

# Development of a Reliable and Valid Questionnaire to Measure the Knowledge, Attitudes, and Behaviors of Nurses Caring for Traumatic Brain Injury Patients with Cognitive–Social Communication Deficits

## Abstract

**Background:** Nurses are in the critical position of effectively communicating with patients with traumatic brain injury and their families.






**Aim:** The aims of this study were to develop and test the reliability and validity of a questionnaire to determine nurses' knowledge, attitudes, and behaviors on the cognitive–social communication skills of patients with traumatic brain injury.

**Methods:** Eighty-three nurses participated in this cross-sectional pilot study. Reliability–validity analyses were carried out using exploratory and confirmatory factor analysis.

**Results:** Exploratory–confirmatory factor analysis results were above the cutoff levels for the 3 subdimensions. The reliability coefficients were reported to be high. Responses were positively distributed among the 3 subdimensions.

**Conclusion:** The questionnaire was found to be reliable and valid. Results indicate that rehabilitation nurses' behaviors support cognitive and social communication in their routine interactions with traumatic brain injury patients.

**Keywords:** Cognitive impairments, nurse–patient communication, nursing care, social communication, traumatic brain injury

Mariam Kavakcı<sup>1,2</sup> ,  
Halil Tayyip Uysal<sup>1,2</sup> , Melike Ural<sup>2</sup> ,  
Rojda Özalp<sup>2</sup> , Seher Merve Ay<sup>2</sup> 

<sup>1</sup>Department of Speech and Language Therapy, Faculty of Health Sciences, Ankara Yıldırım Beyazıt University, Ankara, Türkiye

<sup>2</sup>Department of Physical Medicine and Rehabilitation, Ankara City Hospital, Ankara, Türkiye

## Introduction

Traumatic brain injury (TBI) is defined as neurological dysfunction that disrupts the normal function of the central nervous system.<sup>1</sup> Patients with TBI show features such as a change in the level of consciousness, memory loss, orientation problems, and hemiparesis. Cognitive domains such as attention, working memory, executive functions, and social cognition may also be affected in these patients.<sup>1,2</sup>

Nurses are in the critical position of effectively communicating with TBI patients and their families<sup>3</sup> which is essential for providing quality health-care services.<sup>4</sup> They perform tasks such as neuroprotective care, the integration of treatments, protecting the patient, and educating and providing emotional support to the patient and their family in the care process.<sup>5-7</sup> In addition, they use strategies that support communication and cognitive skills in patients with cognitive impairment while carrying out specified tasks. When they apply these strategies, they can target cognitive communication by supporting memory, attention, and executive functions. Likewise, strategies can be used to support general communication (i.e., changing communication style, rewording questions, expanding, and providing explanations).<sup>8</sup> Alternative communication methods also can be used by nurses caring for patients with severe cognitive impairment.<sup>9</sup> Furthermore, nurses can assess and follow up on individuals with cognitive impairment outside of the hospital setting after discharge.<sup>10</sup>

In a study conducted on patients' experience of communication with nurses, it was observed that nurses may not have sufficient knowledge about alternative communication.<sup>11</sup> In addition, it has been reported that the work environment and workload of nurses can be limiting when communicating with the patient.<sup>12</sup> In this process, it is suggested that there is a need to receive training in cognitive disorders and that nurses should be able to receive additional training on the general care of patients with TBI.<sup>8,13</sup>

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**Corresponding author:** Halil Tayyip Uysal  
E-mail: htuysal@ybu.edu.tr

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The importance of an interdisciplinary approach for working with TBI patients has been reported by the World Health Organization and several studies.<sup>14-16</sup> The interdisciplinary team typically includes nurses, physiatrists, occupational therapists, physical therapists, speech and language pathologists (SLP), and others.<sup>14</sup> Furthermore, there is interdisciplinary work between SLPs and nurses in patients with TBI within the scope of communication. Although these professionals help patients in different ways during the acute period, some argue that they should work together to support communication skills.<sup>16,17</sup>

The previous studies have examined nurses' perceptions, beliefs, and knowledge of patients with TBI.<sup>7,13,18</sup> These studies have included nurses working in many different hospital departments and have predominantly examined general care issues or cognitive disorders post-TBI. Since these studies have been conducted in more than one hospital and department, it is not possible to differentiate the knowledge and skills in a specific area [e.g., emergency service, physical medicine, and rehabilitation (PMR)].<sup>13</sup> Furthermore, when previous studies are examined, it is seen that there is no common consensus among the questionnaires used.<sup>7,13</sup> The paucity of research on this particular topic in Türkiye is also a significant gap in the literature. Rehabilitation nurses in Türkiye play an active role in caring for patients with TBI; as such, developing a reliable and valid tool to measure their experiences is of critical importance.

The present study aimed to (1) develop a new questionnaire with reliability and validity analyses; (2) examine the knowledge, attitudes, and behaviors of nurses working in a PMR hospital on cognitive and social communication skills of patients with TBI; and (3) examine the attitudes of nurses toward interdisciplinary work and educational needs.

## Methods

### Design

The design of the study was a cross-sectional pilot study with reliability and validity analyses for the questionnaire on the knowledge, attitudes, and behaviors of nurses caring for TBI patients with cognitive-social communication deficits. The present study adhered to "a guide for the design and conduct of self-administered surveys of clinicians" guidelines (Supplementary Figure 1).<sup>19</sup> This study was carried out in 2 phases. Phase 1 consisted of reliability and validity analyses and Phase 2 consisted of reporting and interpreting the results of the questionnaire.

