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ORIGINAL RESEARCH

The Development of a Scale Measuring Medical Mistrust Among Medical and Healthcare Students and Providers

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Objective: Lack of medical trust among healthcare providers may result in delayed decision-making, repeated medical examinations, or increased medical errors. Hence, the study intends to develop and validate a medical mistrust scale (MMtS-MHC-SP) grounded in the Taiwanese cultural and healthcare context's perspective of healthcare students and providers to provide a reference framework for administrators and healthcare policymakers.

Methods: Following an in-depth review of existing literature and expert consultations through panel discussions, the researchers utilized SPSS to conduct an exploratory factor analysis (EFA) on data collected from a sample of 322 participants. This analytical process was designed to uncover the underlying factors of the MMtS-MHC-SP and to rigorously examine its psychometric soundness. To confirm the factor structure and validate the identified factor structure, the researchers subsequently performed a confirmatory factor analysis (CFA) using AMOS software on a separate sample of 233 individuals to assess the observed factor structure. Tests were also performed on goodness-of-fit indexes, convergent and discriminant validities, and internal consistency.

Results: The EFA reduced the original 59 items to 31 items, grouped into five factors: provider trustworthiness (8 items), healthcare accessibility (6 items), institutional integrity (7 items), treatment justifiability (6 items), and system reliability (4 items). These five factors accounted for 41.578% of the total variance in responses. Subsequent CFA validated this five-factor, 31-item structure. The EFA and CFA models demonstrated adequate convergent and discriminant validities. The Cronbach's alphas, composite reliability values, and McDonald's ω Coefficients ranged from 0.853 to 0.982 across factors, indicating good internal consistency.

Conclusion: The results validated the developed MMtS-MHC-SP as a valid tool for assessing the medical mistrust among medical and healthcare students and providers. Hence, it can serve as a valuable tool to guide educational interventions, policy-making, and administrative strategies to foster trust within healthcare systems.

Keywords: medical mistrust, healthcare providers, scale development, psychometric validation

Introduction

In healthcare, trust is crucial to the provider-patient relationship and is essential for establishing a positive and harmonious relationship.[1] Some researchers highlight the emotional aspect of trust and believe that patient trust in healthcare providers is rooted in interpersonal dynamics. This trust reflects the patient's confidence in the doctor's competence and commitment, which is important in their interactions. The patient believes in the doctor's professional competence to provide treatment with the patient's best interests and expectations.[2,3] According to Anderson and Dedrick,[4] interpersonal trust is the belief and expectation that a doctor's words and deeds are trustworthy and dependable. Patients' levels of trust in their providers would be the most important factors motivating patients to participate in health-promoting, preventative, and therapeutic procedures.[5,6] With trust, patients would be secure and believe that physicians' treatments and recommendations will benefit their health outcomes.[7–12] Bonds et al's research[13] revealed that a trusting

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doctor-patient relationship can lead to better interactions between doctors and patients. With a higher sense of security, they are more willing to work with their doctors to identify the most suitable treatment options for their conditions. They may hence collaborate with doctors to better carry out clinical diagnosis and treatment, even risky treatments, to improve medical and healthcare outcomes.[13]

Though trust has long been acknowledged as a fundamental element of interpersonal relationships between providers and patients in the healthcare setting; however, many studies have found that there has been a significant decline in provider-patient trust in modern societies.[1,14,15] Since the twentieth century, ethical crimes such as Nazi medical experiments and Tuskegee syphilis experiments have undermined the medical community's credibility, which explains why current patients are increasingly skeptical of doctors, as well as medical systems.[10] Patients perceive that doctors are more concerned with money-making than with addressing their medical conditions, using their medical expertise for profit rather than saving lives.[16–19] While the issues of commercialization of medicine and depersonalization of care have gained more attention, instead of building trust, patients become more skeptical and watchful of medical professionals because they fear being treated more like objects than like individuals.[20]

Similar to the tendency to trust, mistrust is a negative attitude toward particular healthcare professionals, institutions, and systems. The term "medical mistrust" denotes skepticism or a lack of faith in medical and healthcare personnel, procedures, institutions, or systems.[21,22] It encompasses doubts about healthcare professionals' competence, integrity, and ethical behavior, as well as concerns about the fairness, transparency, and reliability of healthcare organizations and systems. This captures both interpersonal mistrust and institutional mistrust.[23] It reflects a lack of confidence in providers' intentions and skepticism toward broader institutions—such as hospitals, insurers, or pharmaceutical companies—potentially undermining collaboration, guideline adherence, and clinical decision-making.[23–27] Building on this framework, medical mistrust can be understood as a multidimensional construct influenced by individual-level perceptions of healthcare workers (interpersonal mistrust) and organizational-level perceptions of institutional integrity (institutional mistrust).[21,28] This perspective highlights how historical discrimination, systemic injustices, and professional hierarchies contribute to mistrust among healthcare providers themselves.[25,29]

Research has shown that healthcare systems are experiencing a crisis of trust, and several instances highlight the adverse impacts of mistrust, such as decreased treatment adherence and lower patient satisfaction.[5,30–32] With a lack of trust, patients deter to consent to a physical examination, not willing to give their medical history or adhere to treatment recommendations. In addition, patients' lack of trust in doctors increases the risk of mutual suspicion and conflict between providers and patients. It also negatively affects doctors' attitudes and behaviors, which may lead to doctors adopting over-cautious words and deeds and defensive medical behaviors to avoid medical risks, thus leading to further conflicts and mistrust between providers and patients.[33] The commodification of health care may contribute to this phenomenon.[34] Moreover, under the pressure of rising healthcare costs and financial constraints, countries worldwide have attempted to adopt the most effective tool of managed care practices, the mainstream medical service in the United States, to control medical costs while ensuring quality. However, managed care has significantly declined public trust in medical systems and providers. Strict regulatory measures that limit patients' access to medical care have further led to mistrust in the traditional principles of patient-centered medical ethics and further mistrust in patients and providers.[29,35] In Taiwan, medical institutions face severe operational challenges with the changes in national health insurance payments. The total budget system forces operators to increase revenue and reduce expenditure in order to control medical costs in a more enterprise-oriented manner.

