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Adequacy of Human Resources in Medical Tourism: Scale Development Study

Medikal Turizmde Sağlık İnsan Kaynağı Yeterliliği: Ölçek Geliştirme Çalışması

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Abstract

Aim: This study aims to develop the first validated psychometric scale designed to assess the adequacy of human resources in medical tourism. As a rapidly growing global industry, medical tourism demands competent, communicative, and analytically skilled healthcare professionals. Given its strategic advantages, Türkiye has emerged as a major destination in this field, underscoring the novelty and the necessity of an assessment tool to ensure sustainable service quality.

Method: This methodological study reports analyses of the validity and reliability of the Healthcare Workforce Adequacy Scale (MedToue-HHR). Participants were 347 healthcare personnel working in medical tourism at a public hospital in Konya. This study followed the seven-step framework proposed by DeVellis (2014). The item pool was generated through an integrative literature review and expert interviews, which were analyzed using conventional content analysis. Two coders independently reviewed codes and themes (Cohen's kappa > 0.80). An initial 25-item pool was refined through expert panel review and pilot testing, resulting in a final 17-item scale. Data were collected from 347 healthcare professionals engaged in medical tourism. Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and validity and reliability analyses were conducted. Convergent and discriminant validity were assessed through AVE, CR, and Fornell-Larcker criteria.

Results: EFA revealed a three-factor solution—Communication and Team Competence (CTC), Technical Competence (TC), and Analytical Competence (AC)—explaining 63.2% of the total variance. Factor loadings ranged between 0.436 and 0.861. CFA confirmed this structure with acceptable fit indices: $\chi^2/df = 3.05$, RMSEA = 0.077, SRMR = 0.045, CFI = 0.924, TLI = 0.911. For all constructs, AVE values exceeded 0.50 and CR values surpassed 0.70.

The square roots of the AVEs exceeded the inter-construct correlations, confirming discriminant validity. Cronbach's alpha ranged from 0.819 to 0.895.

Conclusion: The MedTour-HHR Scale represents a theoretically informed, empirically validated instrument for assessing healthcare workforce adequacy in medical tourism. Its three-factor structure has practical implications for healthcare institutions and decision-makers by enabling the identification of skill shortages, supporting the development of training programs, and improving the quality of service delivery in globally competitive environments. Nevertheless, future cross-cultural validation studies are encouraged to further establish the scale's robustness and generalizability.

Keywords: Medical tourism, healthcare workforce, healthcare management.

Öz

Amaç: Bu çalışma, sağlık turizminde insan kaynaklarının yeterliliğini değerlendirmek amacıyla geliştirilecek ilk doğrulanmış psikometrik ölçeği ortaya koymayı amaçlamaktadır.

Yöntem: Bu metodolojik çalışma, "Sağlık Çalışanları Yeterlilik Ölçeği'nin (MedTour-HHR)" geçerlilik ve güvenilirlik analizlerini kapsamaktadır. Katılımcıları, Konya'daki bir kamu hastanesinde tıbbi turizm alanında çalışan 347 sağlık çalışanı oluşturmuştur. Bu metodolojik çalışmada, DeVellis (2014) tarafından önerilen yedi adımlı çerçeve izlenmiştir. Madde havuzu, bütünleştirici bir bilimsel alan taraması ve uzman görüşmeleri yoluyla oluşturulmuş ve geleneksel içerik analizi kullanılarak analiz edilmiştir. Kodlar ve temalar, iki kodlayıcı tarafından bağımsız olarak incelenmiştir (Cohen's Kappa > 0,80). Başlangıçta 25 maddeden oluşan ölçek, uzman paneli incelemesi ve pilot uygulama yoluyla geliştirilerek 17 maddelik son ölçek taslağı oluşturulmuştur. Veriler, tıbbi turizm

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alanında çalışan 347 sağlık çalışanından toplanmıştır. Keşfedici Faktör Analizi (AFA), Doğrulayıcı Faktör Analizi (CFA) ve geçerlilik ve güvenilirlik analizleri gerçekleştirilmiştir. Yakınsak ve ayırıcı geçerlilik, AVE, CR ve Fornell-Larcker ile değerlendirilmiştir.