### Participants

A total of 83 nurses were included in the study. The sample size was determined based on a power analysis from a pilot application with 20 participants yielding a power of 0.80. The inclusion criteria of the participants were (1) nurses employed in the PMR department, (2) age over 18 years, and (3) literacy in Turkish. Ninety-seven nurses were excluded from the study for reasons stated in Figure 1. Eighty-three (n=83) nurses were enrolled in the study.

### Development of the Knowledge, Attitudes, and Behaviors of Nurses Caring for Traumatic Brain Injury Patients Questionnaire

Existing studies in the literature were reviewed while creating the questionnaire for this study.<sup>11,12,15,17,20-23</sup> From these studies, a subset of 28 items were selected for the questionnaire. Expert opinions were taken as recommended for the questionnaire development process.<sup>24</sup> In our study, items were examined by 3 SLPs working with patients with TBI, who gave feedback about the suitability of each item.<sup>24</sup> The number of

items was reduced from 28 to 21 based on the feedback received. The 21 items on the final form of the questionnaire consist of demographic information (6 items), knowledge statements (6 items), attitude statements (5 items), and behavior statements (10 items). After the inclusion of 7 additional questions based on the clinical experiences of the researchers and with feedback from 4 experts, an item-subdimension match was made for each item. The final form consisted of 28 questions (Appendix). Accordingly, 4 subdimensions (demographic information, knowledge, attitudes, and behaviors) were created in the questionnaire. The demographic information section was presented in a multiple-choice format. For the knowledge, attitudes, and behaviors subdimensions, statements were presented on a Likert scale ranging from 0 (Never) to 10 (Always). Higher scores were indicative of higher levels of knowledge, attitudes, and behaviors. The maximum total points possible on the questionnaire was 210. The final version of the questionnaire was administered to 3 experienced SLPs working with TBI, who worked in the same hospital but were not associated with the study, as recommended by Mertens (2014).<sup>24</sup> For the final step, comprehension and spelling errors were checked by conducting a pilot application to a different sample of hospital nurses (n=20).

### Data Collection

The data collection phase was initiated by obtaining consent from 6 different rehabilitation units of the hospital. A total of 83 nurses were enrolled in the study. If the participant agreed to be in the study, the questionnaire form was sent through a "Google Forms" link through e-mail by the researchers. The original form used in the pilot application required minor editing for clarity. The final version of the form was used for the present study. The entire form took approximately 8-10 minutes to complete. Data collection started in March 2021 and ended in May 2021.

### Data Analysis

Data were transferred to IBM SPSS Statistics 23 and IBM SPSS AMOS 23 (IBM Corp., Armonk, NY, USA) programs. While evaluating the study data, frequency distribution for categorical variables and descriptive statistics (mean and SD) were given for numerical variables. For the validity of the scale, exploratory and confirmatory factor analysis (CFA) was carried out. For reliability, the results are given in tables using the Cronbach's alpha value. In this context, tests for data analyses were made based on consensus-based standards for the selection of health measurement instruments.<sup>25</sup>

After the reliability and validity analyses were completed, frequency and SDs of the responses of the participants on the questionnaire were calculated. Boxplot graphics were created and summarized for the results.

### Ethical Consideration

The Ethics Committee of Ankara Yildirim Beyazit University (Approval No: 43, 03.15.2021-2021/113, Date: 03.15.2021) approved this study. Written consent was obtained from all participants who participated in this study.

## Results

### Results Phase 1

The majority of participants were female (90.4%) between the ages of 20 and 29 (60.2%) with an undergraduate education (83.1%). Table 1 shows the characteristics of the participants. As shown in Table 2, the