Recent COVID-19 pandemic events have also rekindled questions about the public's and medical providers' medical mistrust of medical and healthcare institutions, systems, or professionals,[36,37] which has highlighted the critical role of trust among individuals, institutions, and healthcare systems.[38,39] However, it is not just patients concerned about whom to trust and when; medical staff, too, face concerns about whom to trust and when. During infectious disease outbreaks, physicians and other clinicians know that their safety and families depend heavily on trusting others—including patients, colleagues (doctors, nurses, etc)., employers, administrators, and so on.[40]

Lack of medical trust among healthcare providers, including personnel, institutions, and systems, may lead to skepticism about their peers' diagnosis or treatment plans, resulting in delayed decision-making, repeated medical examinations, or increased medical errors. Moreover, to protect themselves and their patients, medical professionals must depend on institutional support, accurate information, and patient cooperation, particularly in times of crisis.[41–43]

However, low trust in coworkers, hospital management, or the system may lead to burnout, moral discomfort, and lower job satisfaction.[43,44] Hence, in order to enhance healthcare team collaboration and service quality, there is a necessity to facilitate the development of a measurement tool that can quantify the level of mistrust among healthcare providers to gain a deeper insight into the dynamics of mistrust and provide evidence to support the improvement of healthcare teamwork, and in turn, use intervention to facilitate professional cooperation and communication to enhance the safety and efficiency of healthcare services, and ultimately, improve the health outcomes of patients.[25]

Various scales have been employed to measure medical mistrust, with the most commonly used being the Group-Based Medical Mistrust Scale (GBMMS),[21] the Medical Mistrust Index (MMI),[45] and the Health Care System Distrust Scale.[46] The 12-item Group-Based Medical Mistrust Scale (GBMMS),[21] with Cronbach's alpha 0.83, included three dimensions: suspicion, group disparities, and lack of support. The 7-item Medical Mistrust Index (MMI)[45] has only one dimension, with Cronbach's alpha of 0.76, to measure general mistrust in healthcare systems. The 10-item Health Care System Distrust Scale, with Cronbach's alpha of 0.75, included four dimensions, honesty, confidentiality, competence, and fidelity, to measure distrust of the healthcare system. Though these scales proved appropriate for measuring medical mistrust among healthcare providers and institutions, they are not used for measuring medical mistrust among medical providers or in the Taiwanese cultural and healthcare context.

Aside from these widely used measures, several tools have been developed to measure specific aspects of medical distrust or associated concepts. For instance, the Chinese version of the Defensive Medicine Scale (DMS; Cronbach's alpha: 0.917) assesses the degree to which physicians engage in defensive actions out of distrust or fear of responsibility.[47] The Physician Internalized Occupational Stigma Scale (PIOSS; Cronbach's alpha: 0.938) assesses healthcare providers' internalized perceptions of stigma related to their professional role,[48] whereas the Patient toward Physician Occupational Stigma Scale (PPOSS; Cronbach's alpha: 0.940) assesses patients' negative attitudes or mistrust toward physicians based on perceived occupational stigma.[49] In addition, several studies used questionnaires that were not formally validated, thus reducing the reliability and generalizability of their findings.[50]

The existing literature on medical mistrust can be grouped into three categories. First, patient- or public-focused instruments (eg, GBMMS, MMI, Health Care System Distrust Scale) primarily assess patients' distrust toward providers and institutions, but they have limited applicability for healthcare professionals. Second, provider- or occupation-specific instruments (eg, DMS, PIOSS, PPOSS) measure defensive behaviors or occupational stigma, but they often focus on specific aspects and overlook broader interpersonal and institutional mistrust across healthcare teams. Third, unvalidated instruments lack established reliability and validity, making them ineffective for a thorough study. No existing instrument comprehensively measures medical mistrust among healthcare providers and students, particularly in the Taiwanese cultural and healthcare context, highlighting the need for a culturally relevant, multidimensional scale. To address these gaps, the study intended to develop a Medical Mistrust Scale for Medical Healthcare Providers and Students in Taiwan (MMtS-MHC-SP).

Methodology

Procedure and Participants

The researchers have carried out a thorough review and held panel discussions on medical and healthcare mistrust Scale, physician-patient trust, institutional trust in healthcare, measurement of medical mistrust, etc. for the development of a valid and reliable Medical Mistrust Scale (MMtS-MHC-SP) based on Taiwanese cultural and medical and healthcare background. The primary sources were obtained from academic databases such as PubMed, ScienceDirect, PsycINFO, Web of Science, EBSCO, ProQuest, Google Scholar, and ResearchGate, using the following keywords: physical mistrust, medical mistrust, mistrust in institutions, etc. Pilot studies and expert panel discussions were carried out to examine the validity and reliability of the MMtS-MHC-SP developed. The study was approved by Chung Shang Medical University Hospital's Institutional Review Board (No. 112008, dated December 12, 2022). To ensure that each participant may complete the questionnaire at their discretion, the researchers informed participants of the study's goals and their rights before data collection. All participants provided informed consent, in accordance with the Declaration of Helsinki. Additionally, the researchers examined the data anonymously and maintained the confidentiality of the participants' identities.

