

# Malpractice Tendency Scale for Physiotherapists, Scale Development Study

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## What is already known on this topic?

- *Medical malpractice is a prevalent concern in healthcare, with significant implications for patient safety and professional accountability.*
- *Despite its importance, there is no standardized, profession-specific tool to evaluate malpractice tendencies among physiotherapists.*
- *Identifying factors contributing to malpractice, such as institutional conditions, patient communication, and individual professional competencies, is essential but remains underexplored in physiotherapy research.*

## What this study adds on this topic?

- *This study introduces the first validated and reliable scale specifically designed to assess malpractice tendencies among physiotherapists.*
- *The Malpractice Tendency Scale for Physiotherapists (MTSP) can be used to inform and improve educational curricula, ensuring future physiotherapists are better equipped to minimize risks in clinical practice.*
- *The MTSP provides a practical tool for professional self-evaluation, educational program development, and targeted interventions to enhance patient safety and clinical quality in physiotherapy.*

## ABSTRACT

**Objective:** The Malpractice Tendency Scale for Physiotherapists (MTSP) was developed to assess physiotherapists' malpractice tendencies, addressing a gap in patient safety and professional standards. This pioneering tool provides a valid and reliable way to measure malpractice risks specific to physiotherapy. The MTSP aims to improve professional conduct and patient outcomes by enabling physiotherapists to systematically evaluate and enhance their practice. This study aimed to develop a valid and reliable scale to measure the malpractice tendencies of physiotherapists, ultimately enhancing patient safety and elevating professional standards.

**Methods:** This methodological scale-development study was conducted among 351 physiotherapists working across diverse healthcare settings in Türkiye between 2023 and 2024. Data were collected online using a snowball sampling approach. The development process proceeded through sequential phases, including an extensive literature review, creation of an item pool, expert evaluation, calculation of the content validity ratio, pilot administration, and large-sample psychometric testing. Construct validity was examined through exploratory factor analysis (EFA) with 217 participants and confirmatory factor analysis (CFA) with 134 participants. Reliability analyses included Cronbach's alpha, item-total correlations, and subscale consistency assessments.

**Results:** The MTSP demonstrated high reliability (Cronbach's  $\alpha=0.89$ ). The EFA identified a 3-factor structure (institutional, patient-related, and personal) with 15 items. At the sub-factor level, the Cronbach's  $\alpha$  values were 0.68 for factor 1, 0.72 for factor 2, and 0.87 for factor 3. The CFA confirmed the construct validity with excellent fit indices ( $\chi^2/df$ , standardized root mean square residual, comparative fit index, and incremental fit index).

**Conclusion:** A valid and reliable scale was developed to enable physiotherapists to objectively evaluate malpractice tendencies and gain insight into their causes, thereby improving their professional performance. It is thought that MTSP will increase patient safety in physiotherapy by contributing to educational programs and professional development activities.

**Keywords:** Confirmatory factor analysis, cronbach alpha, explanatory factor analysis, malpractice tendency, scale development study

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## Introduction

Physiotherapy is a health discipline focused on treating and preventing the loss of physical function resulting from injury, disease, or disability. Physiotherapists are essential healthcare professionals who help patients regain their functional abilities and improve their quality of life.<sup>1,2</sup> Due to the nature of physiotherapy practices, which often involve long-term, hands-on treatments and independent clinical decision-making, there is a high potential for professional error. These errors may stem from the intense work tempo, workplace conditions, or limitations in clinical judgment. As in all other health professions, physiotherapy practices carry inherent risks that can lead to malpractice.<sup>3</sup>

