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Confirmatory validation of the transgender health care humanization scale



Liliane Lins-Kusterer^{1*}, Nicolle Melo Vieira¹ and Carlos Brites¹

Abstract

Background Despite the critical importance of humanized healthcare for transgender individuals, no existing measures specifically assess care humanization for this population. The Transgender Health Care Humanization Scale (THcH Scale) was developed to address this gap, yet it initially lacked confirmatory validation. This study validates the Transgender THcH scale for evaluating healthcare providers' sensitivity towards transgender patients.

Methods This study involved 443 healthcare professionals and students from a public university and associated hospital. Participants were divided randomly into two groups for Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). Using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity, EFA confirmed data suitability for factor analysis. Factors were identified using parallel analysis with an oblique Promax rotation to allow for inter-factor correlations. The internal consistency of the factors was assessed using Cronbach's alpha. CFA was performed using Maximum Likelihood estimation, with goodness-of-fit evaluated by multiple indices. The THCH Scale's divergent validity was assessed through Spearman's correlation analysis with the Duke University Religion Index (DUREL).

Results Exploratory and Confirmatory Factor Analyses confirmed the scale's two-factor structure with excellent psychometric properties, including high internal consistency (Cronbach's alpha > 0.8) and good fit indices (χ^2 /df=1.74, CFI=0.972, TLI=0.964, GFI=0.989, RMSEA=0.069, SRMR=0.043). Divergent validity was established through moderate correlations with the DUREL index.

Conclusions The THcH scale is a reliable and valid tool for promoting sensitivity and awareness among healthcare professionals, thereby enhancing healthcare access and quality for the transgender population. Further research should expand its application to primary care and diverse populations and settings.

Keywords Transgender, Humanization, Health care, Validation, Scale

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Introduction

Healthcare for the transgender population is an ever-evolving field that demands more sensitive and humanized approaches. Transgender stigma restricts opportunities and resource access in key areas like employment and healthcare, leading to ongoing impacts on the physical and mental health of transgender individuals [1].

The stigma and discrimination faced by transgender individuals when seeking medical care are welldocumented and have detrimental effects on many levels, underscoring the importance of more sensitive and empathetic approaches in the healthcare domain [2]. Stigma can result in delays in accessing healthcare, treatment avoidance, and even severe health consequences. Lack of knowledgeable providers, financial constraints, discrimination, and systemic issues represent some of the barriers to health care. Studies indicate a greater disparity in care for the transgender population compared to the cisgender population [3, 4]. Recognizing and respecting diverse gender identities, considering biological, psychological, and social aspects, is crucial for providing comprehensive care to the transgender population. Moreover, it is important to highlight that gender transition can be a challenging journey that may involve not only physical changes but primarily the affirmation of one's true gender identity, which requires psychological preparation and time. This can elevate levels of anxiety and depression, especially if the healthcare team adopts a pathologizing stance towards transgender identity [5]. Healthcare workers need to understand these barriers and develop interventions to address them, including assessing the healthcare system's capacity, improving provider knowledge and cultural competence, and finding ways to fund appropriate care [6].

An online survey of 810 healthcare professionals (HCPs) across four European countries revealed that 52.7% had some training on transgender care, with training significantly boosting their confidence in working with transgender patients. Overall, 92.4% of HCPs believed that training would enhance their competence, with higher belief levels among those with training experience and those working in Serbia and Sweden or belonging to a sexual minority group. The study underscores the importance of training in improving healthcare for transgender people by increasing HCP awareness, knowledge, competence, and confidence [7].

Recently, our group developed a Transgender Health Care Humanization Scale (THcH scale), demonstrating good psychometric properties using the Exploratory Factor Analysis method. The scale seems to be valuable for guiding healthcare providers in implementing a Health Humanization Policy and reducing prejudice against gender-diverse individuals in healthcare settings [8]. However, we did not conduct the confirmatory factor analysis of the scale to assess whether the scale demonstrates the same factor structure, reliability, and validity across different samples or settings as initially identified in the exploratory validation phase.

Beyond serving as an assessment tool, this validated scale can be a powerful ally in the education of healthcare professionals. Incorporating it into undergraduate health programs is an effective way to prepare future doctors, nurses, and other professionals to adequately conduct the healthcare of the transgender population [8]. The THCH scale can enhance direct care and contribute to training more sensitive and affirming healthcare professionals, better prepared to provide inclusive and high-quality care. The discrimination faced by the transgender population is a reality that must be addressed, and the validation of this scale represents an important step in that direction.