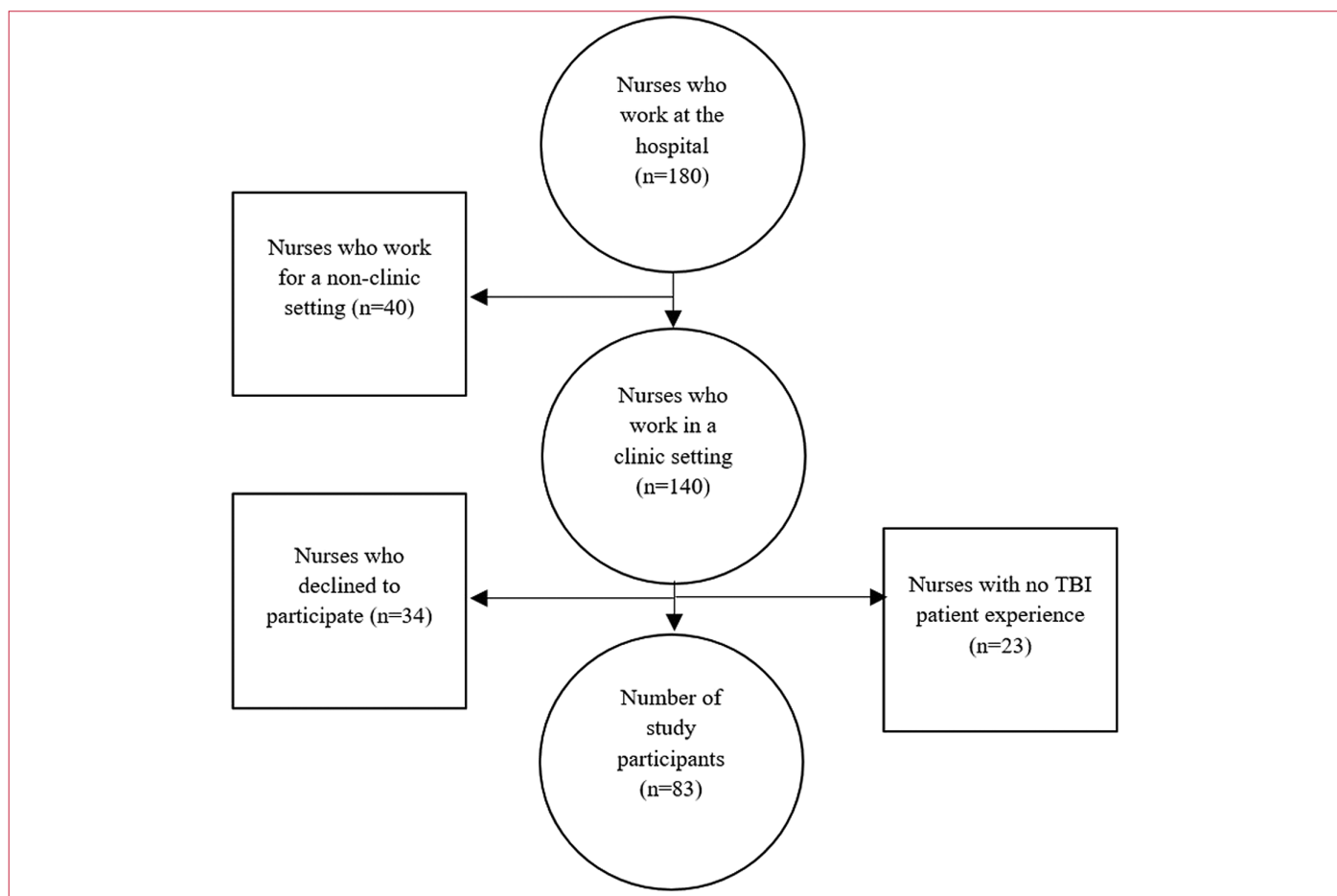


Figure 1. Flowchart of participants.

knowledge subdimension average of the participants is  $52.43 \pm 7.67$  (minimum=30, maximum=60), the attitudes subdimension average is  $46.13 \pm 5.96$  (minimum=10, maximum=50), and the behavior subdimension average is  $88.29 \pm 11.72$  (minimum=55, maximum=100).

#### Validity Analysis

Data were transferred to the IBM Statistical Package for the Social Sciences (SPSS) Statistics 23 program (IBM Corp., Armonk, NY, USA), which was carried out to create a scale based on data from 83 participants. First, exploratory factor analysis was applied to this data set and the "Principal Components Method" was preferred as the factor extraction method. Expressions with a factor load above 0.500 were provided. *Knowledge Subdimension*: After ensuring that the Kaiser–Meyer–Olkin (KMO) value was acceptable (0.800), the result of the Bartlett Sphericity test was carried out. As a result of the test, it was concluded that there are significantly high relationships between variables and the data are suitable for factor analysis ( $\chi^2: 237.572$ ,  $df: 15$ ,  $P < .001$ ). The knowledge subdimension explains 57.746% of the total variance in the questionnaire data. For the *Attitudes Subdimension*, the KMO value was found to be 0.855. As a result of the Bartlett Sphericity test for this step, it was concluded that there are significantly high relationships between variables and the data are suitable for factor analysis ( $\chi^2: 278.713$ ,  $df: 10$ ,  $P < .001$ ). The attitudes subdimension explains 71.850% of the total variance in the questionnaire data. *Behaviors Subdimension*: according to the table, the

KMO value was found to be 0.913. Thus, the factor analysis to be applied to the data will be acceptable. As a result of the Bartlett Sphericity test, it was concluded that there are significantly high relationships between variables and the data are suitable for factor analysis ( $\chi^2: 539.681$ ,  $df: 45$ ,  $P < .001$ ). The behavior subdimension explains 61.577% of the total variance in the questionnaire data. Besides, content validity reveals that all items of questionnaires are collected in 1 factor, and all factor loads are above 0.500. When the exploratory factor analysis results were examined, it was found that the values for all 3 subdimensions were at acceptable levels. Once the exploratory factor analysis was conducted, CFA was applied to the same data set using the IBM SPSS AMOS 23 program for 3 subdimensions. For each dimension, the same procedure was conducted in the CFA. *Knowledge Subdimension*: the first-order CFA model, in which the latent variable of the single factor dimension is also included as the indicator variable, was created (Figure 2). Since the latent variable is not metric, it should be ensured that one of the paths drawn from latent variables toward the observed (indicator) variables is assigned a value of 1 (factor load=1) or a value is assigned to the variance of the latent variable (generally 1) in order to predict the parameter value.<sup>26</sup> Overall, results from CFA were compatible with those of exploratory factor analysis.

In the second stage, the maximum likelihood method, which is frequently used in structural equation models and gives reliable results

Characteristics	n	%
Age		
20-29	50	60.2
30-39	12	14.5
40-49	20	24.1
50-59	1	1.2
Gender		
Male	8	9.6
Female	75	90.4
Highest education level		
High school	3	3.6
Associate degree	3	3.6
Undergraduate degree	69	83.1
Graduate degree	8	9.7
Work experience		
<1 year	18	21.7
1-3 years	26	31.3
4-6 years	1	1.2
7-9 years	5	6.0
10-12 years	9	10.8
More than 12 years	24	28.9
TBI education status		
Yes	11	13.3
No	72	86.7
Interdisciplinary work <sup>a</sup>		
Yes	65	78.3
No	18	21.7
Interdisciplinary work <sup>b</sup>		
Yes	50	60.3
No	33	39.8

<sup>a</sup>Physiatrist, occupational therapist, and physical therapist.  
<sup>b</sup>Speech-language pathologist.  
 TBI, traumatic brain injury.

