were examined to determine whether the scale items were usually distributed. In the relevant literature, the results of the kurtosis and skewness values of the variables are considered normal distribution when they are between +1.5 and -1.5¹⁸ and +2.0 and -2.0.²⁶ This classification shows a normal distribution.

It was ascertained that the scale items exhibited a normal distribution. To elucidate the construct validity of the scale, exploratory factor analysis was employed. The Barlett test ($P < .001$) revealed a significant relationship among the variables subjected to factor analysis. Following the test ($KMO = 0.892 > 0.60$), it was established that the sample size was adequate for factor analysis.²⁶

Utilizing the varimax method in factor analysis ensured the preservation of the inter-factor relationship structure. Following the factor analysis rotation process, items with low factor loadings and co-loadings were removed, and the

Table 1. Factor Structure

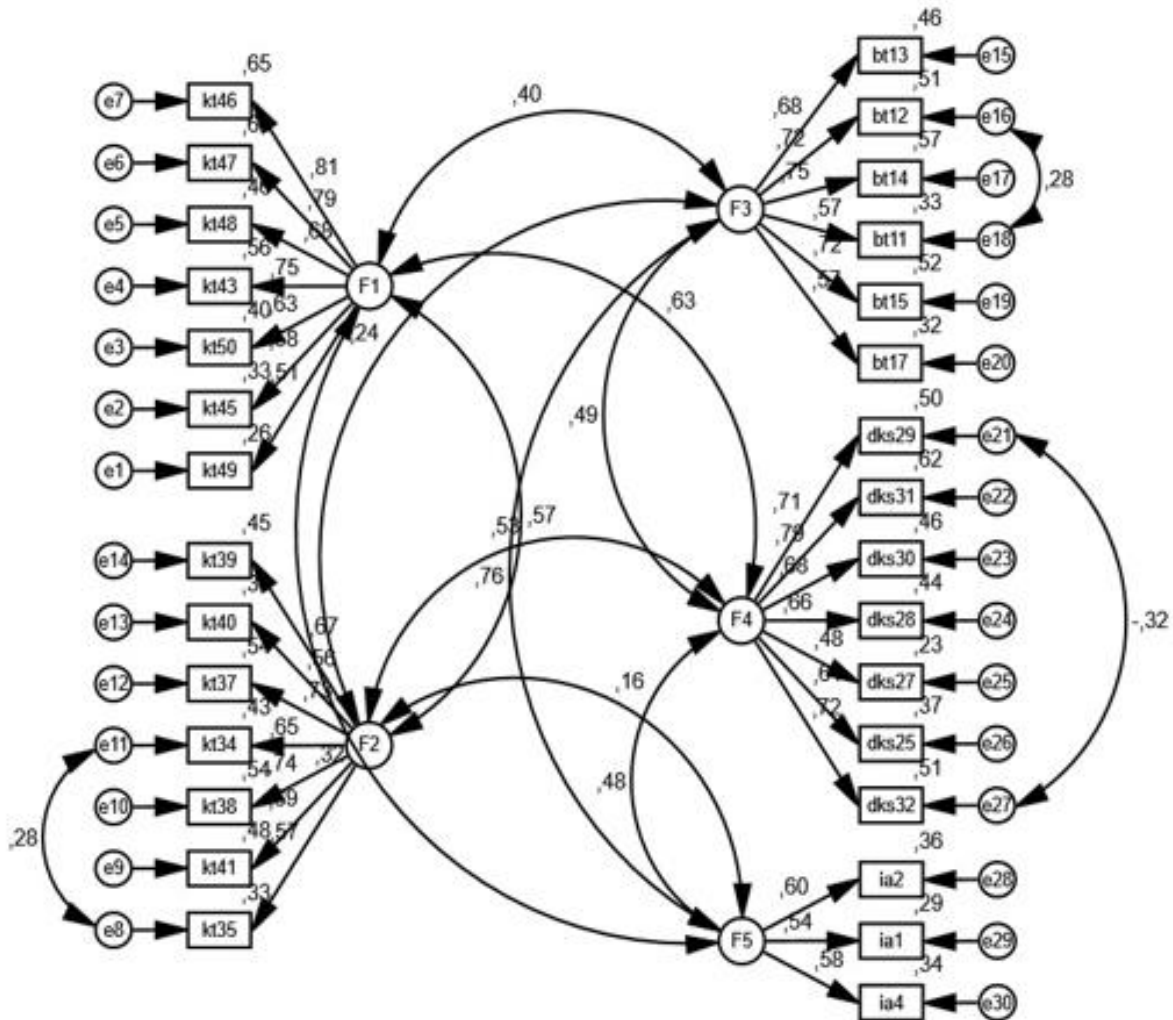
Dimension	Factor Load	Item scale correlation	Item-subscale correlation
Perception of Wastefulness (Eigenvalue=1.272; Explained Variance=7.530; Alpha=0.767)			
Pw2	0.763	0.550	0.579
Pw1	0.717	0.550	0.649