Bulgular: Yapılan açımlayıcı faktör analizinde, ölçek üç faktörlü bir yapıya sahip olmuş ve toplam varyansın %63.2'sini açıklamıştır. Bu üç faktör sırasıyla; "İletişim ve Ekip Yetkinliği (CTC), Teknik Yetkinlik (TC) ve Analitik Yetkinlik (AC)" olarak adlandırılmıştır. Faktör yükleri 0,436 ile 0,861 arasında değişmektedir. CFA, bu yapıyı kabul edilebilir uyum indeksleriyle doğrulamıştır: χ^2/df = 3,05, RMSEA = 0,077, SRMR = 0,045, CFI = 0,924, TLI = 0,911. AVE değerleri tüm yapılar için 0,50'yi, CR değerleri ise 0,70'i aşmıştır. AVE'lerin karekökleri, yapılar arası korelasyonlardan daha yüksek olup ayırıcı geçerliliği doğrulamıştır. Cronbach alfa katsayısı 0,819 ile 0,895 arasında değişmiştir.

Sonuç: MedTour-HHR Ölçeği, sağlık turizminde sağlık iş gücü yeterliliğini değerlendirmeye yönelik, kuramsal bir temele dayanan ve ampirik olarak doğrulanmış güvenilir bir araçtır. Üç faktörlü yapısı, sağlık kurumları ve karar vericilere beceri eksikliklerini belirleme, eğitim programlarını güçlendirme ve hizmet sunum kalitesini küresel rekabet ortamında artırma konusunda katkılar sunmaktadır. Bununla birlikte, ölçeğin farklı bağlamlarda da geçerliğini ve sağlamlığını ortaya koymak üzere gelecekte kültürlerarası doğrulama çalışmalarının yapılması önerilmektedir.

Anahtar Sözcükler: Medikal turizm, sağlık insan gücü, sağlık yönetimi.

Introduction

Driven by the fundamental human desire for well-being, people have long regarded health as a powerful motivator for travel. As tourism became a significant part of modern life over the past century, health tourism has experienced sustained growth (Ateş and Sunar, 2024). More recently, medical tourism has emerged as a rapidly expanding and increasingly vital global industry, driven by access to advanced medical services, lower costs, expedited treatment, and high- quality care. With globalization and increased access to information, it has evolved into a highly competitive international market. The sustainability of this growth, however, depends not only on infrastructure and pricing but also critically on the adequacy of the healthcare workforce.

Recent studies highlight the need for reliable metrics to evaluate healthcare workforce capacity in international healthcare settings (Turner, 2020; Yu and Ko, 2021). Human resources are not only facilitators of clinical services but also key determinants of patient satisfaction, international accreditation, and operational excellence in cross-border healthcare delivery (Mohammed and Ayub, 2022). Despite this critical role, there remains a scarcity of valid and reliable tools that assess healthcare personnel's readiness for medical tourism environments.

Moreover, the rapid growth of medical tourism has introduced demands that extend beyond technical competence, such as cultural sensitivity, cross-border communication, and team- based interdisciplinary collaboration (Boateng et al., 2020). This study addresses this gap by developing and validating a multidimensional instrument—the MedTour-HHR Scale—aligned with theoretical and empirical standards in psychometric research. Although research has explored the policy implications of medical tourism development in destination countries, no study has directly examined the adequacy of healthcare human resources in this context and, to date, no validated scale specifically measures this adequacy within the field of medical tourism. We hypothesize that the adequacy of the healthcare workforce in medical tourism can be represented by three dimensions: communication and team competence, technical competence, and analytical competence.

Method

Aim and Research Questions: This methodological study aimed to develop and validate the Medical Tourism-Health Human Resources (MedTour-HHR) scale to assess the adequacy of health human resources in medical tourism.
The research sought to answer whether MedTour-HHR is a valid and reliable scale for assessing the human competence of healthcare personnel in medical tourism.

Participants and Setting: The study population comprised healthcare personnel involved in medical tourism at a public hospital. Due to the nature of the research, a convenience sample of healthcare personnel actively engaged in medical tourism at this institution was recruited. This hospital was selected because it has a well-established medical tourism unit and employs a diverse range of healthcare personnel directly involved in cross-border care delivery. While this approach provided access to an appropriate study population, it may introduce selection bias, as the findings primarily reflect the characteristics of personnel from a single institution rather than those of the broader medical tourism workforce.

Data Collection Instruments: Data were collected using two instruments: a Personal Information Form and the MedTour-HHR scale.
This form collected essential demographic and professional characteristics participants', including age, gender, educational background, and professional experience in healthcare.
MedTour-HHR Scale: This form collected essential demographic and professional characteristics of participants, including age, gender, educational background, and professional experience in healthcare. Data for this methodological study were collected using a structured questionnaire developed in line with the multi-stage process recommended by DeVellis (2014). The MedTour-HHR scale was developed following a multi-stage process, as recommended by DeVellis (2014), encompassing both qualitative and quantitative phases. The stages of the scale development process are presented in Figure 1. The final version of the scale consists of 17 items distributed across three distinct dimensions: Communication and Team Competence (CTC), Technical Competence (TC), and Analytical Competence (AC).