even when the data are not normally distributed, was used while estimating the model. It was aimed to predict the errors of the observed variables, the variances of the latent variables and the parameters including the regression coefficients of the paths drawn from the latent variables to the observed variables. To improve the fit indices, a 2-way relationship was established between the error terms of "Item 5" and "Item 6" questions in the knowledge subdimension, which has the highest modification index value. At the last stage, fit indices for the 1-dimensional first-order CFA model were examined. Results show that the single-factor structure of the knowledge subdimension consisting

	Mean	SD	Minimum	Maximum
Knowledge subdimension	52.43	7.67	30	60
Attitudes subdimension	46.13	5.96	10	50
Behavior subdimension	88.29	11.72	55	100

of 6 statements generally adapts well. It is seen that the fitness values are good.<sup>27,28</sup> *Attitudes Subdimension:* The same procedure which was completed for the knowledge subdimension was conducted. Results show that the single-factor structure of the attitudes subdimension, which consists of 5 statements, generally adapts well. It is seen that the fitness values are good (Table 3). *Behaviors Subdimension:* After the first 2 stages were completed as in attitudes and knowledge, the 2-way relationship between the items was checked. A 2-way relationship has been established between the error terms of the questions "Item 3" and "Item 6," "Item 9," and "Item 10" in the behavior subdimension, which has the highest modification index value to improve fit indices. In the final stage, fit indices for the 1-dimensional first-order CFA model were examined. Results show that the behavior subdimension with a single factor structure consisting of 10 statements generally adapts well. It is seen that the fitness values are good. When looking at the fit indices in general, the knowledge, attitudes, and behaviors subdimensions are acceptable (Table 3).

### Reliability Analysis

One of the most frequently used instruments during the evaluation of questionnaire reliability is Cronbach's alpha, which is the internal consistency measure. Calculations were made for the questionnaire and subdimensions, and Cronbach's alpha values were calculated. The obtained values are generally higher than the acceptable value of 0.70.<sup>29</sup> If the item-total score correlation coefficient is below 0.30 (if the sample is 400 or more, it is accepted as 0.20), these items are considered to be a serious problem and should be removed from the questionnaire. An item-total score correlation coefficient of 0.30 and above is interpreted as good for reliability. However, it is not used alone to eliminate items below this value, rather it is decided by evaluating the effect of the item on the Cronbach's alpha coefficient. In this study, no items were found to have a coefficient below 0.30, and in the item analysis, the Cronbach's alpha value did not change significantly when an item was deleted (Table 4). As a result of the Pearson correlation analysis applied, there is a significant positive correlation between knowledge, attitudes, and behaviors subdimensions ( $P < .05$ ) (Table 5).

### Results Phase 2

#### Responses to Knowledge, Attitudes, and Behaviors Subdimensions

Based on the results, knowledge levels about the cognitive and social communication of patients with TBI are similar across participants. According to nurses, the need to include an evaluation of patients' cognitive skills in formulating care plans ranks first with a frequency of  $\bar{x} = 9.0$ ,  $SD=1.4$ . There was a high rate of responses ( $\bar{x} = 8.93$ ,  $SD=1.6$ ) regarding the correlation between cognitive skills and social