In this context, validating the Transgender Health Care Humanization Scale becomes essential. Rigorous validation studies, such as the proposed THcH scale, are required to assess an instrument's psychometric properties thoroughly. Once validated, it holds significant potential as a robust tool for evaluating and improving the quality of care delivered to this vulnerable population while also playing a critical role in the education and training of future healthcare professionals. The present study aimed to investigate the factorial structure of the THcH scale by using exploratory and confirmatory factor analysis.

Methods

Study design and participants

This study involved 450 healthcare professionals and students from a public university working at a university hospital. All the students were in the final semester of their degree program, during the clinical practice period. The data collection questionnaire, which comprised the Transgender Health Care Humanization Scale and occupational, sociodemographic, and religious practice-related variables, was subject to exclusion criteria. Specifically, questionnaires with 20% or more missing responses were excluded from the analysis. Of the 450 health professionals, 443 completed 80% or more of the questionnaire. Notably, in this study, there were no missing responses for any items of the Transgender Health Care Humanization Scale. Exploratory Factor Analysis (EFA) was conducted on one randomly selected half of the sample, while Confirmatory Factor Analysis (CFA) was performed on the other half. The sample size was determined based on the ratio of the number of variables to the number of factors, typically at a ratio of 5:1 or 10:1, as previously outlined by Hair et al. [9].

The Transgender Healthcare humanization scale (THcH scale)

The THcH scale intends to measure humanization in the healthcare of transgender people. The responses are rated on a 5-point Likert scale: 1-strongly disagree, 2-disagree, 3-indifferent, 4-agree, 5-strongly agree. Scores can range from 12 to 60 and are calculated by summing the ordinal values for the 12 items [8].

The Duke university religion index (DUREL)

The DUREL comprises five items that capture the three dimensions of religiosity. Its overall score ranges from 5 to 27. However, the DUREL index consists of three subscales: organizational religious activity (ORA) related to public religious activities, non-organizational religious activity (NORA) comprising religious activities performed in private, and Intrinsic religiosity (IR) related to personal religious motivation [10].

Statistical analysis

All analyses were performed using JASP software (Version 0.17.3) and SPSS 21 statistical software packages. In the EFA, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity were employed to evaluate the appropriateness of the data for factor analysis.

EFA was first performed, and factors were extracted through parallel analysis. An oblique rotation (Promax) was applied to explore potential correlations between factors. Cronbach's alpha evaluated the internal consistency of items. The number of latent factors was selected by a scree plot [11] and eigenvalues greater than 1 [12]. Oblique factor rotation was performed using the Promax method. Items with factor loadings less than 0.30 were removed. Cronbach's alpha above 0.70 was considered to be acceptable [13].

Confirmatory factor analyses (CFAs) were conducted using the Maximum Likelihood estimation method [14]. Goodness-of-fit indices included the χ 2 statistic, the root mean square error of approximation (RMSEA) along with its 95% confidence interval, the Standardized Root Mean Square Residual (SRMR), the Comparative Fit Index (CFI), the Tucker-Lewis Fit Index (TLI), and Goodness of Fit Index (GFI). An acceptable model fit is indicated by χ 2/df \leq 5, CFI, TLI and GFI \geq 0.90, RMSEA < 0.08, and SRMR < 0.1 [15]. Item analysis was conducted to estimate internal consistency reliability (Cronbach's alpha).

Divergent validity

Divergent validity was examined using Spearman's correlation analysis to estimate the correlation of the THcH scale with the Duke University Religion Index (DUREL) Results were interpreted according to Cohen's classification: small correlation (0.10–0.29), medium correlation (0.30–0.49), and large correlation (0.50-1.0) [16]. Organizational religious activity (ORA) involves public religious activities such as attending religious services or participating in other group-related religious activities (prayer groups, Scripture study groups, etc.). Non-organizational religious activity (NORA) consists of religious activities performed in private, such as prayer, Scripture study, watching religious TV, or listening to religious radio. Intrinsic religiosity (IR) assesses the degree of personal religious commitment or motivation.

Ethical aspects

The project received approval from the Ethics Board of Climério de Oliveira University Hospital in Salvador, Bahia, Brazil, under number 5.637.846. Participants provided informed consent to participate, clearly understanding that their involvement was voluntary, could be withdrawn at any time without justification, and that all information would be handled confidentially.