Following the scale development framework proposed by Slavec and Drnovšek,[51] the researchers developed the MMtS-MHC-SP scale, involving a structural process consisting of three phases and ten steps. Phase 1's main goal was to create scale items emphasizing the scale construct's theoretical significance. During this phase, a review of existing literature and interviews were conducted (Step 1), followed by the development of scale items (Step 2) and the assessment of content validity (Step 3). Phase 2's main goal was to confirm the suitability and representativeness of the data collection process. This required constructing and evaluating the scale (Step 4), translating and back-translating the scale to ensure linguistic consistency (Step 5), conducting a pilot study (Step 6), and analyzing the data collected (Step 7). In Phase 3, the scale's construct was thoroughly examined through statistical analysis and validation procedures, including evaluating factors, reliability, and construct validity (Steps 8–10).

Following expert panel discussions on the scoring items regarding medical mistrust, the 87 items collected were reduced to 59 items for the MMtS-MHC-SP scale. Each scale item was evaluated according to its importance to the study's primary subject, how well it fits its central theme, and how well the scale item's phrasing is comprehended. The items were assessed using a nine-point Likert scale (where 9 represents "completely agree" and 1 means "completely disagree"), with higher scores reflecting higher medical mistrust of healthcare students and providers. According to established standards for validity and reliability testing, a minimum of 200 participants[52] is typically required, and the recommended sample size should follow a ratio of at least five participants per scale item.[53,54] Based on the criteria, the researchers employed an exploratory factor analysis (EFA) on a convenience sample of 322 participants to identify the factor structure of the MMtS-MHC-SP scale, and then performed a confirmatory factor analysis (CFA) on a sample of 233 participants to investigate the psychometric properties of the scale. The study included healthcare students and providers in Taiwan aged 18 or older who could complete the survey, while excluding those not in healthcare programs or professions, under 18, or with incomplete responses.

Data Analysis

Data analysis was carried out in two steps. First, SPSS (version 14.0)[55] was adopted to perform EFA on data from 322 participants. To assess data acceptability for factor analysis, the Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO)[56,57] measures were used, with a KMO value above 0.60 and Bartlett's test reaching statistical significance ($p < 0.05$)[58,59] indicating appropriateness. Factor extraction was guided by eigenvalues larger than 1.0, scree plot inspection, using Principal Component Analysis (PCA) with Promax rotation to allow for correlated factors. The factor structure obtained from the EFA was validated using CFA with AMOS (version 24.0)[60] on an independent sample of 233 people. Model fit was evaluated using multiple indices, including the chi-square/degrees of freedom ratio ($2 \leq \chi^2/df \leq 5$),[61] the Comparative Fit Index (CFI ≥.90),[62] the Tucker-Lewis Index (TLI ≥.90),[62] Standardized Root Mean squared Residual (SRMR<0.08),[61] and the Root Mean Square Error of Approximation (RMSEA ≤ 0.06).[61] In addition, the researchers evaluate the scale's psychometric properties. Cronbach's α, composite reliability (CR), and McDonald's ω coefficient were adopted to assess reliability, with values ≥.70 indicating adequate internal consistency.[63–66] Convergent validity was assessed using average variance extracted (AVE ≥.50), and discriminant validity was established when the square root of the AVE exceeded the correlations between constructs.[67]

Results

Descriptive Statistical Analysis of Participants

To assess the psychometric qualities of the MMtS-MHC-SP scale and determine its likely factor structure, the study first used an EFA on 322 participants. After using EFA to evaluate the structure of possible MMtS-MHC-SP scale factors, the researchers further performed CFA using data from 233 participants in order to further analyze the acquired factor structure. Table 1 presents the demographic information of the participants.

EFA for the Medical Mistrust Scale (MMtS-MHC-SP)

KMO Test and Bartlett's Test of Sphericity

A total of 322 valid surveys were gathered from Taiwan's healthcare students and providers. The study used the KMO test to examine the adequacy of the sample and Bartlett's sphericity test to conclude the factor analysis's worthiness. The

Table 1 Demographic Details of Participants

Characteristics	Categories	EFA Number (%)	CFA Number (%)
Gender	Male	80 (24.8%)	91 (39.1%)
	Female	238 (73.9%)	136 (58.4%)
	Prefer not to say	4 (1.2%)	6 (2.6%)
Age	<19 years old	4 (1.2%)	3 (1.3%)
	19 to 25	165 (51.3%)	109 (46.8%)
	26 to 32	80 (24.9%)	49 (21.0%)
	33 to 39	41 (12.7%)	43 (18.5%)
	40 to 46	20 (6.2%)	20 (8.6%)
	47 to 53	11 (3.4%)	7 (3.0)
	54 to 60	1 (0.3%)	1 (0.4%)
	61+ years old	0 (0%)	1 (0.4%)
Source	Health Students	207 (64.3%)	109 (46.8%)
	Health Providers	115 (35.7%)	124 (53.2%)

KMO value was 0.939, more significant than the 0.6 cutoff value.[56,57] Bartlett's test of sphericity[58,59] was smaller than 0.001 (Approx. = 6569.779; degree of freedom = 465; p-value = 0.000 < 0.05). The test results demonstrated that the sample size was appropriate for EFA. According to the scree-plot for the MMtS-MHC-SP factor analysis, five factors were the best choice for the MMtS-MHC-SP scale (see Figure 1).