Pw4	0.643	0.606	0.591
Individual attitude (Eigenvalue=2.495; Explained Variance=12.702; Alpha=0.852)			
la40	0.740	0.565	0.542
la34	0.686	0.561	0.697
la37	0.654	0.556	0.655
la41	0.653	0.375	0.648
la39	0.649	0.491	0.587
la38	0.576	0.568	0.617
la35	0.560	0.606	0.565
Use of resources (Eigenvalue=10.552; Explained Variance=13.208; Alpha=0.859)			
Ur47	0.711	0.536	0.727
Ur50	0.689	0.469	0.664
Ur46	0.687	0.487	0.636
Ur48	0.674	0.522	0.613
Ur43	0.673	0.455	0.654
Ur49	0.583	0.596	0.588
Ur45	0.518	0.477	0.554
Non-Value Adding Processes (Eigenvalue=1.660; Explained Variance=12.647; Alpha=0.853)			
Nap13	0.789	0.592	0.725
Nap14	0.762	0.609	0.678
Nap17	0.668	0.672	0.626
Nap12	0.643	0.577	0.575
Nap11	0.635	0.593	0.608
Nap15	0.634	0.583	0.634
Organizational Culture of Wastefulness (Eigenvalue=1.474; Explained Variance=12.091; Alpha=0.832)			
Ocw29	0.716	0.472	0.675
Ocw31	0.680	0.414	0.669
Ocw30	0.671	0.581	0.657
Ocw27	0.666	0.619	0.472
Ocw28	0.587	0.533	0.560
Ocw25	0.487	0.571	0.520
Ocw32	0.450	0.695	0.556
Total Variance = 58.178%; Overall Confidence (Alpha)=0.933			
Pw; Perception of Wastefulness, la; Individual Attitude, Ur; Use of Resources, Nap; Non-Value Adding Processes, Ocw; Organizational Culture of Wastefulness			