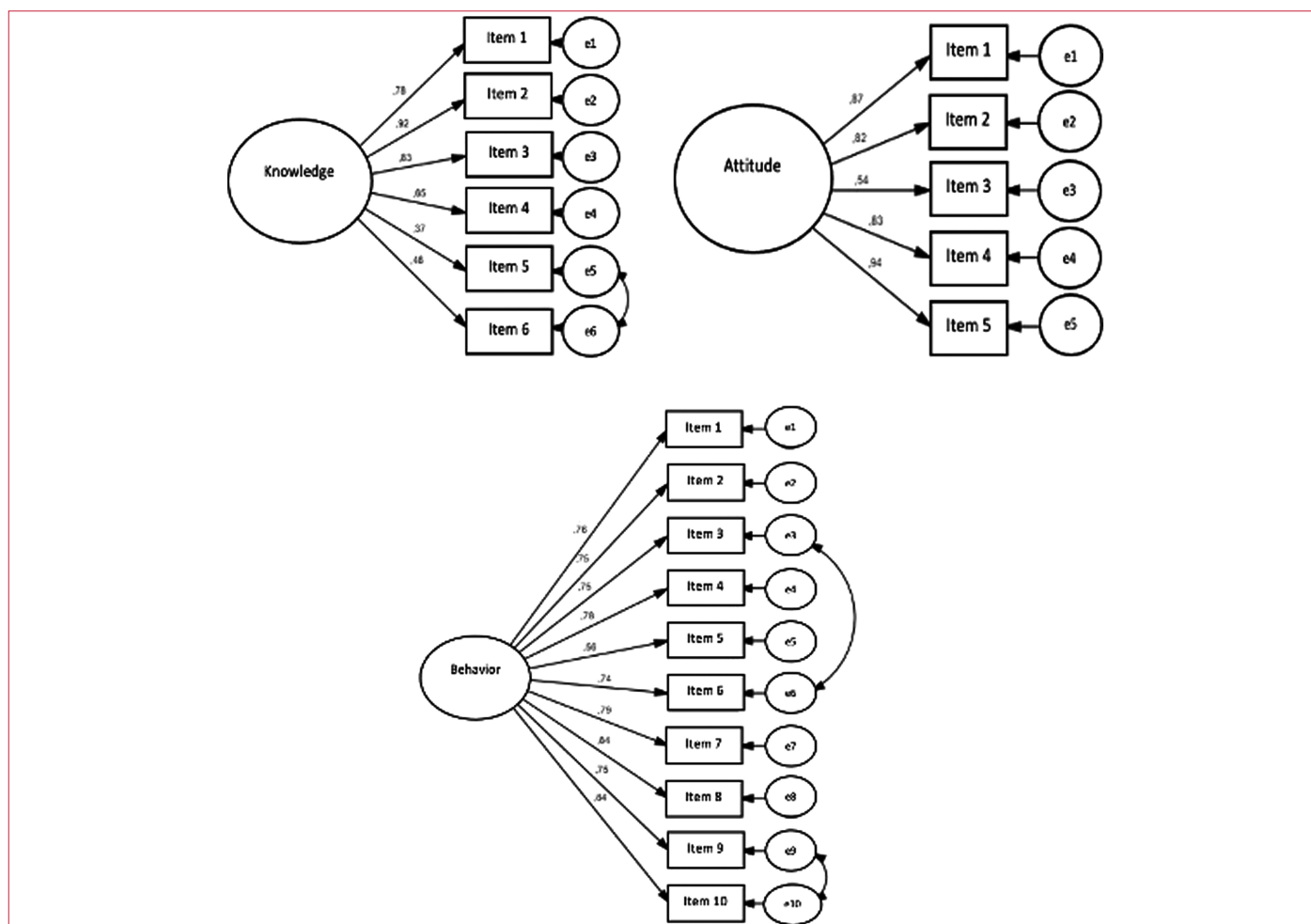


Figure 2. One-dimensional first-order confirmatory factor analysis model of subdimensions.

interaction. All of these answers are summarized in the boxplot graph in Figure 3. When the responses of the nurses to the attitudes subdimension were examined, the results were obtained in correlation with the knowledge subdimension. It was frequently reported that they would like to participate if training is provided for cognitive-communication disorders ( $\bar{x} = 9.4$ ,  $SD = 1.2$ ). Similarly, it was observed that when patients were hospitalized, participants often found that introducing themselves is important ( $\bar{x} = 9.4$ ,  $SD = 1.1$ ). Responses to the specified attitudes items are reported in Figure 4. In the last section of the questionnaire, “Behaviors,” the responses differed relative to the previous subdimensions. It was found that the majority of nurses use basic language ( $\bar{x} = 9.1$ ,  $SD = 1.2$ ), gestures, adjust their vocal tone ( $\bar{x} = 9.4$ ,  $SD = 1.15$ ), and follow the patient’s communication in group conversations ( $\bar{x} = 9.1$ ,  $SD = 1.1$ ). It is additionally reported that they frequently use encouragement strategies ( $\bar{x} = 9.02$ ,  $SD = 1.4$ ) to communicate. The results of the behavior subdimension are summarized in Figure 5.

## Discussion

In this study, a new questionnaire to measure the knowledge, attitudes, and behaviors of nurses caring for patients with TBI was developed. The development phase included reliability and validity analyses. The data from the questionnaire were used to analyze PMR

nurses’ knowledge, attitudes, and behaviors regarding their social and communication skills with TBI patients. Furthermore, the present study was conducted by a research team of SLPs and the participants were all PMR nurses.

In the previous studies involving nurses’ approaches to patients with TBI, non-standard questionnaires, qualitative studies,<sup>9,22,23</sup> questionnaires with latent class analyses,<sup>18</sup> pre/post-training and subjective questionnaire studies,<sup>23</sup> and content analysis techniques<sup>8</sup> have been used. Between these studies, there is no agreement among the questionnaires and tools used. In the present study, we used exploratory and CFAs for the structural features of the questionnaire, developed similarly to the study<sup>18</sup> and it was seen that the values obtained constitute evidence for the validity of the questionnaire. Furthermore, the present study calculated Cronbach’s alpha coefficients for reliability analysis adding a novel and useful tool to the current literature.

It was determined that the results of the exploratory and CFAs and reliability coefficients for the questionnaire were at acceptable levels. The participants responded positively and similarly to the importance of the therapist’s role in cognitive disorders, that cognitive disorders can be chronic, cognitive impairment may increase with the severity of TBI, and the presence of a relationship between the

Table 3. Goodness-of-Fit Indices and Acceptable Ranges Used in the Study			
Index	Good Fit	Acceptable Fit	Result
Knowledge			
$\chi^2/df$	$0 \leq \chi^2/df \leq 3$	$3 \leq \chi^2/df \leq 4$	1.588
GFI	$0.95 \leq GFI \leq 1$	$0.90 \leq GFI \leq 0.95$	0.949
IFI	$0.95 \leq IFI \leq 1$	$0.90 \leq IFI \leq 0.95$	0.980
TLI	$0.95 \leq TLI \leq 1$	$0.90 \leq TLI \leq 0.95$	0.980
CFI	$0.95 \leq CFI \leq 1$	$0.90 \leq CFI \leq 0.95$	0.980
RMSEA	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.08$	0.085
Attitudes			
SRMR	$0 \leq SRMR \leq 0.08$	$0.05 \leq SRMR \leq 0.10$	0.057
GFI	$0.95 \leq GFI \leq 1$	$0.90 \leq GFI \leq 0.95$	0.964
IFI	$0.95 \leq IFI \leq 1$	$0.90 \leq IFI \leq 0.95$	0.990
TLI	$0.95 \leq TLI \leq 1$	$0.90 \leq TLI \leq 0.95$	0.980
CFI	$0.95 \leq CFI \leq 1$	$0.90 \leq CFI \leq 0.95$	0.990
RMSEA	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.08$	0.082
SRMR	$0 \leq SRMR \leq 0.08$	$0.05 \leq SRMR \leq 0.10$	0.026
Behavior			
$\chi^2/df$	$0 \leq \chi^2/df \leq 3$	$3 \leq \chi^2/df \leq 4$	1.517
GFI	$0.95 \leq GFI \leq 1$	$0.90 \leq GFI \leq 0.95$	0.894
IFI	$0.95 \leq IFI \leq 1$	$0.90 \leq IFI \leq 0.95$	0.968
TLI	$0.95 \leq TLI \leq 1$	$0.90 \leq TLI \leq 0.95$	0.956
CFI	$0.95 \leq CFI \leq 1$	$0.90 \leq CFI \leq 0.95$	0.967
RMSEA	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.08$	0.079
SRMR	$0 \leq SRMR \leq 0.08$	$0.05 \leq SRMR \leq 0.10$	0.044