31-Item EFA-Model MMtS-MHC-SP Scale

EFA was carried out using eigenvalues greater than 1.0, PCA, and Promax rotation to assess the construct validity and consistency validity of the MMtS-MHC-SP scale. Scale items were kept if they had a loading more than 0.50 on the relevant factor but less than 0.50 on any irrelevant factors. Following expert panel discussions on the scoring items

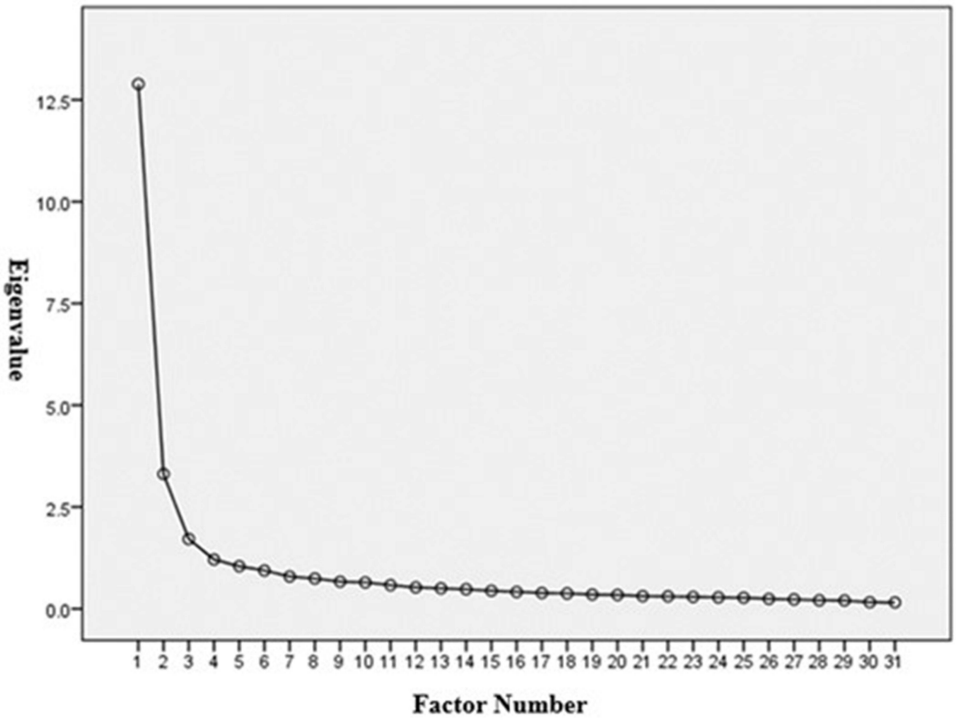

Figure 1 Scree plot for factor analysis of the MMtS-MHC-SP Scale.

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regarding medical mistrust, the 87 items were shortened to 59 items for the MMtS-MHC-SP, using a nine-point Likert scale (9: completely agree; 1: completely disagree). After going through EFA and principal component analysis, the researchers identified five factors and 31 items: "provider trustworthiness", "healthcare accessibility", "institutional integrity", "treatment justifiability", and "system reliability".

The five factors maintained in the MMtS-MHC-SP explained 65.051% of the total variance (see Table 2). Factor 1, related to "provider trustworthiness", included eight items and explained 41.578% of the variance. Factor 2, concerning "healthcare accessibility", consisted of six items and explained 10.675% of the variance. Factor 3, focused on "institutional integrity", included seven items and accounted for 5.524% of the variance. Factor 4, covering "treatment justifiability", had six items and explained 3.904% of the variance. Factor 5, related to "system reliability", consisted

Table 2 Rotated Factor Loading and Cronbach's α for the MMtS-MHC-SP Scale

Item	Factor 1: Provider Trustworthiness	Factor 2: Healthcare Accessibility	Factor 3: Institutional Integrity	Factor 4: Treatment Justifiability	Factor 5: System Reliability	Communality
Factor 1:α= 0.906						
9	**0.835**	0.168	−0.128	0.120	−0.095	0.765
8	**0.825**	0.021	−0.035	−0.035	0.051	0.686
6	**0.824**	0.080	0.195	−0.241	−0.084	0.789
7	**0.735**	0.276	0.038	−0.138	−0.048	0.639
10	**0.715**	−0.136	−0.016	0.252	0.000	0.593
11	**0.708**	−0.177	0.039	0.225	−0.023	0.585
5	**0.638**	0.173	0.272	−0.133	−0.186	0.563
12	**0.604**	−0.183	0.011	0.196	0.191	0.473
Factor 2:α= 0.885						
57	−0.010	**0.846**	−0.003	−0.016	−0.112	0.729
54	−0.041	**0.820**	0.048	−0.125	0.199	0.732
55	0.108	**0.792**	0.027	0.068	−0.020	0.645
59	−0.006	**0.679**	−0.063	0.176	0.122	0.511
56	0.188	**0.565**	−0.100	−0.002	0.302	0.456
58	0.131	**0.557**	−0.220	0.208	0.250	0.482
Factor 3:α= 0.894						
37	0.069	−0.012	**0.711**	0.137	−0.070	0.534
43	0.167	−0.160	**0.695**	0.067	0.017	0.541
31	0.101	−0.079	**0.683**	−0.072	0.217	0.535
32	−0.020	−0.108	**0.663**	−0.019	0.297	0.540
33	−0.115	0.222	**0.633**	0.237	−0.090	0.527
44	0.174	0.100	**0.631**	0.008	−0.008	0.439
34	0.039	−0.148	**0.582**	−0.077	0.395	0.524

(*Continued*)

Table 2 (Continued).