rotation process was reiterated. Subsequently, the variables were categorized into five factors, elucidating a total explained variance of 58.178%. The factor structure of the scale is delineated in Table 1.

The explained factors of the scale were named as the perception of wastefulness, individual attitude, use of resources, non-value-adding processes, and organizational

culture towards wastefulness. The factor analysis of the scale was tested with confirmatory factor analysis. The diagram of the confirmatory factor analysis is given in Figure 2.

The study utilized the predominant goodness-of-fit indices found in the literature. Table 2 displays the criteria and values acquired during the confirmatory factor analysis.



ia; Perception of Wastefulness, kt (F2); Individual Attitude, kt (F1); Use of Resources, bt; Non-Value Adding Processes, dks; Organizational Culture of Wastefulness

Figure 2. Diagram of Confirmatory Factor Analysis

The results showed that the fit statistics calculated by confirmatory factor analysis were compatible with the scale's previously determined factor structure at an acceptable level, which was determined before standardized factor loads. The t values are given in Table 3.

When the standardized coefficients were examined, it was determined that factor loadings were high, standard error values were low, and t-values were significant. These results confirm the construct validity of the previously determined factor structure.

Convergent Validity and Divergent Validity

Table 5 shows that the Composite Reliability (CR) values exceed the Average Variance Extracted (AVE) values, with the AVE values surpassing the threshold of 0.5. This observation affirms the convergent validity of the scale. Examining CR and AVE values tests the construct validity of the variables in the measurement model. The AVE is computed by dividing the sum of the squares of the standardized factor loadings by the number of items.²⁷ For convergent validity, CR values about the scale are expected to be greater than AVE values, and the AVE value is expected to be greater than 0.5.²⁷

Table 2. Confirmatory Factor Analysis Index Values

Index	Normal value	Acceptable value	Value
χ^2 / sd	<2	<5	2.07
GFI	>0.95	>0.90	0.90
AGFI	>0.95	>0.90	0.90
CFI	>0.95	>0.90	0.90
RMSEA	<0.05	<0.08	0.08
RMR	<0.05	<0.08	0.06

χ^2 ; Chi-Square test, sd; Standard deviation, GFI; Goodness of Fit Index, AGFI; Adjusted Goodness of Fit Index, CFI; Comparative Fit Index, RMSEA; Root Mean Square Error of Approximation, RMR; Root Mean Square Residual

Table 3. Confirmatory Factor Analysis Factor Loads

Substances	and	Factors	β	Std. β	S.Error	t	P
Ur49	<---	F1	1,000	.512			
Ur45	<---	F1	1.026	.577	.152	6,759	<.001
Ur50	<---	F1	1.108	.634	.155	7,151	<.001
Ur43	<---	F1	1,234	.748	.158	7,796	<.001
Ur48	<---	F1	1.165	.678	.157	7,416	<.001
Ur47	<---	F1	1,210	.794	.151	8,009	<.001
Ur46	<---	F1	1.219	.809	.151	8,074	<.001
Ia35	<---	F2	1,000	.572			
Ia41	<---	F2	1,234	.694	.153	8,087	<.001
Ia38	<---	F2	1,294	.738	.154	8,387	<.001
Ia34	<---	F2	1.222	.654	.132	9,252	<.001
Ia37	<---	F2	1,470	.733	.176	8,351	<.001
Ia40	<---	F2	1,180	.561	.168	7,013	<.001
Ia39	<---	F2	1,311	.672	.165	7,929	<.001
Nap13	<---	F3	1,000	.676			
Nap12	<---	F3	1,045	.717	.109	9,626	<.001
Nap14	<---	F3	1.027	.753	.102	10,033	<.001
Nap11	<---	F3	.954	.572	.122	7,851	<.001
Nap15	<---	F3	1,024	.718	.106	9,663	<.001
Nap17	<---	F3	.771	.570	.097	7,915	<.001
Ocw29	<---	F4	1,000	.710			
Ocw31	<---	F4	.976	.790	.086	11,285	<.001
Ocw30	<---	F4	.745	.676	.076	9,816	<.001
Ocw28	<---	F4	.838	.663	.087	9,634	<.001
Ocw27	<---	F4	.751	.481	.106	7,089	<.001
Ocw25	<---	F4	.865	.612	.097	8,938	<.001
Ocw32	<---	F4	.925	.716	.102	9,078	<.001
Pw2	<---	F5	1,000	.601			
Pw1	<---	F5	.871	.538	.144	6,065	<.001
Pw4	<---	F5	1.106	.582	.174	6,368	<.001

Pw; Perception of Wastefulness, Ia; Individual Attitude, Ur; Use of Resources, Nap; Non-Value Adding Processes, Ocw; Organizational Culture of Wastefulness, β ; Beta, Std. β ; Standardized Beta, S.Error; Standard Error, t; t-test

Reliability

The reliability level of the scale was evaluated with "item analysis" and "internal consistency" approaches. In the analysis phase, the contribution score of each item to the

scale is expected to be >.40. In this study, the score obtained in the range of .80-.1 indicates that the scale has high reliability.²⁸