Results

Most participants were from the nursing field (n=235), followed by medicine (n=163) and dentistry (n=45). The sample was randomly divided into two parts using SPSS for Exploratory Factor Analysis and Confirmatory Factor Analysis. The participants' characteristics are described in Table 1. The groups did not differ in age (P=0.564), having a stable relationship, race, income, religion, and professional area of expertise. The difference occurred between genders (P=0.002), with more cisgender men in the EFA group.

Exploratory factor analysis (EFA)

EFA was conducted with 240 participants. All individual item Kaiser-Meyer-Olkin (KMO) values exceeded 0.874, with an overall KMO of 0.914, confirming the sample's adequacy for factor analysis. Fit indices indicated a TLI value of 0.945, CFI of 0.964, and RMSEA of 0.074 (0.056–0.094), suggesting adequate data for EFA. Bartlett's test χ^2 (66)=1674.074, p<0.001 indicated a patterned relationship among the items. The construct reliability was evaluated by Cronbach's alpha (THcH=0.912; Factor 1=0.889; Factor 2=0.894) values were above the reference value (\geq 0.70).

Table 2 shows the factor loading of each item and information on item communality (uniqueness). Factor loadings were above 0.30, and the commonality analysis showed values far from 0 to 1, indicating the item's adequacy.

The scree plot confirmed the findings of parallel analysis, indicating that the two-factor solution appeared to be the most likely structure for the scale (Fig-1).

Characteristics	EFA N=240 (%)	CFA N=203 (%)		
Gender Identity			0.002	
Cisgender woman	155 (64.6)	157 (77.3)		
Cisgender man	85 (35.4)	46 (22.7)		
Relationship			0.425	
In a relationship	146 (60.8)	131 (64.5)		
Not in a relationship	94 (39.2)	72 (35.5)		
Race			0.073	
Black	27 (11.3)	13 (6.4)		
Mixed Race	97 (40.4)	73 (36,0)		
White	116 (48.3)	117 (57.6)		
Income in Brazilian MW*			0.935	
≤3 MW	5 (2.1)	4 (2,0)		
3–5 MW	66 (27.5)	59 (29.0)		
≥5 MW	169 (70.4)	140 (69.0)		
Religion			0.288	
Kardecist	43 (17.9)	32 (15.8)		
Catholic	88 (36.7)	72 (35.5)		
Evangelical	47 (19.6)	54 (26.6)		
Other	9 (3.8)	11 (5.4)		
No religion	53 (22.0)	34 (16.7)		
Field			0.708	
Medicine	92 (38.3)	71 (35.0)		
Nursing	123 (51.3)	112 (55.1)		
Dentistry	25 (10.4)	20 (9.9)		
MW=minimum wages				

Table 1 Characteristics of participants in the exploratory factor analysis (N=240) and confirmatory factor analysis

Table 2 Item loadings of the transgender health care humanization (THcH) scale (N = 240)

Factor Loadings	Factor 1	Factor 2	Unique-
			ness
Q1- I think it's important to understand the emotional problems of the trans person	0.763		0.414
Q2- Listening carefully to the trans person increases the quality of my healthcare	0.817		0.287
Q3- I consider it is important to guide the trans person on prevention and basic healthcare.	0.900		0.247
Q4- I believe that a good reception of the trans people by the health professional influences their compliance to healthcare	0.731		0.333
Q5- I think it's important to call the trans person by their social name.		0.414	0.561
Q6- The health professional must have inclusive language.		0.727	0.373
Q7- I'm bothered by the exaggerated behavior of trans people		0.832	0.460
Q8- I don't feel comfortable meeting a trans person		0.772	0.432
Q9- I'm afraid to be alone with a trans person		0.712	0.401
Q10- I believe trans people victimize themselves		0.726	0.439
Q11- Trans people face prejudice and discrimination in health services	0.417		0.717
Q12- I think trans people have HIV, they use drugs and they're sex workers			0.311

Applied rotation method: Promax

Confirmatory factor analysis (CFA)

CFA was conducted with 203 participants based on the proposed factor model, giving a significant p-value and a 95% confidence interval. The adjusted confirmatory factor analysis model is shown in Table 3. The significant chi-square test indicated that the factorial model improved over the null model. Additionally, the chi-square value divided by the degrees of freedom was less than 5.