Item	Factor 1: Provider Trustworthiness	Factor 2: Healthcare Accessibility	Factor 3: Institutional Integrity	Factor 4: Treatment Justifiability	Factor 5: System Reliability	Communality
Factor 4:α= 0.859						
25	0.169	−0.056	−0.089	**0.771**	0.056	0.637
39	−0.054	0.166	0.139	**0.741**	−0.119	0.613
27	−0.197	0.174	0.056	**0.675**	0.088	0.536
19	0.189	−0.088	0.132	**0.576**	0.023	0.3932
24	0.223	−0.154	−0.004	**0.571**	0.205	0.442
41	−0.136	0.370	0.358	**0.514**	−0.180	0.580
Factor 5:α= 0.856						
50	−0.051	0.126	0.077	0.000	**0.769**	0.616
48	−0.122	0.070	0.089	0.100	**0.754**	0.606
49	−0.118	0.054	0.113	0.182	**0.692**	0.542
51	0.090	0.301	0.027	−0.206	**0.684**	0.610
Eigenvalue	9.163	5.757	9.268	8.783	8.276	
% of variance	41.578	10.675	5.524	3.904	3.370	

Notes: Overall α= 0.952; total variance explained is 65.051%. Factor loadings >0.5 are in bold.
Abbreviations: *S.D.* = Standard Deviation.

of four items and explained 3.370% of the variance. All five factors showed eigenvalues greater than one: 12.889, 3.309, 1.712, 1.210, and 1.045 (see Table 2). These results confirm the MMtS-MHC-SP scale's multidimensional nature.

Validities and Reliabilities of the MMtS-MHC-SP Scale in the EFA-Model

Because the literature review and most existing medical mistrust scales were published in English, the MMtS-MHC-SP scale was originally created in English and then translated into Mandarin Chinese, with two bilingual English teachers reviewing the translation. Following this, the scale was back-translated into English. To ensure accuracy, two Taiwanese researchers with advanced degrees in English compared the original and back-translated versions, making slight adjustments where necessary. Afterward, three experts assessed the final version for content validity. To further ensure clarity, three college students were selected to review the items and provide feedback to avoid potential ambiguity.

The internal reliability of each scale factor was also tested using Cronbach's Alpha. Generally, 0.8 or higher is preferred, and 0.7 is considered the minimum acceptable threshold.[64,65] The data gathered revealed that Cronbach Alpha values of the five subscales were 0.906, 0.885, 0.894, 0.859, and 0.856, and the scale's overall Cronbach alpha value was 0.952. These results suggest that the subscales/factors and the MMtS-MHC-SP scale have reasonably satisfactory reliabilities in evaluating participants' medical mistrust. Table 2 presents the internal consistency values and rotated factor loadings for the MMtS-MHC-SP scale.

Descriptive Statistics of the EFA-Model MMtS-MHC-SP Scale

Table 3 details the scale items, their average scores, and the standard deviations across the five subscales of the MMtS-MHC-SP scale.

Table 3 Scale Items, Average Scores, and Standard Deviations of the MMtS-MHC-SP Scale

Item	Mean	*S.D.*
Factor 1: Provider Trustworthiness	34.02	11.823
9. I am not sure that medical professionals fully consider the potential risks and benefits of different treatment options.	4.52	1.935
8. I suspect that medical professionals may not fully disclose potential treatment risks and side effects.	4.41	1.983
6. I believe patients may feel a lack of trust or sincerity in the medical provider-patient relationship.	4.43	1.885
7. I think patients may feel pressured to make decisions without adequate information.	5.09	1.970
10. I am skeptical about the clinical judgment of medical professionals.	3.71	1.871
11. I have concerns about the competence and professionalism of medical professionals.	3.66	1.804
5. I have reservations about the accuracy of medical advice provided by professionals.	4.41	1.944
12. I doubt whether medical professionals can effectively manage treatment side effects.	3.80	1.831
Factor 2: Healthcare Accessibility	35.97	9.362
57. I believe there is a staff shortage and excessive workload in Taiwan's medical facilities.	6.98	2.028
54. I think Taiwan's medical system has been having problems meeting the medical needs of rural areas.	6.12	2.074
55. I believe that patients from marginalized communities often receive poorer medical care.	6.13	1.888
59. I suspect that political interests may influence Taiwan's medical and healthcare policies and regulations.	5.65	1.987
56. I believe Taiwan's medical system has failed to adequately support patients' families and caregivers.	5.43	1.872
58. I believe Taiwan's medical system may lack an effective mechanism for handling patient complaints and dissatisfaction.	5.67	1.897
Factor 3: Institutional Integrity	31.37	10.496
37. I remain skeptical about the reliability and authenticity of medical research findings.	4.43	1.910
43. I think medical institutions may not pay enough attention to infection control and safety risks.	4.21	1.979
31. I doubt whether hospitals can effectively prevent medical errors and infections.	4.26	1.937
32. I am not sure whether medical institutions consistently adhere to ethical standards.	4.35	1.864
33. I believe that conflicts of interest among professionals may affect the effectiveness of patient treatment.	4.99	1.903
44. I think participants in medical research may not be adequately informed of potential risks.	4.79	2.004
34. I think the continuity and follow-up care provided by medical staff is insufficient.	4.34	1.827
Factor 4: Treatment Justifiability	27.10	9.076
25. I suspect that doctors' medical decisions might be swayed by how much money they can earn.	4.19	1.856
39. I believe that medical professionals may change their prescribing behavior after receiving pharmaceutical industry-sponsored education and training.	4.96	1.958
27. I believe that medical institutions sometimes prioritize profits over patient well-being.	4.57	2.091
19. I believe patients may be subjected to unnecessary surgeries or medical interventions.	4.27	1.896
24. I do not believe that medical professionals always communicate with patients or their families regarding any medical errors or complications.	3.90	1.963
41. I think that commercial interests may influence the results of medical research.	5.20	2.075

(*Continued*)

Table 3 (Continued).