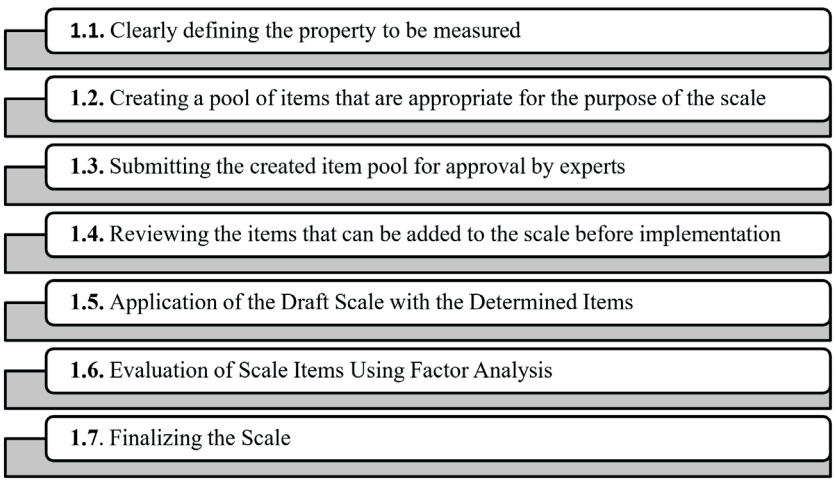


Figure 1. Scale development stages

Data Collection Procedure: Ethical approval for the study was obtained from the Ethics Committee for Non-Interventional Clinical Research at the Faculty of Health Sciences, Selçuk University (Approval Number: 2024/453, dated May 30, 2024) prior to data collection. Data were collected online via Google Forms between June 1 and June 15, 2024. Participants were provided with an informed consent form at the beginning of the survey, and only those who provided explicit consent were included in the study. Of the 459 healthcare personnel invited, 347 completed the survey, yielding a response rate of 75.6%.

Data Analysis: Data analysis for the study was conducted using the JASP 0.19 statistical program. To test the psychometric properties of the Healthcare Workforce Competency Scale in Medical Tourism (MedTour-HHR), several analyses were performed. Sampling adequacy and sphericity were first assessed using KMO and Bartlett's tests. Exploratory factor analysis (EFA) with oblique rotation and parallel analysis were conducted, yielding a three-factor solution. Confirmatory Factor Analysis (CFA) was then performed, showing acceptable fit indices. Reliability was assessed using Cronbach's alpha for the total scale and subscales, while convergent and discriminant validity were examined through AVE, CR, and the Fornell–Larcker criterion. Content validity was ensured through expert review and pilot testing, and descriptive statistics of participant demographics were reported.

Results

Expert opinions and substance development findings: During the initial stage of this research, the content themes for scaling were identified, and inter-coder agreement was measured. The inter-coder agreement measurement indicated that Cohen's kappa exceeded 0.80. A preliminary twenty-five-item scale was developed based on the identified themes. The developed items were assessed for simplicity, generality, and appropriateness based on experts' evaluations. The content validity of the scale items was checked using the Content Validity Index technique, and items with values exceeding 0.80 were included in the scale. Based on expert judgments, the item pool was reorganized and reduced from twenty-five to seventeen items, yielding the final form of the scale.

Preliminary application findings: The 17-item form of the scale was piloted on a sample of 100 healthcare professionals. Items with an item correlation coefficient below 0.50 were excluded from the scale. Based on these criteria, it was determined that the form of the scale would be adapted for use.

Participant characteristics and data collection findings: The sample for this research included 347 healthcare personnel working in the medical tourism field at a public hospital in Konya. The research population included 459 healthcare personnel working at the same hospital. The data collection process took place between June 1, 2024, and June 15, 2024. A Personal Information Form and the MedTour-HHR Scale were administered during data collection. Key findings regarding participant characteristics are presented in Table 1.

Table 1. Factor loadings structure matrix

Item No	Factor 1	Factor 2	Factor 3
1	**0.676**	0.439	0.427
2	**0.768**	0.421	0.534
3	**0.741**	0.471	0.510
4	**0.642**	0.465	0.593
5	**0.666**		0.546
6	**0.589**		0.479
7	**0.658**		0.483
8	0.472	**0.588**	
9	0.479	**0.809**	0.512
10	0.504	**0.875**	0.628
11		**0.575**	
12		**0.693**	0.523
13	**0.736**	0.548	0.661
14	0.717	0.550	**0.909**
15	0.667	0.562	**0.879**
16	0.701	0.633	**0.777**
17	**0.533**		0.427

Validity analysis findings: Within the framework of validity testing, the scale's content and construct validity were assessed. Regarding content validity, the scale was reduced from twenty-five to seventeen items based on expert judgment. Exploratory factor analysis and Confirmatory factor analysis were conducted to assess construct validity. During factor analysis, the cutoff value for factor loadings was set at 0.40.