In the literature, errors caused by healthcare professionals in their practice are referred to as malpractice. Malpractice is defined as harm to the patient caused by a healthcare professional's lack of knowledge, skill, or attention. Malpractice can negatively affect patient health and damage the professional reputation of the healthcare professional. Therefore, it is necessary to continuously evaluate and improve the professional practices of healthcare professionals to enhance the quality of healthcare services and patient safety.<sup>4</sup> Identifying the malpractice tendencies of physiotherapists and developing effective strategies to minimize these tendencies is critical for both increasing patient safety and raising professional standards. A study conducted in Türkiye titled "Evaluation of Awareness and Knowledge Levels of Physiotherapists About Medical Errors (Malpractice) in Türkiye" reported that physiotherapists experience serious concerns regarding medical errors. The study found that 40.8% of physiotherapists face significant challenges related to medical errors in physiotherapy, highlighting a substantial gap in knowledge and professional competence.<sup>4</sup> Despite this, there is a notable lack of training programs and scholarly research addressing malpractice within the professional domains of physiotherapists. Globally, studies suggest that while physiotherapists are less frequently subject to malpractice lawsuits than physicians, the complexity of their independent clinical roles still exposes them to considerable legal and ethical risks, particularly in musculoskeletal and neurological rehabilitation settings.<sup>3</sup> However, to the best of knowledge, no specific scale in the literature evaluates malpractice tendencies in physiotherapists. This deficiency makes it challenging to determine the risks that physiotherapists may encounter in their professional practices and the measures that can be taken to reduce them.<sup>4</sup> Although tools such as the Malpractice Attitude Scale for Nurses (MAS-N) and instruments measuring error-reporting behavior are available in other health professions,<sup>5</sup> a framework tailored to the unique clinical responsibilities of physiotherapists is notably absent. In response to this need, the Malpractice Tendency Scale for Physiotherapists (MTSP) was developed as a psychometrically robust instrument to identify factors associated with malpractice risk. The scale encompasses key dimensions, including institutional infrastructure, patient-related variables, and individual professional competencies, providing a comprehensive assessment of the elements that may contribute to clinical error.

The primary objective of this study is to develop and validate the MTSP as a reliable and practical tool for physiotherapists. By enabling practitioners to evaluate their clinical practice and recognize potential risk areas, the scale aims to enhance professional standards and contribute to patient safety. Additionally, the MTSP is expected to inform educational curricula and guide professional development initiatives.

The following research question guided this study:

What are the underlying dimensions of malpractice tendency among physiotherapists, and how can these be reliably and validly measured using a standardized scale?

## Methods

### Research Design

This study employed a methodological research design, which is commonly used in instrument development studies to establish the validity and reliability of a new scale. The design involved multiple sequential stages, including literature review, item generation, expert validation, pilot testing, and statistical validation through EFA and CFA. The primary aim was to develop a psychometrically sound scale (MTSP) to measure physiotherapists' tendencies toward malpractice.

### Type of Research

This research was designed with a methodological approach, utilizing the snowball technique, to develop the MTSP and to conduct its validity and reliability study. The study announcement and survey link were initially shared through professional physiotherapy associations, university mailing lists, and social media platforms such as WhatsApp and LinkedIn groups relevant to physiotherapy. Participants who received the survey were asked to forward it to other eligible physiotherapists in their network.

### Population and Sample of the Research

The research population consisted of physiotherapists working in Türkiye between 2023 and 2024. The number of items in the MTSP was considered when determining the sample size. It was aimed to reach a sample size of 5 to 20 times<sup>6</sup> the number of the 21 items in the draft scale, as suggested in the literature. Based on this information, the study population consisted of 351 individuals over 20 who agreed to participate in the research and did not have communication problems. The results of all physiotherapists who agreed to participate in the study were evaluated. Therefore, the sample size was 16.7 times the number of items.

### Data Collection Tools

The data for the research were collected using the "Personal Information Form and Draft MTSP."

### Personal Information Form

This form, prepared by the researchers, consists of a total of 8 questions that capture the identifying characteristics of the individuals, including age, gender, marital status, education level, years of experience, institution of employment, field of employment, and weekly working hours. The MTSP was finalized and prepared for the data collection process during development.