Item	Mean	*S.D.*
Factor 5: System Reliability	18.60	6.325
50. I remain skeptical about the effectiveness of Taiwan's medical system in responding to public health emergencies.	4.56	1.889
48. I feel that Taiwan's medical system often fails to hold medical professionals accountable for their mistakes and negligence.	4.62	1.894
49. I doubt whether Taiwan's medical system is truly patient-centered.	4.46	1.841
51. I question the long-term sustainability of Taiwan's medical system in addressing future medical challenges.	4.97	1.946

CFA for the Medical Mistrust Scale (MMtS-MHC-SP)

The CFA conducted with AMOS[60] validated the same five scale factors and 31 items. All items retained in the factors of "provider trustworthiness" (8 items; factor loadings: 0.629–0.908), "healthcare accessibility" (6 items; factor loadings: 0.550–0.824), "institutional integrity" (7 items; factor loadings: 0.778–0.876), "treatment justifiability" (6 items; factor loadings: 0.757–0.879), and "system reliability" (4 items; factor loadings: 0.812–0.907) (see Figure 2).

Examination for Goodness of Fit

The study cross-checked the findings using various fit indices to look more closely at these two models' goodness of fit. To calculate the $\chi 2$/df ratio, the researchers divided the chi-square value by the degrees of freedom and compared the observed and expected results. There is minimal discrepancy between the observed and predicted outcomes when the *p*-value is closer to 0 (p-value < 0.05). However, there is a dispute on the proper $\chi 2$/df ratio. Some researchers suggest a range of 5.0 to 2.0;[61] others propose that a ratio of $\chi 2/\text{df} < 2.0$[68,69] signals a strong model fit. In terms of the TLI, higher TLI values indicate better fit, with a score above 0.95 considered excellent and a score of at least 0.90 deemed acceptable.[70,71] In terms of the CFI, a value of 0.95 or higher is deemed a good fit; a value of at least 0.90 is deemed acceptable.[72] In terms of SRMR, the value should be lower than <0.08.[61] The RMSEA index can be used to assess the difference between hypothesized and observed models.[73] A model fit is deemed great if the RMSEA index is less than 0.05, acceptable if it falls between 0.05 and 0.08, marginal if it falls between 0.08 and 0.10, and terrible if it exceeds 0.1.[74] Hu and Bentler[72] suggested that an RMSEA under 0.08 is adequate, while under 0.05 is excellent. The goodness-of-fit indices for the MMtS-MHC-SP scales, based on the CFA and EFA models, are presented in Table 4.

Convergent Validity

By examining the AVE values and composite reliabilities, the study evaluated the convergent validity of the MMtS-MHC -SP scale to determine whether the items converge and appropriately represent the underlying concept. When the AVE values are greater than 0.5 and less than the composite reliabilities, which ought to be greater than 0.6, convergent validity is verified.[65] Table 5 displays the AVE values and their respective composite reliability values for the five MMtS-MHC-SP scale factors: "provider trustworthiness" (AVE: 0.694; composite alpha: 0.940), "healthcare accessibility" (AVE: 0.496; composite alpha: 0.853), "institutional integrity" (AVE: 0.686; composite alpha: 0.939), "treatment justifiability" (AVE: 0.664; composite alpha: 0.922), and "system reliability" (AVE: 0.728; composite alpha: 0.914).[65,67] It is important to know that each AVE value was below the corresponding composite reliability value, which exceeded 0.70.

Discriminant Validity

When the square root of a factor's AVE $\left(\sqrt{\text{AVE}}\right)$ is larger than its correlation coefficient (r) with other factors, discriminant validity can be established. It is clear from the computation (see Table 6) that the requirement is met in discriminating between "provider trustworthiness" and "healthcare accessibility" ($\sqrt{\text{AVE}}$ = 0.833 and 0.704; r = 0.428), between "provider trustworthiness" and "institutional integrity" ($\sqrt{\text{AVE}}$ = 0.833 and 0.828; r = 0.805), between "provider trustworthiness" and "treatment justifiability" ($\sqrt{\text{AVE}}$ = 0.833 and 0.751; r = 0.751), between "provider