Table 2. Validity test results of the scale

Factor No	Item Order No	Factor Loading	Sampling Adequacy Measure (KMO Test)
Factor 1	2	0.811	0.927
	3	0.755	0.948
	1	0.734	0.943
	7	0.665	0.957
	5	0.583	0.937
	6	0.533	0.936
	13	0.516	0.948
	17	0.463	0.960
	4	0.436	0.942
Factor 2	10	0.831	0.895
	9	0.819	0.845
	12	0.658	0.898
	11	0.624	0.845
	8	0.543	0.903
Factor 3	14	0.861	0.916
	15	0.842	0.896
	16	0.488	0.947
Overall Scale Dimension			**0.921**

Findings of exploratory factor analysis: Kaiser-Meyer-Olkin and Bartlett's tests were conducted before exploratory factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett test are presented in Table 2. The Kaiser–Meyer–Olkin value was 0.921. The Bartlett test result was obtained with λ2 = 3215, degrees of freedom = 136, and p-value. Based on these results, the data meet the requirements for factor analysis.

It should be noted that, to ascertain the number of factors included in Exploratory Factor Analysis, the Parallel Analysis technique was used. Parallel analysis revealed that the scale's structure consists of three factors. The scree plot obtained from the parallel analysis is shown in Figure 2. The factor extraction method adopted here was the Minimum Residual method. A skewed rotation method was adopted. The structure here accounts for about 63.2% of the total variance. The factor loading values varied from 0.436 to 0.861. It should be noted that all factors met the 0.40 criterion. The structure matrix indicated that the items were gathered under the respective factors. No situation required the deletion of any item. Table 3 shows factor loadings and some observations on the structure scale.

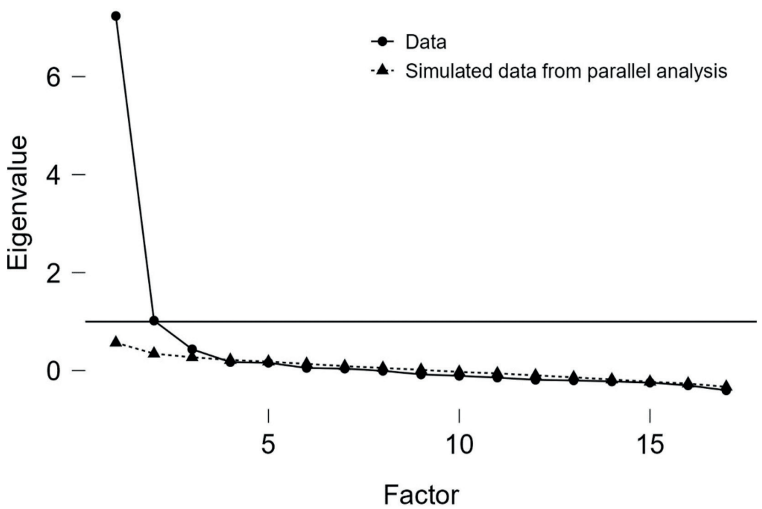


Figure 2. Scree plot based on parallel analysis

Table 3. Reliability analysis

Factor No	Item Order No	Cronbach α If the Item is Removed	Reliability Analysis (Cronbach α)
Factor 1 (CTC)	2	0.853	0.874
	3	0.854	
	1	0.861	
	7	0.861	
	5	0.860	
	6	0.866	
	13	0.853	
	17	0.874	
	4	0.861	
Factor 2 (TC)	10	0.750	0.819
	9	0.761	
	12	0.782	
	11	0.819	
	8	0.807	
Factor 3 (AC)	14	0.809	0.895
	15	0.839	
	16	0.898	
		Overall Scale Dimension	**0.921**

AC: Analytical Competence, CTC: Communication and Team Competence, TC: Technical Competence.