CFI, comparative fit index; GFI, the goodness-of-fit index; IFI, incremental fit index; TLI, the Tucker Lewis index; RMSEA, the root mean square error of approximation; SRMR, standardized root mean square residual;  $\chi^2/df$ , chi-square degrees of freedom.

TBI lesion site and communicative skills. Their behaviors indicated good strategy use to support cognitive and social communication. Although there is some variability among the responses received in the questionnaire, overall, the knowledge, attitudes, and behaviors indicate positive social and cognitive communication skills of nurses working with TBI patients.

Participants in the study indicated that their participation in a TBI training/course is limited (13.3%). The high levels of knowledge, attitudes, and behaviors scores reported are presumably the result of working with an interdisciplinary team. The high rate of nurses working with SLPs (60.2%) also supports this idea. These findings are compatible with the literature.<sup>16,17</sup>

It is thought that high values of nurses' knowledge level may be positively correlated with attitudes and behaviors. When the relationship

Table 4. Scale and Subdimension Reliability Coefficients						
Scale	Question	Item–Total Correlation	Cronbach's Alpha if the Item Is Removed	Cronbach's Alpha		
Knowledge	Knowledge 1	0.631	0.824	0.845		
	Knowledge 2	0.768	0.792			
	Knowledge 3	0.727	0.805			
	Knowledge 4	0.656	0.814			
	Knowledge 7	0.468	0.848			
	Knowledge 8	0.559	0.833			
	Attitudes	Attitude 1	0.787		0.832	0.873
		Attitude 3	0.771		0.831	
Attitude 4		0.531	0.920			
Attitude 5		0.754	0.836			
Behaviors	Behavior 2	0.722	0.913	0.921		
	Behavior 4	0.723	0.913			
	Behavior 6	0.676	0.915			
	Behavior 7	0.722	0.912			
	Behavior 8	0.548	0.925			
	Behavior 9	0.701	0.914			
	Behavior 10	0.760	0.910			
	Behavior 11	0.807	0.907			
	Behavior 12	0.743	0.913			
Behavior 13	0.816	0.909				

Table 5. Relationship Between Scale and Subdimensions			
Knowledge		Attitudes	Behaviors
Knowledge			
<i>r</i>	1	0.683	0.698
<i>P</i>		.000*	.000*
Attitudes			
<i>r</i>		1	0.532
<i>P</i>			.000*
Behaviors			
<i>r</i>			1
<i>P</i>			

*P* < .01.  
*r*, Pearson correlation coefficients.



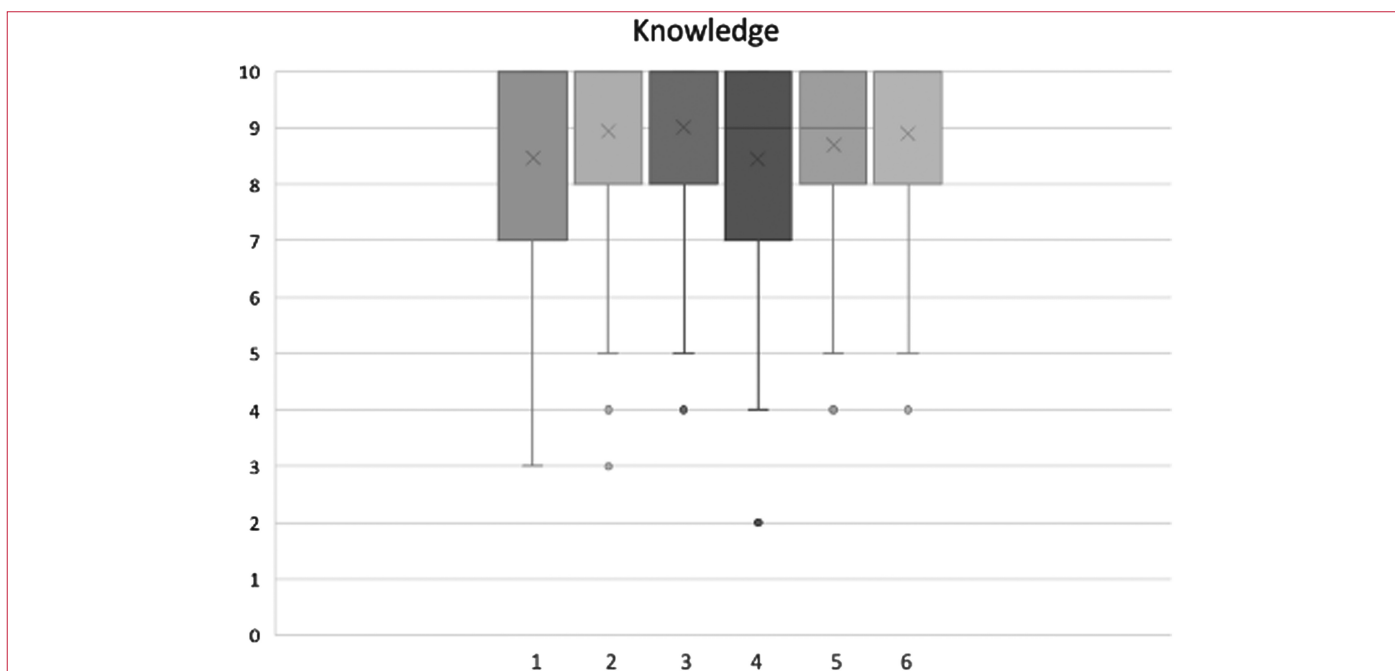


Figure 3. Boxplot graphics for knowledge subdimension responses.