Table 4. CR and AVE Values

	CR	AVE
Attitude to Wastefulness General	0.822	0.624
Perception of Wastefulness	0.821	0.541
Individual Attitude	0.845	0.588
Use of Resources	0.819	0.622
Non-Value Adding Processes	0.843	0.579
Corporate Culture of Wastefulness	0.823	0.617

CR; Composite Reliability, AVE; Average Variance Extracted

Cronbach's alpha internal consistency coefficient showed internal consistency of the scale. The overall reliability of the scale was found to be high, as Cronbach's Alpha=0.923. The invariance of the measurement over time was evaluated by the test-retest method. During the evaluation, the scale was administered to 30 health workers with similar characteristics to the sample at 15-day intervals.

Table 5. Test-retest measurements

Measurements	Test		Again		n	t	P ^a	ICC ^b	r ^c
	Mean	Sd	Mean	Sd					
Attitude to Wastefulness General	4.267	0.404	4.236	0.401	33	1,328	.194	0.954	.947
Perception of Wastefulness	4.404	0.505	4.384	0.487	33	0.627	.535	0.947	.931
Individual Attitude	4.434	0.469	4.414	0.464	33	0.780	.441	0.958	.949
Use of Resources	4.429	0.509	4.442	0.491	33	-1.000	.325	0.946	.989
Non-Value Adding Processes	4.403	0.539	4.368	0.535	33	1.136	.264	0.955	.947
Corporate Culture of Wastefulness	3.766	0.817	3.762	0.816	33	1,000	.325	0.977	1,000

^aDependent Group T-Test, ^bIntraclass correlation coefficient, ^c Pearson Correlation, Sd: Standard deviation, n; Sample size, r; Pearson Correlation Coefficient, ICC; Intraclass Correlation Coefficient

DISCUSSION

It is important to report and address all dimensions of increased resource use as a result of wasteful behaviors of nurses. Although there are many studies on unnecessary resource use and lean management in healthcare services, there is no scale used to reveal the wasteful behavior of nurses. "Content validity," "item analysis," and "construct validity" were used in the validity analyses of the NWBAS developed in this study.

When evaluating content validity, I-CVI and S-CVI levels of 0.80 were accepted as criteria for content validity.²⁹ In line with the results obtained from the study, it can be said that the statements in the item pool are above the acceptable lower limit (>0.80) and reflect the construct to be measured.

Prior to assessing reliability and validity, Kurtosis and Skewness values were scrutinized to ascertain the normal distribution of the scale items. According to the relevant

Test-retest

The high Intraclass Correlation Coefficient and test-retest correlation indicate the scale's reliability over short periods, with no significant difference in correlation values as seen Table 5 ($P<.05$). Additionally, significant differences ($P<.05$) in scale scores between the bottom 27% and top 27% groups confirm its strong discriminative capability.

Scoring of the Scale

The scale is used by calculating the overall and sub-dimension scores, and the arithmetic mean is taken when calculating the overall and sub-dimensional scores. It is ensured that the score intervals obtained from the scale sub-dimensions and the overall scale are equivalent. Scores obtainable from the scale range between 1 and 5. Higher scale scores and sub-dimensions indicate a stronger inclination towards wasteful behaviors.

literature, Kurtosis and Skewness values within the range of +1.5 to -1.5 and +2.0 to -2.0, respectively, are considered indicative of normal distributions.¹⁸

In this study, item correlation analysis was conducted to identify the items with the highest ability to measure the phenomenon under investigation. This analysis evaluates the relationship between items on the scale and the construct to be measured, allowing for the selection of items with high correlations and the elimination of those with low correlations. This process is crucial for enhancing the validity and reliability of the scale. The general correlations among the 50 items examined ranged from 0.37 to 0.67, consistent with those found in other scales in nursing and healthcare.³⁰ The level of item correlations indicates how well the scale measures the relevant construct and reflects the validity of the items. However, the literature suggests that effective scale development typically requires item correlations to be at least 0.40.¹⁷ In this context, the correlation values obtained in our study

demonstrate that the scale has an excellent capacity to measure the construct and that the selected items provide sufficient accuracy.