Exploratory Factor Analysis and Reliability Findings: A brief description of the exploratory factor analysis method and its results are shown in Table 2. Both factors were extracted using the minimum residual method and subjected to skewed rotation. Parallel analysis indicated three factors for the scale, which together accounted for 63.2% of the total variance. factor loadings for these items ranged from 0.436 to 0.861. It also met all three criteria for satisfactory factor loading, with a value of 0.40 or higher. The result of structural matrix factor loadings indicated that all the items loaded properly on the factors. The value shown in bold in Table 1 indicates the factor on which an item loaded. The result for the first factor indicated that item 2 had the maximum loading (0.768). It also depicted a loading for item 17, the lowest being 0.533. The result for the second factor indicated that item 10 had the highest loading. It also showed that item 8 had the lowest loading. The result for the third factor showed that item 14 had the maximum loading. It showed that item 16 had the lowest loading. The findings from the structural matrix indicated that all items had satisfactory loadings on their respective factors.

Exploratory factor analysis indicated that the scale contained seventeen items and three factors. Within the first factor, items 2, 3, 1, and 7 had high loadings, followed by items 5, 6, 13, 17, and 4. Within the second factor, all items loaded highly except for item 8. Within the third factor, there were significant groupings of items under a single dimension. Structural matrix analysis indicated that some items had similar loadings. Within the first factor, items 1 and 7 grouped; within the second factor, items 8 and 12 grouped; and within the third factor, items 14 and 16 grouped, all on a single dimension. Based on exploratory factor analysis, factors were labeled CTC, TC, and AC. Within CTC, there were nine items labeled 2, 3, 1, 7, 5, 6, 13, 17, and 4. Within TC, there were five items labeled 10, 9, 12, 11, and 8. Within AC, there were three items labeled 14, 15, and 16. Scoring on the scale was designed based on subdimension total scores and total scale scores. Reliability analysis indicated satisfactory internal consistency of the scale. Overall, Cronbach's alpha for scale reliability was 0.918. Based on subdimensions, it had values of 0.874 for CTC, 0.819 for TC, and 0.895 for AC. Based on these findings, there was high internal consistency for the scale and its subdimensions.

Table 4. Factor characteristics

Variables	Eigen values	SumSq. Loadings	Variance %	Cumulative Variance	SumSq. Loadings	Variance %	Cumulative Variance %
CTC	9.23	8.896	0.523	0.523	5.568	0.328	0.328
TC	1.633	1.29	0.076	0.599	3.156	0.186	0.513
AC	0.87	0.564	0.033	0.632	2.027	0.119	0.632

AC: Analytical Competence, CTC: Communication and Team Competence, TC: Technical Competence.

Exploratory Factor Analysis, Factor Characteristics, Factor Relationships, and Confirmatory Factor Analysis Findings: Figure 3 shows the result obtained using theTrust in Medical Institutions scale. The scale emphasizes three aspects: CTC, TC, and AC. The cumulative variance explained by these three factors is 63.2. Results indicate that CTC accounted for 52.3%, TC for 7.6%, and AC for 3.3% of the total variance. The cumulative result shows that the first two factors account for 59.9%. Applying Parallel Analysis indicates that the eigenvalues need not be considered. Based on the obtained scale structure, CTC, TC, and AC exhibited high total factor loadings of 5.568, 3.156, and 2.027, respectively. Table 4 shows the results of intercorrelations among factors. A positive correlation (r = 0.595) was observed between CTC and TC. A positive correlation of r = 0.72 was obtained between CTC and AC. A positive correlation (r = 0.647) was observed between TC and AC. Based on a structure comprising three subdimensions, three relationships among the factors were identified. These factors are shown in Table 4. Given these factors, it can be assumed that CTC and TC, CTC and AC, and TC and AC exhibit levels of covariation. The result shows that these three factors exhibit some covariation. Based on these three factors, it can be assumed that they are neither identical nor separate from each other.