The THcH scale presented excellent goodness-of-fit indexes results, suggesting the adequacy of the model (Table 4). Cronbach's alpha values for THcH, Factor 1, and Factor 2 were 0.915, 0.908, and 0.893, respectively, all surpassing the reference threshold of 0.70.



Fig. 1 Scree plot of EFA (N=240)

Table 3 Adjusted of	confirmatory factor	analysis mod	lel
Model	X²	df	Р
Baseline model	1570.299	66	
Factor model	92.748	53	< 0.001

Factor loadings and scale models are described in Table 4; Fig. 2. Items demonstrated satisfactory factor loadings on their respective factors. The Goodnessof-fit indexes of the THcH scale were better than the required threshold ($\chi 2/df \le 5$, CFI, TLI, and GFI \ge 0.90, RMSEA < 0.08, and SRMR < 0.1): $\chi 2/df = 1,74$, CFI = 0.972, TLI = 0.964, GFI = 0.989, RMSEA = 0.069 (0.047-0.090), and SRMSR = 0.043.

Divergent validity

We used Spearman's correlation coefficient to evaluate divergent validity by comparing Factor scores obtained with DUREL subscales (Table 5). Factors 1 and

Table 4 Factor loadings

							95% Confid Interval	ence
Factor	Indicator	Estimate	Std. Error	z-value	p	Lower	Upper	
Factor 1		Q1	0.795	0.057	13.868	< 0.001	0.682	0.907
		Q2	0.941	0.061	15.487	< 0.001	0.822	1.060
		Q3	0.818	0.048	16.918	< 0.001	0.724	0.913
		Q4	0.829	0.062	13.288	< 0.001	0.707	0.952
Factor 2		Q5	0.850	0.070	12.119	< 0.001	0.713	0.988
		Q6	1.009	0.071	14.314	< 0.001	0.871	1.147
		Q7	0.936	0.078	11.964	< 0.001	0.783	1.090
		Q8	1.028	0.081	12.665	< 0.001	0.869	1.187
		Q9	0.798	0.067	11.898	< 0.001	0.666	0.929
		Q10	0.807	0.076	10.653	< 0.001	0.658	0.955
		Q11	0.346	0.073	4.756	< 0.001	0.204	0.489
		Q12	1.096	0.075	14.704	< 0.001	0.950	1.242



ORA=organizational religious activity; NORA=non-organizational religious activity; RI=Intrinsic religiosity

**. The correlation is significant at the 0.01 level (2-tailed)

*. The correlation is significant at the 0.05 level (2-tailed)

2 exhibited moderate correlation (r=0.433). The correlation between Factor 1 and each of the three DUREL subscales was lower than 0.1. Factor 2 presented moderate correlations with the subscales ORA (r=0.351) and NORA (r=0.322) and weak correlations with the subscale IR (r=0.149).

Discussion

This study aims to investigate the factorial structure of the THcH scale by using exploratory and confirmatory factor analysis. The sample size was a critical consideration in conducting EFA and CFA. Consistent with traditional guidelines, a minimum of five observations per variable was deemed necessary to ensure adequate power and reliability in the analyses. The scale was applied to a sample of 443 healthcare professionals and students from a public university. Given that the Transgender Health Care Humanization Scale comprises 12 items, the EFA and CFA analysis required a minimum sample size of 60 participants (12 variables \times 5 observations per variable). However, the actual sample size for EFA and CFA exceeded this minimum requirement, thereby providing a more robust basis for the factor extraction, ensuring the reliability of the results, and enhancing the credibility of the scale's psychometric properties. Overall, adhering to the recommended observation-to-variable ratio in both EFA and CFA contributed to the study's methodological rigor and the reliability of the findings regarding the THcH scale [17]. The groups showed no significant differences in age, relationship status, race, income, religion, or professional area. However, a significant difference was observed between genders, with more cisgender men in the EFA group.

This is the first study to confirm the validity and reliability of our scale by using exploratory and confirmatory factor analysis. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) are sequential steps in analyzing factor models. EFA explored the data and established a hypothetical factor model for the population. Subsequently, CFA evaluated the plausibility of the hypothesis generated during the exploratory phase [18]. Common practice involves collecting a single sample and dividing it into two halves for EFA and CFA.