The suitability of the dataset generated from the study for factor analysis was assessed. In this stage, the Kaiser-Meyer-Olkin (KMO) coefficient was utilized to determine the adequacy of the sample size, with a threshold of >0.60 considered acceptable. With a KMO value of 0.892 (>0.60), indicating a significant relationship among the variables included in the factor analysis, and a Barlett test result of $P < .001$, signifying the dataset's suitability, it was concluded that it was well-suited for factor analysis.¹⁸

Exploratory factor analysis examines the internal structures of the statements remaining in the item pool and the consistency of their relationships. A low factor loading indicates that the item does not have a strong enough relationship with the factor in question. In this sense, although it is argued that the factor loading value should not be less than 0.30, some theorists argue that this size should be 0.40.¹⁸

The factor rotation method is employed to determine the most suitable scale structure. This study chose the varimax method for factor analysis to ensure consistency in the relationship structure between factors.¹⁸

Following the factor analysis rotation process, items with low factor loadings and co-loading were eliminated, and the rotation process was reiterated³¹.

Consequently, the variables were categorized into five factors, accounting for a total explained variance of 58.178%.

This finding confirms the validity of the scale's factor structure. Upon conducting convergent and discriminant validity analyses, it was observed that the scale's results were consistent with those reported in existing literature.³²

Confirmatory factor analysis is used to test the factor structure of a scale in scale development studies. As a result of this analysis, evaluating the relationship between scale items, error rates, factor loadings, and the alignment of the scale sub-dimensions with the theoretical framework is crucial. Based on these findings, recommendations for enhancing the scale can be proposed.³³

In this study, the goodness-of-fit values resulting from confirmatory factor analysis were determined as $\chi^2/Sd=2.07$, GFI=0.90, CFI=0.90, RMSEA=0.08, and SRMR=0.06.

The fit statistics computed via confirmatory factor analysis

were deemed acceptable in accordance with the previously established factor structure of the scale. Upon examination of the standardized coefficients, it was observed that factor loadings were high, standard error values were low, and t -values were significant, thereby confirming the construct validity of the factor structure.³⁴

In line with the results obtained, it was proved that the five-factor structure of the NWBAS was valid.

Reliability

Various reliability coefficients have been proposed to evaluate the reliability of scales. Increasing the reliability of a measurement tool indicates the possibility of accurate measurement. The reliability values of this scale were examined with Cronbach's alpha internal consistency coefficient and test-retest coefficients.³⁵

When Cronbach's alpha coefficient of a scale or its sub-dimensions is closer to 1, the scale is strong and stable regarding the concept it wants to measure. Studies show that Cronbach's alpha coefficient should be greater than .70. The coefficients obtained for the sub-dimensions in this study are as follows: perception of wastefulness (Alpha=0.767), individual attitude (Alpha=0.852), use of resources (Alpha=0.859), processes that do not add value (Alpha=0.853), and organizational culture towards wastefulness (Alpha=0.832). The Cronbach's alpha coefficient for the entire scale is also reported as 0.933.

NWBAS consists of five dimensions: Perception of wastefulness, individual attitude, resource utilization, non-value-adding processes, and organizational culture of wastefulness. This scale reveals the attitudes and behaviors of nurses working in hospitals toward wasteful behaviors. When the sub-dimensions of the scale are examined one by one, it is seen that the first factor, the perception of wastefulness, consists of three items. This factor is related to the predisposition of health workers towards wasteful behaviors and reflects what wastefulness means to them. The second factor, individual attitude, consists of six items. The items examine the individual attitudes and behaviors of nurses related to their wasteful behavior in the hospital.

The third factor, resource utilization, consists of seven items, reflecting the wasteful behavior encountered in using materials and equipment provided by hospitals. The fourth factor, named non-value-adding processes, consists of seven items. This factor reflects in-hospital processes. The fifth and last factor has been named organizational culture of wastefulness since it reflects the attitude of the relevant organization towards wasteful behaviors.