### Literature Review and Creation of the Item Pool

Researchers conducted a literature review on malpractice in physiotherapy. They examined databases such as Scopus, Web of Science, PubMed, ScienceDirect, YökTez, Google Scholar, and Ulakbim, using keywords including "physiotherapy," "malpractice," "medical error," "professional liability," "patient safety," and "scale development," in both Turkish and English. The review compiled existing studies on physiotherapists' malpractice tendencies, types of professional errors, reasons for mistakes, and patient safety. Based on this review, a conceptual framework was developed, and an item pool of 35 items was created. According to the literature, the items should adhere to language rules, reflect the relevant concept, be simple and understandable, convey a single judgment or thought, and be written in the present tense.<sup>7</sup> Accordingly, the items were designed with consideration of the specified grammar rules. The scale was organized into 22 items. It was determined that a Likert-type scoring system was the most appropriate, as it is a widely used and straightforward method. Item responses were created using a 5-point Likert scale, ranging from "strongly disagree" to "strongly agree," with each item scored between 1 and 5.<sup>8</sup>

## Ensuring Content Validity

The content validity rate of the items in the scale and the content validity index of the scale were evaluated using the Davis Technique.<sup>9</sup> In this technique, the “content validity rate for the item” is obtained by dividing the number of experts who rate the suitability of an item by the total number of experts. The content validity index is calculated by averaging the content validity rates of all items. It is recommended that the content validity ratio and content validity index be greater than 0.80.<sup>10</sup> In the study, the item pool of the scale was presented for evaluation to 16 experts working as physiotherapists. The working areas of physiotherapists are pediatrics rehabilitation, neurological rehabilitation, orthopedic rehabilitation, physiotherapy, and rehabilitation. Following this evaluation, 1 item was removed from the scale because its content validity rate was 0.63. Consequently, the content validity index of the scale was calculated to be 0.94.

## Pilot Study

Following expert opinions, the scale must be prepared for the data collection process, and a preliminary study must be conducted by applying it to a small sample group representing the target population.<sup>11</sup> A pilot application was conducted with 40 participants using the 21-item MTSP draft form created based on expert opinions. The draft scale was finalized for the main application phase by correcting any unclear expressions in the scale items.

## Data Collection

The MTSP participation link, prepared via Google Forms, was sent to the participants. The purpose of the study was explained to the physiotherapists, and those who agreed to participate were asked to fill out the form after providing their consent via the link.

## Data Analysis

The data analysis was conducted using IBM SPSS Statistics version 22 (IBM SPSS Corp.; Armonk, NY, USA) alongside IBM SPSS Amos. Content validity was assessed using the content validity index, based on expert opinions. Structural validity was examined through EFA and CFA within the framework of structural equation modeling.<sup>12</sup> The EFA process included the Kaiser–Meyer–Olkin (KMO) test, Bartlett’s test of sphericity, anti-image correlation, principal components analysis, and Varimax rotation. For CFA, a comprehensive set of tests was utilized, including  $\chi^2$ ,  $\chi^2/SD$ , goodness of fit index (GFI), adjusted GFI, comparative fit index (CFI), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), normed fit index (NFI), Tucker-Lewis index, incremental fit index (IFI), parsimonious GFI, and parsimonious NFI. Reliability analysis was conducted using Cronbach’s  $\alpha$ , the Spearman-Brown prediction formula, the Guttman split-half coefficient, and the item-total correlation test.<sup>13</sup> Notably, all data and analyses were carried out by a team of researchers, ensuring a blinded approach throughout the study. The MTSP was administered to 30 individuals to emphasize and assess the scale’s temporal stability, with evaluations conducted 15 days apart.<sup>14</sup> Examining the pre-test and post-test scores using Pearson’s correlation method yielded a notably strong and statistically significant relationship ( $r=0.962$ ,  $P < .01$ ,  $n=30$ ).

## Ethics Committee Approval

Before commencing the research, ethical approval was obtained from Erzurum Technical University Scientific Research and Publication Ethics Committee (Date: May 30, 2022, Meeting Number: 5, Decision Number: 8).

## Results

Of the 351 participants in the study, 190 (54.1%) were female, and 161 (45.9%) were male physiotherapists. The average age of the female physiotherapists was  $31.91 \pm 7.07$ , and the average age of the male

physiotherapists was  $34.28 \pm 7.02$ . Among the participants, 140 (39.9%) were single, and 211 (60.1%) were married. The average weekly working hours for female physiotherapists were  $38.13 \pm 10.14$ , while for male physiotherapists it was  $39.98 \pm 9.69$ . The individual characteristics of the participants regarding the physiotherapist profession are shown in Table 1.