between subdimensions is examined, it is observed that as knowledge levels increase, there is also an increase in attitudes and behaviors. Furthermore, although not directly related to the knowledge levels of cognitive and social communication, it was found that nurses in their study have a lack of knowledge or understanding of serious communication problems.<sup>22</sup> This is in contrast with the results of our study. On the other hand, it is reported that nurses working with TBI patients also need to provide cognitive assessment in addition to motor and

neuropsychological assessments.<sup>10,15,30,31</sup> In line with this, the nurses in our study reported in the behavior subdimension that they assess the cognitive communication of patients with basic tasks.

Nurses' responses about the effects of cognitive skills on social interaction and the persistence of cognitive disorders are consistent with the TBI literature.<sup>11,20,21</sup> It is reported that SLPs play an important role in cognitive skills.<sup>17</sup> The fact that the nurses in our study gave similar

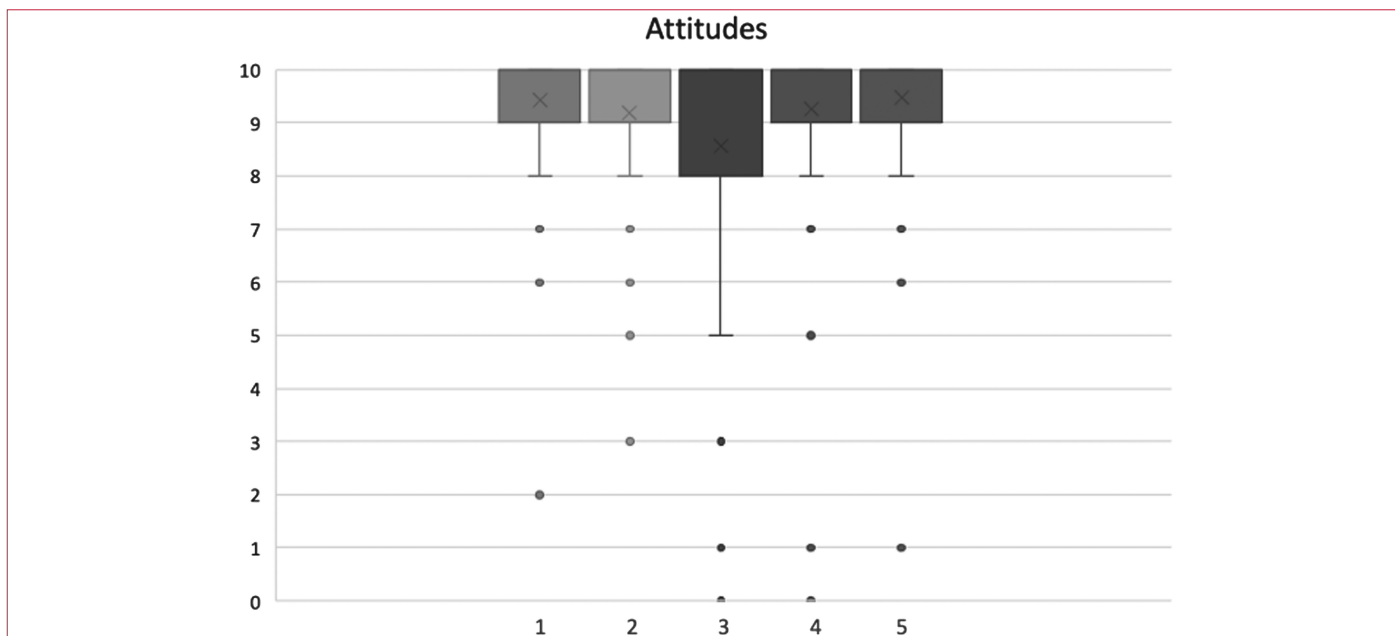


Figure 4. Boxplot graphics for attitude subdimension responses.