In this research, the scale's reliability over time was evaluated using the test-retest method. The final version of

the scale was administered to 30 nurses with characteristics similar to the initial sample, with a 2-week interval between administrations. The findings revealed no statistically significant difference between the mean scores obtained from the first and second administrations, indicating a positive, strong, and significant relationship. Moreover, the test-retest reliability coefficients for both the overall scale and its sub-dimensions were found to be above 0.90, indicating a perfect level of reliability.²⁸ Consequently, the NWBAS emerges as a time-stable and reliable instrument, aligning with these outcomes.

Study Limitations

This study carefully followed the steps to develop a valid and reliable scale, but there are some limitations. Since it has been confirmed by Turkish nurses, it can be studied in different cultures to make generalizations.

The NWBAS is a reliable, valid scale designed to assess nurses' attitudes toward wasteful behaviors in hospitals. Comprising 30 items across five subscales; wasteful perception, individual attitude, resource utilization, value added processes, and organizational culture. It aims to enhance awareness of resource efficiency and sustainability and identify behaviors that contribute to waste, aiding in developing more effective processes.

Etik Komite Onayı: Etik kurul onayı Beykent Üniversitesi Yerel Etik Kurulu'ndan (Tarih: 02.12.2021, Sayı: 152) alınmıştır.

Hasta Onamı: Katılımcılardan yazılı bilgilendirilmiş onam formu alınmıştır.

Hakem Değerlendirmesi: Dış bağımsız.

Yazar Katkıları: Fikir- STBM; Tasarım- STBM; Denetleme- UB; Kaynaklar- STBM; Materyaller- STBM, UB; Veri Toplanması ve/veya İşlemesi- STBM; Analiz ve/ veya Yorum- STBM; Literatür Taraması- STBM; Yazıyı Yazan- STBM; Eleştirel İnceleme- UB.

Çıkar Çatışması: Yazarlar, çıkar çatışması olmadığını beyan etmiştir.

Finansal Destek: Yazarlar, bu çalışma için finansal destek almadığını beyan etmiştir.

Ethics Committee Approval: Ethics committee approval was obtained from the Scientific Research for Social and Human Sciences and Publication at Beykent University, Istanbul (Date: 02.12.2021, Number: 152).

Informed Consent: Written informed consent forms were obtained from the participants.

Peer-review: External independent.

Author Contributions: Concept- STBM; Design - STBM; Supervision - UB; Resources - STBM; Materials - STBM, UB; Data Collection and/or Processing - STBM; Analysis and/or Interpretation - STBM; Literature Review - STBM; Writing - STBM; Critical Review - UB.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declare that they received no financial support for this study.