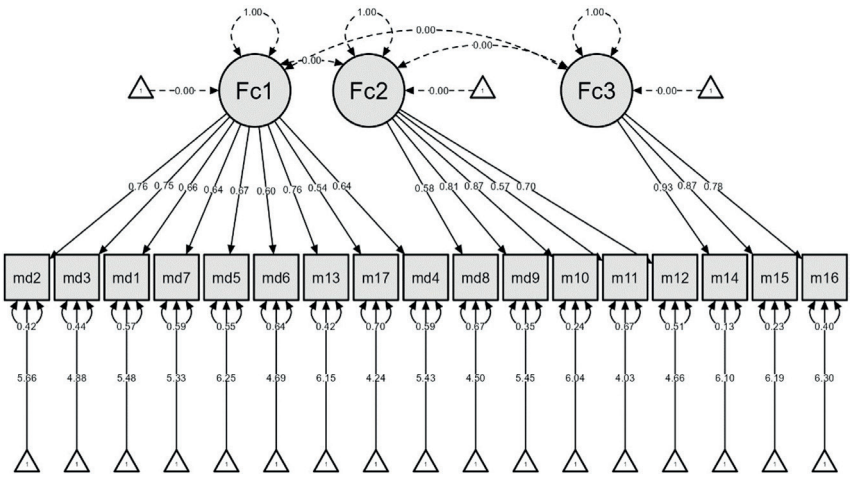


Figure 3. Path diagram of CFA

Table 5. Analysis of Factor Relationships in EFA

Factors	CTC	TC	AC
CTC	–	r = 0.595 p < 0.001	r = 0.720 p < 0.001
TC	r = 0.595 p < 0.001	–	r = 0.647 p < 0.001
AC	r = 0.720 p < 0.001	r = 0.647 p < 0.001	–

r = Pearson correlation coefficient. All correlations are statistically significant at p < 0.001.

CTC: Communication and Team Competence, TC: Technical Competence, AC: Analytical Competence.

Table 5 presents the internal consistency reliability results for the scale. The overall Cronbach's alpha for the scale was 0.921. Cronbach's alpha values for the sub-dimensions were 0.874 for CTC, 0.819 for TC, and 0.895 for AC. No significant change in the reliability coefficient was observed when items were deleted.

Table 6. Factor loadings of CFA

Factors	Items	Estimate	SE	z-value	p	95% Confidence Interval	
						Lower	Upper
CTC	2	0.551	0.035	15.734	< 0.001	0.482	0.619
	3	0.598	0.039	15.249	<0.001	0.521	0.675
	1	0.492	0.038	12.864	< 0.001	0.417	0.567
	7	0.492	0.039	12.774	< 0.001	0.417	0.568
	5	0.458	0.033	13.742	< 0.001	0.393	0.523
	6	0.504	0.043	11.714	< 0.001	0.42	0.588
	13	0.547	0.033	16.76	< 0.001	0.483	0.611
	17	0.53	0.05	10.531	< 0.001	0.431	0.629
	4	0.508	0.038	13.475	< 0.001	0.434	0.582
TC	10	0.621	0.031	19.756	< 0.001	0.56	0.683
	9	0.623	0.037	17.042	< 0.001	0.551	0.695
	12	0.61	0.043	14.23	< 0.001	0.526	0.694
	11	0.55	0.051	10.837	< 0.001	0.45	0.649
	8	0.495	0.045	11.047	< 0.001	0.408	0.583
AC	14	0.645	0.03	21.379	< 0.001	0.586	0.704
	15	0.606	0.03	20.051	< 0.001	0.547	0.665
	16	0.556	0.031	17.849	< 0.001	0.495	0.617

The fit indices associated with the confirmatory factor analysis are shown in Table 6. The χ^2/df ratio from the confirmatory factor analysis was 3.05. The RMSEA and SRMR values were 0.077 and 0.045, respectively. CFI and TLI values were 0.924 and 0.911, respectively. All measures clearly indicate that the three-factor model provides an acceptable fit.

Table 7. Factor covariances

Factors			Estimate	SE	z-value	p
CTC	↔	TC	0.629	0.040	15.684	< 0.001
CTC	↔	AC	0.842	0.023	36.468	< 0.001
TC	↔	AC	0.686	0.036	19.102	< 0.001

Table 7 shows the factor loadings obtained for the items in the confirmatory factor analysis. All item factor loadings were significant (p < 0.001). The highest and lowest factor loadings on the CTC dimension were observed for item 3 (0.598) and item 5 (0.458), respectively. The largest factor loading on the TC dimension was for item 9 (0.623), whereas the smallest was for item 8 (0.495). The largest factor loading on the AC dimension was observed for item 14 (0.645), and the smallest for item 16.

The findings on factor covariances are shown in Table 8. The pairwise covariances were 0.629 (CTC, TC), 0.842 (CTC, AC), and 0.686 (TC, AC). All p-values for covariances were below 0.001.

Table 8 presents the results for residual variances. Residual variances for the items were low. The average explained variance at the factor level within the model was 0.438 for Factor 1, 0.479 for Factor 2, and 0.748 for Factor 3. Figure 3 shows a path diagram for the CFA. The diagram depicts the result using standardized values. Testing of the three-dimensional model yielded acceptable fit indices.