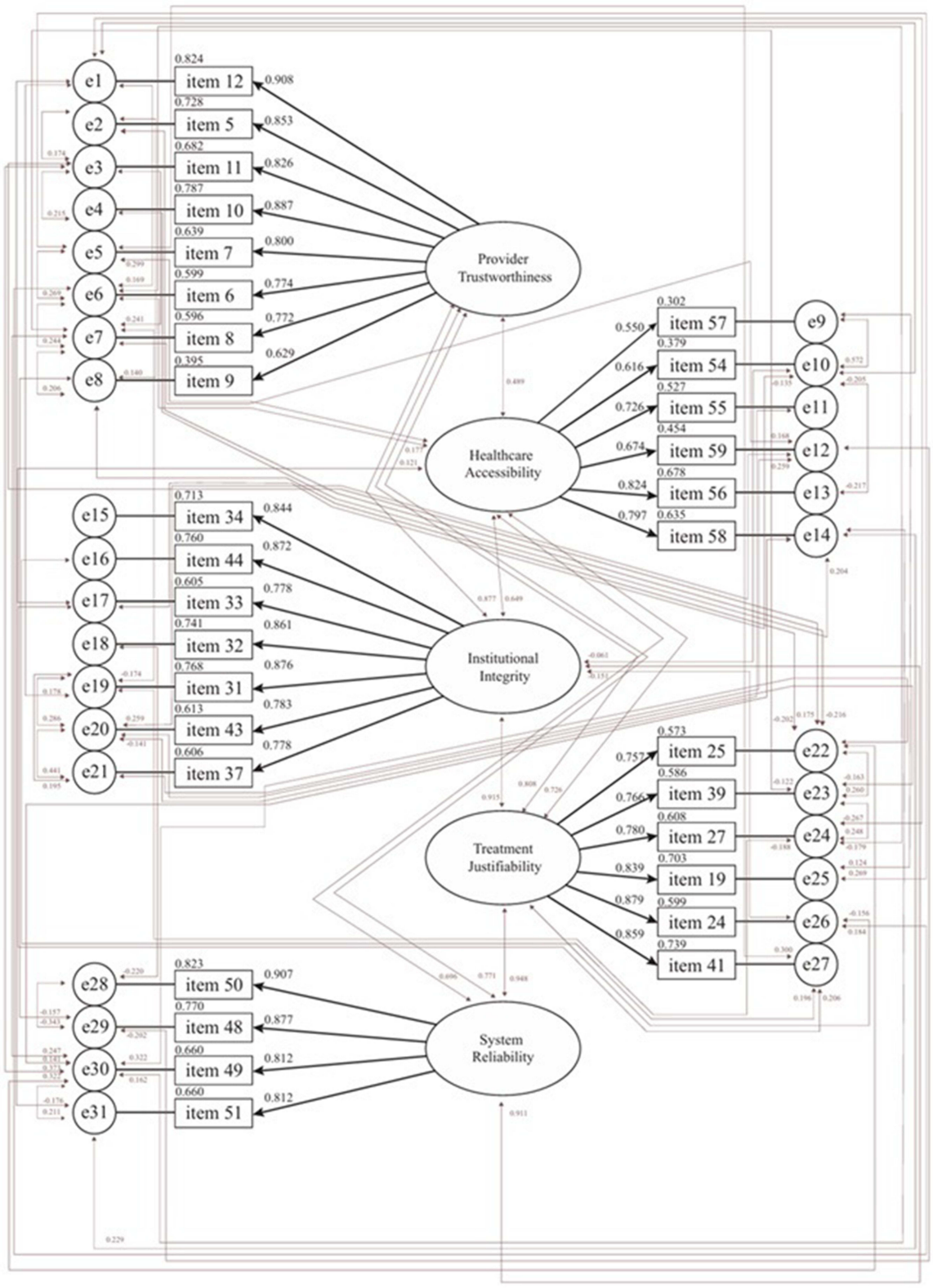

Figure 2 The CFA model of the MMtS-MHC-SP scale.

Table 4 Goodness-of-Fit Indexes of the EFA- and CFA-Model MMtS-MHC-SP Scale

	χ^2	*df*	χ^2/df	*p*	TLI	CFI	SRMR	RMSEA
EFA-model MMtS-MHC-SP	1060.94	424	2.74	0.000	0.88	0.89	0.0616	0.09
CFA-model MMtS-MHC-SP	468.67	366	1.28	0.000	0.98	0.99	0.0443	0.04

Abbreviations: *df*, degree of freedom; TLI, Tucker Lewis index; CFI, comparative fit index; RMSEA, root mean square error of approximation.

Table 5 AVE and Reliabilities the CFA-Model MMtS-MHC-SP Scale

Reliability / Factor	AVE	Composite Reliability Value	Cronbach's Alpha	McDonald's ω Coefficients
1. Provider Trustworthiness	0.694	0.940	0.941	0.938
2. Healthcare Accessibility	0.496	0.853	0.865	0.853
3. Institutional Integrity	0.686	0.939	0.943	0.939
4. Treatment Justifiability	0.664	0.922	0.917	0.922
5. System Reliability	0.728	0.914	0.912	0.914
Total	0.643	0.982	0.972	0.982

Abbreviation: AVE, average variance extracted.

Table 6 Square Root of a Factor's AVE $\left(\sqrt{\text{AVE}}\right)$ and Correlation Coefficients (r)

Factor	1	2	3	4	5
1. Provider Trustworthiness	**0.833**				
2. Healthcare Accessibility	0.428**	**0.704**			
3. Institutional Integrity	0.805**	0.539**	**0.828**		
4. Treatment Justifiability	0.751**	0.594**	0.751**	**0.815**	
5. System Reliability	0.710**	0.589**	0.758**	0.790**	**0.853**

Notes: The $\sqrt{\text{AVE}}$ values are displayed in bold. The remaining values are r. **p<0.01.

trustworthiness" and "system reliability" ($\sqrt{\text{AVE}}$ = 0.833 and 0.853; r = 0.710), between "healthcare accessibility" and "institutional integrity" ($\sqrt{\text{AVE}}$ = 0.704 and 0.828; r = 0.539), between "healthcare accessibility" and "treatment justifiability" ($\sqrt{\text{AVE}}$ = 0.704 and 0.815; r = 0.594, between "healthcare accessibility" and "system reliability" ($\sqrt{\text{AVE}}$ = 0.704 and 0.853; r = 0.589), between "institutional integrity" and "treatment justifiability" ($\sqrt{\text{AVE}}$ = 0.828 and 0.815; r = 0.751), between "institutional integrity" and "system reliability" ($\sqrt{\text{AVE}}$ = 0.828 and 0.815; r = 0.751), and between "treatment justifiability" and "system reliability" ($\sqrt{\text{AVE}}$ = 0.815 and 0.853; r = 0.790).

Reliabilities: Cronbach's Alphas, Composite Reliability (CR) Values, and McDonald's ω Coefficients

The internal consistency and stability of the CFA-model MMtS-MHC-SP scale were evaluated, confirming its effectiveness in measuring participants' medical mistrust. Cronbach's alpha, composite reliability (CR), and McDonald's ω values for all factors and the total scale exceeded 0.70, indicating excellent reliability.[64–66] Specifically, CR values were 0.940, 0.853, 0.939, 0.922, 0.914, and 0.982, Cronbach's α values were 0.941, 0865, 0.943, 0.917, 0.912, and 0.972, and McDonald's ω values were 0.938, 0.853, 0.939, 0.922, 0.914, and 0.982 for the factors of "provider trustworthiness", "healthcare accessibility", "institutional integrity", "treatment justifiability", "system reliability", and overall scale, respectively (see Table 5). All indices indicate excellent internal consistency across factors and the total scale.