REFERENCES

1. Organisation for Economic Co-Operation and Development (OECD). Health Statistics 2022—Frequently Requested Data. Available from: <https://www.oecd.org/en/topics/policy-issues/the-future-of-health-systems.html>
2. Giray F, Cimen G. Factors determining the change in health expenditures: an analysis of Turkey and OECD countries. *Sayıştay Journal*. 2018;111:143-171. <https://doi.org/10.1234/sayıstay.2018.111>
3. Ministry of Commerce. Türkiye Waste Report. General Directorate of Consumer Protection and Market Surveillance. Available from: <https://ticaret.gov.tr/data/5c51a78e13b8762dc06a72c9/T%C3%BCrkiye%20%C4%B0sraf%20Raporu.pdf>
4. Ministry of Science, I. and T. G. D. of I. National Recycling Strategy Document and Action Plan; 2017. Available from: <https://leap.unep.org/en/countries/tr/national-legislation/national-recycling-strategy-and-action-plan-2014-2017>
5. Behar Villegas E. Wasteful spending cultures: State inefficiency and policy narratives. *Rev. Adm. Pública*. 2021;55:662–678. <https://doi.org/10.1590/0034-761220200647>
6. Karaca PO, Atılğan E, Zekioglu A. An Innovative Application in the Context of Sustainability in Health Services: Green Hospitals. *Ejovoc*. 2018;8(2):77–87. <https://dergipark.org.tr/en/pub/ejovoc/issue/41199/497922>
7. Kaypak Ş. Extravagance and its reflection on nature. *Atlas National Journal of Social Sciences*. 2019; 3(4): 1–16. <https://dergipark.org.tr/en/pub/atlas/issue/55584/760716>
8. Chías P, Abad T. Green hospitals, green healthcare. *IIETA*. 2017;2(2):196–205. <https://www.witpress.com/elibrary/EQ-volumes/2/2/1860>
9. Shrank WH, Rogstad TL, Parekh N. Waste in the US health care system: estimated costs and potential for savings. *JAMA*. 2019;322(15):1501–1509. <https://10.1001/jama.2019.13978>
10. Gurumurthy A, Nair VK, Vinodh S. Application of a hybrid selective inventory control technique in a hospital: a precursor for inventory reduction through lean thinking. *The TQM Journal*. 2021;33(3):568–595. <https://doi.org/10.1108/TQM-06-2020-0123>
11. Annex, A. Global Road Map for Health Care Decarbonization. 2021. Available from: <https://healthclimateaction.org/sites/default/files/2021-06/Health%20Care%20Decarbonization%20Road%20Map%20-%20Annex%20A%20Technical%20report.pdf>
12. Turkish Statistical Institute. Health Spending Statistics. 2020. Available from: <https://data.tuik.gov.tr/Kategori/GetKategori?p=saglik-ve-sosyal-koruma-101&dil=2>
13. Kalogirou MR, Dahlke S, Davidson S, Yamamoto S. Nurses' perspectives on climate change, health and nursing practice.