## Reliability Analysis

Item-total correlation and Cronbach’s Alpha tests were conducted to assess internal consistency within the scope of reliability. A Cronbach’s  $\alpha$  coefficient above 0.80 indicates high reliability.<sup>15</sup> The Cronbach’s  $\alpha$  value of the MTSP draft scale was 0.89. The item total score correlation values for the draft scale ranged between 0.41 and 0.85. At the sub-factor level, the Cronbach’s  $\alpha$  values were 0.68 for factor 1, 0.72 for factor 2, and 0.87 for factor 3.

## Explanatory Factor Analysis of Malpractice Tendency Scale for Physiotherapists

Exploratory factor analysis (EFA) was conducted to determine the structural validity of the MTSP and reveal its factor structure. Principal components analysis and Varimax rotation methods were adopted for the factor analysis.<sup>16</sup> First, the KMO sample adequacy value was 0.892, indicating that the sample size was sufficient for explanatory factor analysis. A KMO value above 0.50 is considered enough, and values between 0.80 and 0.90 are classified as “great”.<sup>17</sup> The KMO values calculated for each item were at least 0.814, confirming that the sample was sufficient. Additionally, the Bartlett Test resulted in  $\chi^2(210)=1717.233$ ,  $P < .05$ , indicating that the correlations between the items were strong enough for explanatory factor analysis.<sup>17</sup> At the end of this process, it was concluded that the sample size 217 was sufficient. During the EFA, items were allocated to sub-factors based on their statistical and conceptual coherence. Six items (specifically Items 3, 5, 12, 13, 14, and 15) were excluded from the final version of the scale due to low factor loadings (below 0.50) and/or substantial cross-loadings that compromised the factorial clarity of the instrument. Each of these items was subsequently reviewed for theoretical relevance to ensure that their exclusion did not diminish the conceptual integrity of the scale. For example, Items 3 and 5, which pertained to inadequate patient communication and deviation from institutional

**Table 1.** The Individual Characteristics of the Participants Regarding the Physiotherapist Profession

Characteristic	Female (%)	Male (%)
Participants	54.1	45.9
Education status		
Bachelor’s degree	63.8	60.4
Master’s degree	24.1	21.8
Doctoral degree	12.1	17.8
Institution of employment		
University hospital	21.6	25.7
City hospitals	25.9	27.7
Other public institutions	11.2	9.9
Private hospital	6.9	5.9
Private clinic	7.8	9.9
Rehabilitation centers	26.7	17.8
Sports club	0	2.0
Academician	0	1.0
Area of clinical practice		
Pediatrics rehabilitation	19.0	14.9
Neurological rehabilitation	11.2	13.9
Orthopedic rehabilitation	16.4	33.7
Physiotherapy and rehabilitation	53.4	37.6

standards, appeared to be interpreted inconsistently by respondents, likely reflecting variations in organizational policies and individual clinical practices. Likewise, Items 12 and 13, which addressed aspects of clinical monitoring and evidence-based practice, demonstrated conceptual ambiguity and cross-loaded onto multiple latent factors, undermining their discriminant validity. Items 14 and 15, despite their ethical significance, yielded weak or diffuse loadings, potentially due to socially desirable response tendencies or context-specific interpretations related to institutional approval mechanisms. Accordingly, the decision to remove these items was grounded in empirical performance and conceptual alignment, consistent with best practices in psychometric scale development.<sup>16</sup> As a result, the MTSP consists of a 3-dimensional (factor) structure with 15 items (Table 2). According to Table 2, the first subdimension comprises 8 items, the second consists of 4 items, and the third includes 3 items. Factor loadings were found to be at least 0.501. Since factor loadings of 0.40 and above are considered ideal, the items were assessed as making significant contributions to their respective factors.<sup>18</sup> Additionally, the factors were named Institutional, Patient, and Personal, respectively.

The study also measured the correlations of the item subdimensions with the overall scale. It was observed that the MTSP scale items were highly correlated with the total subscale and overall scale scores, which were statistically significant (Table 3).

#### Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted using the factor structures identified in the original scale to verify the construct validity

of the MTSP Scale. This analysis was performed with a sample of 134 different participants. In CFA, it is expected that the factor loading for each subdimension to which the relevant items belong should exceed 0.30.<sup>19</sup> The analyses determined that the items' factor loadings were above 0.30, indicating that they should be included in the scale. The GFI statistics were examined to assess whether the data set supported the model evaluated by CFA. Since the Chi-square ( $\chi^2$ ) value is susceptible to sample size, it is recommended to use the ratio of the  $\chi^2$  value to the degrees of freedom rather than the  $\chi^2$  value alone to evaluate model fit.<sup>19</sup> In addition to the  $\chi^2/df$  ratio, several other fit indices were used to assess model fit, including the RMSEA, SRMR, NFI, CFI, GFI, and IFI. The fit indices obtained from the CFA are presented in Table 4. The fit values were evaluated based on the reference values reported by Byrne.<sup>20</sup> The fit indices ranged from acceptable to excellent (Table 4). According to the analysis results, the  $\chi^2/df$ , SRMR, CFI, and IFI values met the criteria for a perfect fit, while the RMSEA, NFI, and GFI values were within acceptable compliance limits. The items were deemed important for the relevant factors. The path diagram analysis confirmed that the obtained values were appropriate regarding item-factor fit (Figure 1).

#### Discussion

This study aims to develop a valid and reliable scale to measure the malpractice tendencies of physiotherapists. This scale will provide a tool for physiotherapists to evaluate their practice objectively, identify potential risk areas, and thus enhance their professional performance. It will enable physiotherapists to recognize the risks associated with

**Table 2.** MTSP 3-Factor Structure, Items, Explained Variance and Factor Loadings

Items	Factors and Expressions	Factor Loadings		
		Factor 1	Factor 2	Factor 3
<b>1. Factor (Institutional)</b>				
6	“In preventing the tendency for medical errors,” I believe that my workplace’s technical infrastructure (treatment materials, institutional features, etc.) is essential.	0.514		
11	“In preventing the tendency for medical errors,” I believe that legislation related to the health field is adequate.	0.588		
16	“In preventing the tendency for medical errors,” I believe that it is necessary to work within the scope of professional job descriptions in the workplace.	0.501		
17	“In preventing the tendency for medical errors,” I believe that work intensity is a significant factor.	0.756		
18	“In preventing the tendency for medical errors,” I believe that establishing effective communication (therapeutic communication) with the patient is essential.	0.788		
19	“In preventing the tendency for medical errors,” I believe that multidisciplinary work is essential.	0.642		
20	“In preventing the tendency for medical errors,” I believe that providing information to patients and their relatives about preventive rehabilitation practices is crucial.	0.776		
21	“In preventing the tendency for medical errors,” I believe that taking the necessary protective measures is essential.	0.549		
<b>2. Factor (Patient)</b>				
7	“In preventing the tendency for medical errors,” I believe that it is important for medical information about the patient to be clear and understandable.	0.548		
8	“In preventing the tendency for medical errors,” I believe that I should always verify any unclear medical information about the patient.	0.701		
9	“In preventing the tendency for medical errors,” I believe that it is necessary to share all pertinent information about the patient during patient transfer.	0.670		
10	“In preventing the tendency for medical errors,” I believe that the patient’s compliance with the treatment process is essential.	0.631		
<b>3. Factor (Personal)</b>				
1	“In preventing the tendency toward medical errors,” I believe that it is important to enjoy the profession.		0.730	
2	“In preventing the tendency toward medical errors,” I believe that it is necessary to evaluate the patient in detail for treatment.		0.802	
4	“In preventing the tendency toward medical errors,” I believe that the level of theoretical knowledge about the profession is effective.		0.577	
Explained variance, % total = 48.44		34.501	7.455	6.486