In our first publication, the psychometric properties of the THcH scale were evaluated by using EFA and estimation of items parameters with the RDWLS method. In both publications, the CFI, GFI, and TLI were higher than 0.9, and the RMSEA was less than 0.08, confirming the adequacy of the structure. However, in the present study, the EFA and CFA showed only two factors instead of four, as suggested in the first publication [8]. The model's overall fit was excellent; CFI, GFI, and TLI were higher than 0.9, and the RMSEA was below 0.08. All Cronbach's alpha values were higher than 0.8 (high reliability). The robustness of the factor structure in the EFA and the subsequent confirmation in the CFA analyses confirm the validity of these findings in medical, nursing, and dental professionals in the hospital environment.

The results of the present study suggest that the version of the THcH scale is a useful and reliable tool for measuring humanization in the health care of the transgender population. Some adjustments to the proposed model will be necessary in different populations and transcultural contexts. New investigations will be conducted to test and refine this instrument's robustness and psychometric qualities. Future analyses will involve different groups and contexts of education and health, evaluating the scale's reliability, sensitivity, and validity. Researchers and faculty members should receive training to effectively engage with the transgender population. A study conducted in 2021, utilizing focus group methodology, identified motivating factors (such as community creation, research led by transgender and gender diverse (TGD) individuals, compensation, integration into healthcare, and relevance of research) and barriers (including aversion to research/healthcare, mistrust, and inaccessibility) for accessing the transgender population in clinical studies [19].

The present study has limitations, including analyzing professionals and students from only three healthcare fields. Moreover, the context was restricted to the hospital setting, and future studies should expand the sample to primary care. Broadening the variety of clinical and educational contexts, as well as different socioeconomic and cultural profiles, is necessary to test the applicability of this instrument in diverse populations to ensure the generalization of the results and the external validation of the instrument. Another significant limitation is the homogeneity of the subject population, which included only Black, White, and mixed-race demographics, with a lack of gender diversity, as no gender-diverse respondents were represented. Despite these limitations, the methodological rigor adopted in conducting this study, from data collection procedures to well-defined data analysis, ensures greater reliability and validity of the obtained results.

It is crucial to highlight the educational potential that this instrument can offer, not only to undergraduate and postgraduate students but also to professionals working in various health sectors. Raising awareness among these professionals about providing specialized, inclusive, and respectful care to the transgender population consequently promotes equity, quality, and effectiveness in the access of the transgender population to health services. Training significantly impacts the confidence of healthcare professionals when working with transgender patients and enhances their perceived competence in providing appropriate care. Training programs that improve healthcare for transgender individuals by fostering greater awareness, knowledge, and confidence among healthcare professionals are very important [7].

In conclusion, this study provides strong evidence supporting the validity and reliability of the Transgender Health Care Humanization Scale (THcH) for use in hospital settings. The scale's two-factor structure was confirmed through both Exploratory and Confirmatory Factor Analysis, demonstrating its applicability across various healthcare professions, including medicine, nursing, and dentistry. The high Cronbach's alpha values and excellent goodness-of-fit indices further attest to the scale's robust psychometric properties. The moderate correlations with the Duke University Religion Index (DUREL) subscales also reinforce its divergent validity. The THcH scale emerges as a valuable tool for assessing and promoting humanization in healthcare for the transgender population, which is crucial for improving healthcare outcomes and ensuring equitable access to services. Future research should focus on expanding the scale's application to broader healthcare contexts and diverse populations to further validate its utility and impact on transgender healthcare.

Abbreviations

CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DUREL	Duke University Religion Index
EFA	Exploratory Factor Analysis
GFI	Goodness of Fit Index
IR	Intrinsic religiosity
MW	Minimum wages
NORA	Non-organizational religious activity
ORA	Organizational religious activity
RMSEA	Root Mean Square Error of approximation
SRMSR	Standardized Root Mean Square Residual
THcH	Transgender Health Care Humanization
TLI	Tucker-Lewis Fit Index

Supplementary Information

The online version contains supplementary material available at https://doi.or g/10.1186/s12939-024-02351-9.

Supplementary Material 1

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Not applicable.

Author contributions

L. L-K. contributed to the conception and design of the study, data collection, data quality control, data analysis and creation of all figures, and writing of the manuscript. C. B. contributed to the conception and design of the study and provided critical review of the manuscript. N M contributed to data collection and writing of the manuscript. Each author has approved the final version of the manuscript and agrees to be accountable for all aspects of the work.

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Data availability

The raw data supporting the conclusions of this article will be made available by the corresponding authors upon reasonable requests.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Board of Climério de Oliveira University Hospital in Salvador, Bahia, Brazil, under number 5.637.846. All respondents agreed to participate in the study and signed a consent form.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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