- J Clin Nurs.* 2020;29(23–24):4759–4768. <https://doi.org/10.1111/jocn.15519>
14. Aij KH, Teunissen M. Lean leadership attributes: a systematic review of the literature. *J Health Organ Manag.* 2017;31(7/8):713–729. <https://doi.org/10.1108/JHOM-12-2016-0245>
 15. Hu H, Fang W, Yu X. Enhancing individual commitment to energy conservation in organizational settings: Identity manipulation for behavioral changes. *Resour Conserv Recycl.* 2020;156:104720. <https://doi.org/10.1016/j.resconrec.2020.104720>
 16. Patey AM, Grimshaw JM, Francis JJ. Changing behaviour, 'more or less': do implementation and de-implementation interventions include different behaviour change techniques? *Implementation Sci.* 2021;16:1–17. <https://doi.org/10.1186/s13012-021-01089-0>
 17. Tabachnick BG, Fidell L. Using multivariate statistics. Boston, MA: Pearson, Education, Inc; 2007. Available from: https://hispl.htmi.ch/pluginfile.php/77114/mod_resource/content/0/Using%20Multivariate%20Statistics%20%28Tabachnick%20and%20Fidell%29.pdf
 18. DeVellis RF. Scale development: Theory and applications (Vol. 26). Sage Publications: Thousand Oaks, CA; 2016.
 19. Baykara Mat ST. Qualitative Examination of Healthcare Professionals' Opinions on Waste and Development of an Attitude Scale on Waste; 2019. Available from: <https://yohed.org.tr/wp-content/uploads/2024/03/3.-ULUSAL-HEMSIRELIKTE-YONETIM-KONGRE-KITABI.pdf>
 20. Davis LL. Instrument review: Getting the most from a panel of experts. *Appl Nurs Res.* 1992;5(4):194–197. [https://doi.org/10.1016/S0897-1897\(05\)80008-4](https://doi.org/10.1016/S0897-1897(05)80008-4)
 21. Yaşlıoğlu MM. Factor analysis and validity in social sciences: Application of exploratory and confirmatory factor analyses. *IBR.* 2017;46(Special issue):74–85. <https://iupress.istanbul.edu.tr/en/journal/ibr/article/sosyal-bilimlerde-faktor-analizi-ve-gecerlilik-kesfedici-ve-dogrulayici-faktor-analizlerinin-kullanilmasi>
 22. Kieffer KM. Orthogonal versus Oblique Factor Rotation: A Review of the Literature regarding the Pros and Cons; 1998
 23. Alavi M, Visentin DC, Thapa DK, Hunt GE, Watson R, Cleary ML. Chi-square for model fit in confirmatory factor analysis; 2020. <https://hdl.handle.net/10779/cqu.16572050.v1>
 24. Schermelleh-Engel K, Moosbrugger H, Müller H. Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online.* 2003;8(2):23–74. https://www.stats.ox.ac.uk/~snijders/mpr_Schermelleh.pdf
 25. Lewis RL, Vasishth S. An activation-based model of sentence processing as skilled memory retrieval. *Cogn Sci.* 2005;29(3):375–419. <https://www.ling.uni-potsdam.de/~vasishth/pdfs/Lewis-VasishthCogSci2005.pdf>
 26. George D, Mallery P. SPSS for Windows step by step: A simple guide and reference. 17th ed. Pearson; 2010. <https://dl.acm.org/doi/abs/10.5555/557542>
 27. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *J Mark Res.* 1981;18(1):39–50. <https://doi.org/10.1177/002224378101800104>
 28. Polit DF, Beck CT. Nursing research: Principles and methods. Lippincott Williams & Wilkins; 2004. Available from: https://books.google.com.tr/books?hl=en&lr=&id=5g6VttYWnjUC&oi=fnd&pg=PA3&dq=28.%09Polit+DF,+Beck+CT.+Nursing+research:+Principles+and+methods.+Lippincott+Williams+%26+Wilkins%3B+2004.+&ots=_1iUwKqpwB&sig=Z3N0T3z-NJ-ABiOi2mL88hzO2r0&redir_esc=y#v=onepage&q=28.%09Polit%20DF%2C%20Beck%20CT.%20Nursing%20research%3A%20Principles%20and%20methods.%20Lippincott%20Williams%20%26%20Wilkins%3B%202004.&f=false
 29. Yeşilyurt S, Çapraz C. A road map for the content validity used in scale development studies. *EUJEF.* 2018;20(1):251–264. <https://doi.org/10.17556/erziefd.297741>
 30. DeVellis RF. Scale development: Theory and applications. 4th ed. Sage Publications; 2017. Available from: https://books.google.com.tr/books?hl=en&lr=&id=QddDEAAQBAJ&oi=fnd&pg=PP13&dq=30.%09DeVellis+RF.+Scale+development:+Theory+and+applications.+4th+ed.+Sage+Publications%3B+2017&ots=OffHFLGbh&sig=g2Hlw_ugizbm8PvPlaYA-C2Z3aA&redir_esc=y#v=onepage&q&f=false
 31. Streiner DL, Norman GR. Health measurement scales: A practical guide to their development and use. 5th ed. Oxford University Press; 2015.
 32. Costello AB, Osborne JW. Best practices in exploratory factor analysis: four recommendations for getting the most from your analysis. *PARE.* 2005;10(7):1–9. https://legacyfileshare.elsevier.com/promis_misc/Best%20practices%20in%20exploratory%20factor%20analysis%20forum%20recommendation.pdf
 33. Johnson RA, Wichern DW. Applied multivariate statistical analysis. 6th ed. Pearson; 2018. https://www.researchgate.net/profile/Jouini-Abdelhafid/post/Can_any_one_explain_me_the_Akaike_Information_Criterion_sensing_based_in_cognitive_radio2/attachment/59d623ec79197b80779823b4/AS%3A309790092267520%401450871121033/download/194866033.pdf
 34. Browne MW, Cudeck R. Alternative ways of assessing model fit. In: Bollen KA, Long JS, editors. Testing structural equation models. Sage Publications; 1993. p.136–162. <https://doi.org/10.1177/0049124192021002005>
 35. Nunnally JC, Bernstein IH. Psychometric Theory. 3rd ed. New York: McGraw-Hill; 1994. <https://journals.sagepub.com/doi/abs/10.1177/014662169501900308>