**Table 3.** MTSP Correlation of the Items with the Subdimension and Scale Total Score

Items	Item–Subdimension Correlation		Item–Scale Total Score Correlation		
	<i>r</i>	<i>P</i>	<i>r</i>	<i>P</i>	
Institutional	6	0.652	.0001	0.613	.0001
	11	0.740	.0001	0.681	.0001
	16	0.646	.0001	0.618	.0001
	17	0.741	.0001	0.638	.0001
	18	0.799	.0001	0.716	.0001
	19	0.727	.0001	0.690	.0001
	20	0.787	.0001	0.695	.0001
Patient	21	0.704	.0001	0.693	.0001
	7	0.696	.0001	0.692	.0001
	8	0.768	.0001	0.531	.0001
	9	0.776	.0001	0.589	.0001
Personal	10	0.714	.0001	0.571	.0001
	1	0.832	.0001	0.475	.0001
	2	0.809	.0001	0.535	.0001
	4	0.711	.0001	0.576	.0001

medical errors and minimize the negative consequences arising from such errors. Additionally, the scale aims to improve patient safety in physiotherapy by contributing to the development of training programs and professional development activities. The scale produced by this study will serve as a significant resource for monitoring and evaluating malpractice tendencies among physiotherapists in both academic and clinical settings. While the MAS-N and similar instruments in other healthcare professions focus on malpractice tendencies in those settings,<sup>5</sup> the MTSP specifically addresses the unique challenges faced by physiotherapists. Similarities between these scales include their focus on areas such as knowledge, communication, and institutional policies, all of which are reflected in the MTSP's factors (institutional, patient-related, and personal).<sup>5</sup> However, the key difference lies in the context-specific nature of the MTSP, which is designed for the physiotherapy profession. While nursing malpractice scales assess broader healthcare-related risks, the MTSP is tailored to the rehabilitation context, focusing on aspects such as hands-on patient care, physical treatment modalities, and specific risk factors like patient compliance with treatment. These distinctions make the MTSP an essential tool for identifying risks specific to physiotherapy, thus complementing the broader healthcare malpractice scales. The MTSP fills a significant gap in physiotherapy research by providing a profession-specific tool to evaluate malpractice tendencies. Unlike scales used in other

healthcare disciplines, the MTSP takes into account the specialized knowledge required in physiotherapy and addresses factors unique to the practice, such as physical therapy techniques, patient interactions, and interdisciplinary collaboration. The insights gained from this scale can directly inform educational curricula and professional development activities tailored to physiotherapists, enhancing their ability to reduce malpractice risks. This contribution to the field is crucial as it targets the nuances of physiotherapy practice that influence both patient outcomes and professional safety, which general healthcare malpractice scales do not fully capture.

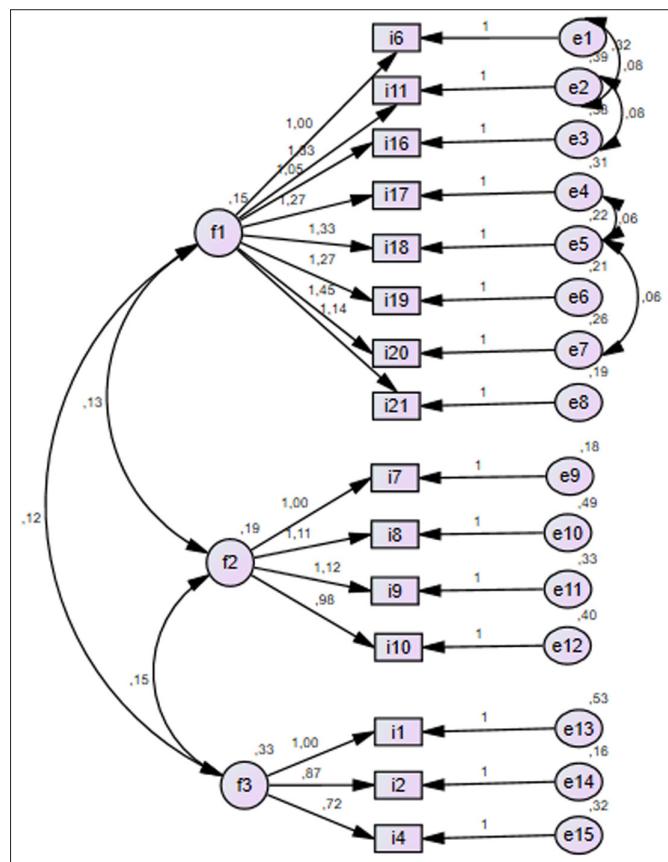
To the best of knowledge, no existing scale in the literature explicitly assesses physiotherapists' malpractice tendencies. The research included 351 participants, comprising male and female physiotherapists working in various health institutions across Türkiye. The demographic analysis revealed a diverse sample of age, gender, marital status, educational background, and work environment. This diversity enhances the generalizability of the findings, indicating that the developed scale applies to a broad range of physiotherapists with varying backgrounds and experiences. The internal consistency reliability, measured by Cronbach's  $\alpha$  for the entire scale, was found to be 0.89, demonstrating high reliability.<sup>21</sup> The scale demonstrated an acceptable high level of reliability, with Cronbach's  $\alpha$  values of 0.87, 0.72, and 0.68 for the 3 factors identified as subdimensions. These subscales reflect distinct dimensions of medical error tendencies, including institutional, patient-related, and personal factors. The solid internal consistency between the scale and its subscales indicates that the items within each factor are well correlated and measure the same underlying construct. This reliability is crucial for ensuring that the scale accurately assesses medical malpractice tendencies and helps physiotherapists identify potential risk areas. Additionally, the scale is a valuable resource for self-assessment, professional development, and enhancement of patient care within physiotherapy.