Table 8. Residual variances

Item No	Estimate	SE	z-value	p
2	0.241	0.021	11.399	< 0.001
3	0.314	0.027	11.578	< 0.001
1	0.345	0.028	12.191	< 0.001
7	0.353	0.029	12.224	< 0.001
5	0.25	0.021	12.007	< 0.001
6	0.463	0.037	12.425	< 0.001
13	0.193	0.018	11.024	< 0.001
17	0.666	0.053	12.601	< 0.001
4	0.324	0.027	12.027	< 0.001
10	0.110	0.016	6.968	< 0.001
9	0.222	0.022	9.929	< 0.001
12	0.388	0.034	11.478	< 0.001
11	0.646	0.052	12.347	< 0.001
8	0.492	0.04	12.183	< 0.001
14	0.089	0.012	7.548	< 0.001
15	0.116	0.012	9.479	< 0.001
16	0.159	0.015	10.594	< 0.001

Discussion

This study presents the results of validity and reliability testing of the scale developed to assess the adequacy of human resources in medical tourism. Both the theoretical rationale and the statistical tests guided the process of scale development. The scale exhibits a three-factor structure; the factors are named CTC, TC, and AC. Results indicate that the scale's construct validity is adequate. Specifically, the KMO value was very high (0.921), and the Bartlett test was significant at $p < 0.001$ ($\chi^2 = 3215$, df = 136), indicating that the sample was adequate for factor analysis (Tabachnick and Fidell, 2013; Alpar, 2016). According to the findings of EFA conducted on the scale, a three-factor structure was interpretable, comprising 17 items and the item factor loadings ranged from 0.436 to 0.861. These are all above the 0.40 cut-off value recommended in the literature (Kline, 1994) and indicate high construct validity. In terms of content validity, the scale was reduced from 25 to 17 items following a literature review and expert consultations (Tenko and George, 2011).

In this context, it shows that content validity was achieved and that the developed scale's relationship with the field was determined. CFA results also support the validity of the structure identified by EFA. Fit indices obtained from the CFA (χ^2/df = 3.05; RMSEA = 0.077; SRMR = 0.045; CFI = 0.924; TLI = 0.911) indicate that the model fits the data reasonably well (Hu and Bentler, 1999; Wang and Wang, 2019; Schreiber et al., 2006). All factor loadings derived from the CFA were significant at $p < 0.001$, which statistically establishes the relationship between the scale and the constructs being measured (Balogun et al., 2024; Tabachnick & Fidell, 2013). For reliability analysis, Cronbach's α coefficient for the total scale was 0.921, indicating high internal consistency. When the sub- dimensions were analyzed, the values 0.874 for CTC, 0.819 for TC and 0.895 for AC were found. These findings indicate that all the sub-dimensions are reliable, and that there is no significant reduction in Cronbach's α values when any item is removed (Kline, 1994; Özdamar, 2017).

This result indicates item fit and homogeneity. When the explanatory power (variance explained) of the factors is considered, it appears that 52.3% of the total variance is explained by the CTC, 7.6% by the TC, and 3.3% by the AC. The three-factor structure, with 63.2% total explanatory power, exceeds the 50% threshold commonly accepted as valid in the literature and indicates that the scale's explanatory power is high (Wood et al., 2015; Tenko and George,2011). The relationships among factors are also significant. The correlations observed among the three factors are not only statistically significant but also theoretically meaningful. The strong association between communication and team competence, on the one hand, and analytical competence, on the other, supports the findings of Rokni et al. (2019), who emphasized the role of communication and problem-solving in medical tourism. Likewise, the explanatory strength of CTC is consistent with Crooks et al. (2019) and Snyder et al. (2013), highlighting teamwork as a determinant of patient outcomes. These findings are consistent with Erdem (2021) and Ates & Sunar (2024), who emphasize the central role of human resource competence and workforce in sustaining competitiveness in medical tourism. In the covariance analysis, analyses within the scope of CFA, CTC, and AC showed the closest relationship (0.842).

These results corroborate that both human behavioral competencies and cultural competencies, highlighted by Rokni et al. (2019), are directly linked to communication skills is corroborated by these results. In medical tourism, in which the scale was created, human resource competency and quality are regarded as one of the fundamental competitive determinants (Ateş and Sunar, 2024; Johnston et al., 2015). In this case, the observation that the scale factors reflect the qualifications of health workers who provide services in medical tourism also indicates the scale's contribution to applied fieldwork. The observation that the CTC dimension explains a large proportion of the variance demonstrates that communication and teamwork among patients are determinants of medical tourism (Crooks et al., 2019; Snyder et al., 2013). This also aligns with Erdem's (2021) research, which highlights the pivotal role of employment and workforce in medical tourism.