Discussion

The study aimed to create a medical mistrust scale (MMtS-MHC-SP Scale) to measure medical mistrust among students and providers in Taiwan's clinical and healthcare settings. The researchers initially developed a preliminary 31-item MMtS-MHC-SP Scale using the EFA. The researchers conducted an in-depth analysis of the mean scores across the five identified factors to provide insights into various aspects of healthcare students' and providers' medical mistrust. Participants had the highest score on the "healthcare accessibility" subscale (Mean=6.00 per item: 35.97÷6=6.00), followed by "system reliability" (Mean=4.65), which corresponds with prior research[21,29,75,76] showing that limited access to timely, affordable care is strongly associated with medical mistrust. It can be suggested that participants strongly believe that healthcare access is neither equitable nor sufficient, perceiving significant barriers to accessing healthcare services. Concerns may stem from financial constraints, systemic inefficiencies, lengthy waiting times, or inequality in healthcare provision. Such obstacles may lead to delayed care, worsening health conditions, and increased financial burdens.[77–79] Recent research has also highlighted the importance of healthcare accessibility in developing trust across several settings. For example, Gagnon et al[80] identified healthcare accessibility as a crucial factor driving medical mistrust. Blendon and Benson[81] highlighted the decline in public trust in medical institutions over the past decades, suggesting these factors may contribute to this trend.

With a mean of 4.51, "treatment justifiability" had the third-highest mean score, indicating that individuals had moderate uncertainty regarding whether medical treatments and interventions are always guaranteed. This may be due to worry about inappropriate procedures,[82] overdiagnosis,[83] or financial motivations in treatment recommendations.[84] Even though some individuals believe that treatments are necessary and appropriate, a sizable section of the population may doubt that medical decisions are always made with the priority of patients' best interests.[85] This finding corresponds with growing global debates about overtreatment, overdiagnosis, and conflicts of interest in clinical decision-making,[86,87] as participants expressed doubts about whether care is consistently delivered in patients' best interests. With a mean score of 4.48 for "institutional integrity", participants demonstrated moderate mistrust, consistent with evidence that transparency and perceived integrity are critical in shaping trust toward healthcare institutions.[35,88] They also reflected broader concerns about financial conflicts of interest, such as pharmaceutical participation in physician education, which may undermine views of institutional integrity.[84,89,90] Interestingly, provider trustworthiness received the lowest mistrust rating, though still within the moderate level of mistrust, suggesting relatively greater trust in individual providers than institutions. This is consistent with Hall et al's[28] and other previous studies indicating that patients often separate their evaluation of physicians from their evaluation of healthcare systems.[28,91] However, factors such as perceived incapacity, poor communication, or unpleasant personal experiences might undermine this trust.[92,93]

When CFA was used to further investigate factorial validity, the same 31 items were produced, with factor loadings ranging from 0.550 to 0.908, which were higher than the established criterion.[65,66] All CEF-derived fit indexes for the MMtS-MHC-SP scale were satisfactory, indicating a suitable or sufficient model fit.[72,73] Compared to the EFA model, the CFA model exhibited a higher fit. This was indicated by a 0.10 increase in both TLI and CFI, a 0.05 decrease in RMSEA, and a 1.46 reduction in the $\chi 2$/df ratio. The MMtS-MHC-SP scale satisfied the requirements for both the discriminant validity and convergent validity tests. Both the CFA-derived and EFA-derived MMtS-MHC-SP scales showed strong internal consistency in terms of reliability.

Unlike previous scales that were primarily in Western contexts, the MMtS-MHC-SP offers an innovative theoretical contribution by extending the conceptualization of medical mistrust into Taiwanese healthcare settings to understand medical mistrust in Taiwan, thereby broadening the cultural scope of medical mistrust research. Moreover, the study's findings may help future healthcare practitioners better understand how mistrust influences patient behavior, treatment adherence, and willingness to seek care. It will also help them develop more empathetic and culturally sensitive care practices. However, there may be some limitations in the study. The scale was validated only among healthcare students and providers rather than patients, as mistrust in healthcare plays a crucial role in shaping medical students' professional development and directly affects providers' clinical decision-making and patient relationships. Hence, it may fail to capture the complexities of how patients experience mistrust in healthcare systems. Besides, mistrust varies across different populations, cultures, and healthcare settings. Therefore, the scale may not fully capture how ethical

considerations, regional contexts, or socioeconomic factors influence the experience of medical mistrust. Future studies may explore the use of the scale with patient populations and diverse community samples, while carefully assessing whether the items remain valid and reliable beyond the healthcare student and provider context.

Conclusion

The study aimed to create a comprehensive instrument for evaluating medical mistrust among healthcare students and providers. Drawing on data collected from a sample of 322 healthcare students and providers for an EFA and a separate sample of 233 participants for a CFA, the findings demonstrated that the MMtS-MHC-SP scale is a reliable and valid measure of medical mistrust within this population. Practically, the MMtS-MHC-SP scale may provide policymakers, educators, and healthcare administrators with a validated tool to assess and monitor medical mistrust, guide reforms, and design interventions to enhance healthcare students' and providers' trust in their peers and systems. By incorporating both interpersonal and institutional dimensions, the scale offers a comprehensive framework for guiding future research and designing appropriate educational interventions, training programs, or administration policies to enhance trust across healthcare settings. Moreover, by addressing the root causes of medical mistrust, these interventions, programs, or policies may help build a more trusting relationship between healthcare providers and the larger medical system, eventually enhancing patient care and health outcomes.

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Disclosure

The authors report no conflicts of interest in this work.

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