The EFA conducted for the MTSP confirmed solid construct validity, demonstrating the scale's effectiveness in capturing the underlying dimensions of malpractice tendencies. Principal Component Analysis and Varimax Rotation revealed a clear factor structure, with a KMO measure of sampling adequacy of 0.892. This high KMO value indicates that the sample size was adequate for factor analysis and falls into the "great" category.<sup>22</sup> Individual KMO values for each item were above 0.814, confirming the scale items' appropriateness. Bartlett's test of sphericity produced a significant result ( $\chi^2(210)=1717.233, P < .05$ ), indicating that the correlations between items were sufficiently robust for EFA. The analysis ultimately identified a 3-factor structure encompassing

**Table 4.** Confirmatory Factor Analysis Goodness of Fit Indices and Normal Values

Index	Normal Value	Allowable Value	Measurement	Result
$\chi^2$ "P" Value	$P > .05$	—	0.000	Perfect compatibility
$\chi^2/SD$ (CMIN/DF)	<2	<5	2.353	Allowable compatibility
GFI	>0.95	>0.90	0.888	Allowable compatibility
AGFI	>0.95	>0.85	0.838	Allowable compatibility
CFI	>0.95	>0.90	0.907	Perfect compatibility
RMSEA	<0.05	<0.08	0.079	Allowable compatibility
SRMR	<0.05	<0.08	0.036	Perfect compatibility
NFI	>0.95	>0.80	0.851	Allowable compatibility
TLI	0.95 < TLI < 1	0.90 < TLI < 0.94	0.907	Allowable compatibility
IFI	>0.90	—	0.909	Perfect compatibility
PGFI	>0.89	>0.50	0.614	Allowable compatibility
PNFI	>0.89	>0.50	0.851	Allowable compatibility

AGFI, adjusted goodness of fit index; CFI, comparative fit index; CMIN/DF, Chi-square to degrees of freedom ratio; GFI, goodness of fit index; IFI, incremental fit index; NFI, normed fit index; PGFI, parsimony goodness of fit index; PNFI, parsimonious normed fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; TLI, Tucker-Lewis index.