The factor loading matrix depicts the relationships between variables and associated factors (Tabachnick and Fidell, 2013). Based on confirmatory factor analysis, model fit was assessed using common indices. Accordingly, χ^2/df ratios ≤ 3, CFI and TLI values ≥ 0.95, RMSEA values < 0.06, and SRMR values < 0.08 are considered indicative of good model fit (Hu and Bentler, 1999; Schreiber et al., 2006). Based on more relaxed criteria, χ^2/df ratios below 5, CFI and TLI values above 0.90, RMSEA values below 0.08, and SRMR values below 0.10 are considered acceptable fit statistics (Wang and Wang, 2019). Based on various methods and standard criteria, χ^2/df ratios below 5 and CFI and TLI values approaching 1 indicate better model fit (Tenko and George, 2011). Confirmatory factor analysis is employed to assess a predefined factor structure, rather than to identify an exploratory factor structure. In confirmatory factor analysis, hypotheses formulated on a predefined factor structure are validated, and the correspondence between the structure and the data is assessed using fit indices (Balogun et al., 2024; Tabachnick and Fidell, 2013). Thus, confirmatory factor analysis differs significantly from exploratory factor analysis in that it aims to determine the structure. Confirmatory factor analysis primarily involves testing the relationships between observable and latent variables (Tabachnick and Fidell, 2013). The fit indices derived from this research were within acceptable values, indicating a satisfactory fit to the data (Schreiber et al., 2006). The direction and degree of association between variables are indicated by the correlation coefficient. A correlation coefficient approaching 1 indicates a strong association between variables, whereas a value approaching 0 indicates a weak association (Kline, 1994; Tabachnick and Fidell, 2013). Orthogonal, oblique, and mixed rotation methods are employed in factor analysis to provide more precise estimates of variable loadings (Anderson, 1958; Jöreskog, 1969). Oblique rotation methods were preferred in this study because theoretical considerations suggest interrelations among factors. A clustering method using oblique rotation was employed. It was highly effective as an indicative method for determining extraction factors and for developing more robust solutions in research approaches (Wood et al., 2015). For factor three, items 14 and 15 exhibited high factor loadings, and item 16 exhibited a moderate factor loading (Kline, 1994). The sample size calculation method employed a formula suggesting that the sample size should be 10–20 times the number of items on the scale or the number of factors in the research approach (Özdamar, 2017; Alpar, 2016). The validity of these tools was assessed according to the guidelines provided by Tenko and George (2011) for content, criterion, and construct validity. During the development of the item pool, theoretical issues related to healthcare workforce competencies in health tourism were examined. Statements associated with these issues were sought (Turner, 2020; Yu and Ko, 2021). Opinions were also solicited, using open-ended questions, from 12 experts (6 academics and 6 clinicians) with knowledge of health tourism. The responses were analyzed using traditional content analysis and organized into thematic categories (Hsieh and Shannon, 2005).

Conclusion and Recommendations

This study aimed to measure the adequacy of healthcare human resources in medical tourism; a 25-item candidate scale was administered to 347 participants, and validity and reliability were assessed. Items with a total item correlation coefficient of

Items with factor loadings of 0.50 or below were removed, and factor analysis was performed on the resulting 17-item structure. Exploratory factor analysis with oblique rotation revealed that the cumulative variance explained by the three-factor, 17-item structure was 63.2%. The obtained structure was confirmed by CFA, and the final version of the scale comprises 17 items. The sub-dimensions of the scale are Communication and Team Competence, Technical Competence, and Analytical Competence. The Communication and Team Competence, Technical Competence, and Analytical Competence sub-dimensions consist of 9, 5, and 3 items, respectively. The Cronbach's alpha coefficient for the three subdimensional structures was above 0.77, and the subdimensions were consistent with one another.

The scale can assess the adequacy of human resources in institutions providing medical tourism services, such as university hospitals, city hospitals, and private healthcare facilities. Using this scale in healthcare workers' training programs can help identify weaknesses and guide targeted remediation. Develop improvement strategies. When formulating medical tourism policies, the subdimensions of the scale (communication competence, technical competence, and analytical competence) should be considered. This scale can be used as a standard assessment tool in international accreditation processes.

It is important to test the validity of the scale across countries to support cross-cultural comparisons. Qualitative studies can be conducted to analyze the scale items in depth and expand the item pool. By repeating measurements over time, sectoral changes can be monitored.

The MedTour-HHR Scale demonstrates high validity and reliability, offering a practical tool for evaluating healthcare workforce adequacy in medical tourism. Policymakers and hospital administrators can use this scale to guide strategic workforce planning, international benchmarking, and targeted training initiatives. Future research should focus on cross-cultural validation and longitudinal applications to assess workforce competency over time.

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