**Figure 1.** Confirmatory factor analysis diagram in malpractice tendency scale for physiotherapists.

institutional, patient-related, and personal factors dimensions, each reflecting different malpractice tendencies. These factors enhanced the scale's comprehensiveness by explaining a substantial portion of the variance. As a result, 6 items (3rd, 5th, 12th-15th) were removed due to their factor loadings being below the 0.50 threshold recommended in the literature.<sup>16</sup> This revision led to a more concise, 15-item scale, ensuring that each item significantly contributed to its respective factor. The factor loadings of the remaining items were at least 0.501, meeting the practical significance threshold for factor analysis.<sup>23</sup> The identified factors—institutional, patient, and personal—align with theoretical expectations and offer a structured framework for assessing malpractice tendencies among physiotherapists. High factor loadings within these dimensions demonstrate strong item-factor relationships, enhancing the scale's validity. Additionally, the significant correlations between subscale scores and the overall scale score underscore the integrated nature of the malpractice tendencies construct. In summary, the EFA results affirm the MTSP's validity as a reliable tool for evaluating malpractice tendencies in physiotherapy. This scale aids in identifying risk areas, guiding professional development, and ultimately contributing to increased patient safety in physiotherapy practice. The robust psychometric properties established in this study support the use of the MTSP in clinical settings and research, making it a valuable resource for improving the quality of physiotherapy services.

The construct validity of the MTSP was rigorously assessed through CFA, which confirmed the robustness and applicability of the scale in evaluating medical malpractice tendencies among physiotherapists. The study aimed to verify the factor structures identified in the original scale and ensure that each item's factor loading exceeded the 0.30 threshold. This evaluation confirmed that all items met this criterion and were thus retained in the scale.

Several GFI were examined to assess model fit, as relying solely on the Chi-square ( $\chi^2$ ) value can be misleading due to its sensitivity to sample size. Therefore, additional fit indices such as the ratio of  $\chi^2$  to degrees of freedom ( $\chi^2/df$ ), RMSEA, SRMR, NFI, CFI, GFI, and IFI were also considered. These indices comprehensively evaluate how well the proposed model fits the observed data.<sup>24</sup> The analysis revealed that  $\chi^2/df$ , SRMR, CFI, and IFI values met the criteria for an excellent fit, indicating a robust model fit with the data. Additionally, RMSEA, NFI, and GFI values remained within acceptable ranges, confirming the adequacy of the model. These results, presented in Table 4, indicate that the model ranges from allowable to perfect fit based on the criteria established by Byrne.<sup>20</sup> The fit indices collectively demonstrate that the MTSP is a valid and reliable instrument, with each item contributing significantly to the relevant factor. The path diagram further confirms the appropriateness of the item-factor relationships by showing the strong fit between the theoretical model and the empirical data.

The CFA results confirm the structural integrity and validity of the MTSP. The scale's robust psychometric properties highlight its utility in identifying and addressing malpractice tendencies in the physiotherapy profession. Ultimately, the MTSP is essential for improving professional standards and patient safety in physiotherapy by providing a robust framework for continuous evaluation and improvement in clinical practice.

### Strengths and Limitations

This study has a limitation that should be acknowledged. The study was conducted solely among physiotherapists in Türkiye, which may limit the generalizability of the findings to other cultural or healthcare contexts. Despite this limitation, the study provides an essential step in developing a profession-specific tool for assessing malpractice risk in physiotherapy practice.

### Conclusion

In conclusion, the development and validation of the MTSP represent a significant advancement in assessing malpractice tendencies in the physiotherapy profession. Through extensive exploratory and confirmatory factor analyses, the MTSP has demonstrated solid psychometric properties, including high reliability and validity. The 3-factor structure of the scale, encompassing institutional, patient-related, and personal dimensions, provides a nuanced understanding of various aspects of malpractice tendencies. These factors reflect the diverse elements contributing to potential errors in clinical practice and enable targeted interventions and professional development. The MTSP is a valuable tool for physiotherapists to evaluate their practice objectively, identify potential risk areas, and implement mitigation strategies. Additionally, the scale's application extends to shaping training programs and professional development activities, ultimately enhancing patient safety and the quality of care in physiotherapy. The MTSP stands out as a crucial resource for academic research and clinical practice, offering a structured framework for continuous improvement in physiotherapy and filling a critical gap in the literature.

**Data Availability Statement:** The data that support the findings of this study are available on request from the corresponding author.

**Ethics Committee Approval:** Ethical committee approval was received from the Scientific Research and Publication Ethics Committee of Erzurum Technical University (Approval no: 5/8, Date: 30.05.2022)

**Informed Consent:** Written informed consent was obtained from participants who participated in this study.

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