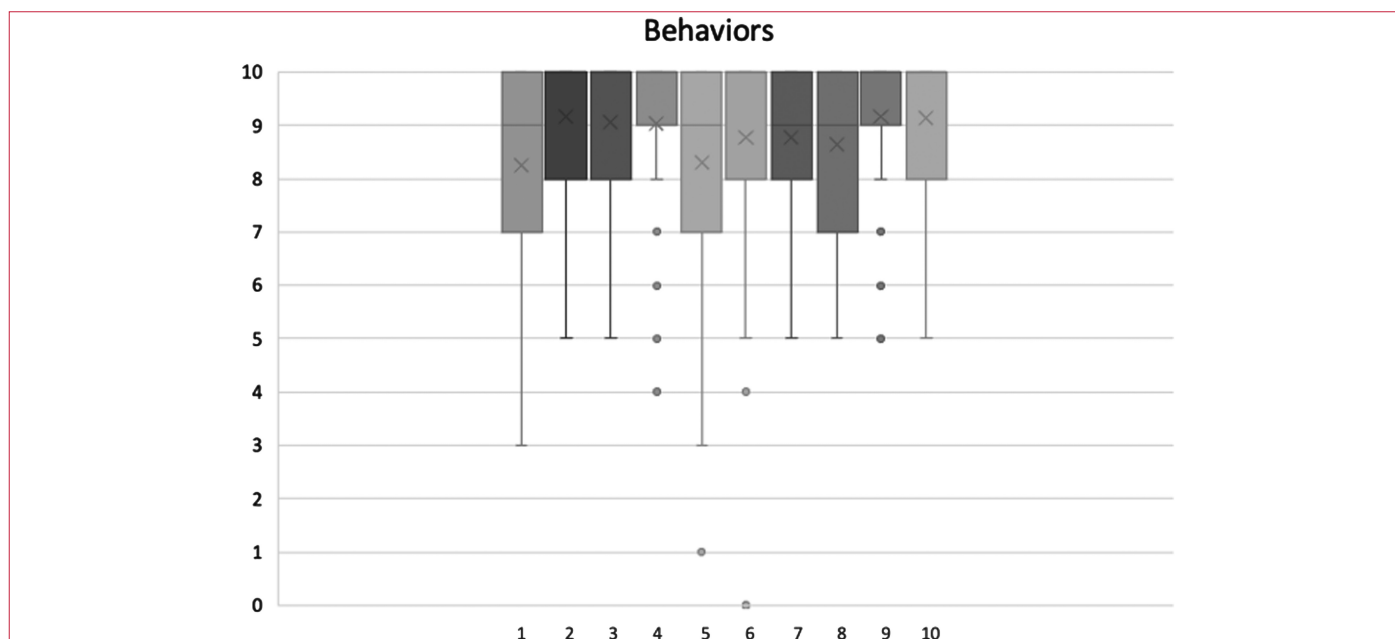


Figure 5. Boxplot graphics for attitude section responses.

responses to these findings was interpreted as a predisposition to interdisciplinary work. Thus, the knowledge levels of nurses in our study appear to be high and the results are consistent with the previous studies.<sup>15,17,20,22</sup>

It is conducted as a training program related to cognitive disorders for nurses. Participants expressed their interest in the training and reported afterward that they found it effective.<sup>23</sup> Similarly, nurses included in our study gave highly positive responses ( $\bar{x} = 9.4$ ,  $SD = 1.2$ ) in their attitudes toward participating in learning about cognitive training. These findings have important implications for planning training for nurses. Considering that nurses state their willingness to introduce themselves to patients upon admission and have positive attitudes toward collecting information from the patients' relatives, positive responses given about their ability to follow group conversations in the behavior subdimension may be related ( $\bar{x} = 9.1$ ,  $SD = 1.1$ ). The positive distribution of nurses' attitudes toward working with SLPs ( $\bar{x} = 8.5$ ,  $SD = 2.0$ ) and learning strategies ( $\bar{x} = 9.1$ ,  $SD = 1.3$ ) may be a result of interdisciplinary work and their knowledge levels. It is believed that sharing information about patients with other health professionals may also be associated with obtaining high responses.

According to one study, strategies used by nurses caring for TBI patients include using simple language, repeating what is said, and using visual and written cues.<sup>8</sup> In our study, it was observed that these components were frequently reflected in the behaviors of nurses. This can be interpreted as nurses' ability to regulate cognitive and social communication skills in patients with TBI. Our study additionally showed that nurses utilize encouragement to promote communication with their patients. While a previous study found that nurses do not pay particular attention to strategies involving eye contact, our findings show that nurses' behaviors include the use of gestures and vocal tone.<sup>8</sup> This finding is thought to be important in terms of maintaining communication with patients. A large number

of nurses also reported standing close to patients to facilitate ease of communication. This finding is especially striking given that the study took place during the COVID-19 pandemic. In summary, nurses generally appear to pay attention to cognitive and social communication skills.

#### Strengths and Limitations

The researchers of this study conducted the development of a questionnaire, reliability, and validity analyses of the questionnaire, and testing the questionnaire to determine the knowledge, attitudes, and behaviors of nurses caring for patients with TBI.<sup>6,7,8,13,22</sup> To the best of our knowledge, this is the first study to include all 3 components. Another strength of our study is that it was specifically conducted in a PMR hospital as previously suggested by Oyesanya, Brown, and Turkstra (2017).<sup>13</sup> The study findings support improved rehabilitation nurses' social communication skills. They might find the results useful in their work with TBI patients in terms of behaviors, types of attitudes, and knowledge levels relevant to communication. Finally, this is the first study in Türkiye to examine nurses' approach to the social and cognitive communication skills of patients with TBI. We believe that the questionnaire will be a valuable tool for the Turkish community as well as other countries.

The study also has a few limitations. Nurses in a single PMR hospital were included in the sample. Although the results are significant, making generalizations will require a larger and more varied sample of participants. The unequal distribution of years of experience and education levels of the nurses participating in our study may also be considered a limitation. The study also did not include patients' and caregivers' views on cognitive and social communication which would be valuable to compare against nurse reports. Finally, it is possible that some of the questions on the questionnaire may have response bias. Nevertheless, the psychometric properties of the scale are strong providing evidence that the tool is a valuable resource.



## Conclusion

In this study, the pilot phase of developing a reliable and valid questionnaire for determining nurses' knowledge, attitudes, and behaviors toward TBI patients with cognitive and social-communication deficits was conducted. With the findings obtained from this scale, it was concluded that nurses working in a PMR hospital have a good level of knowledge about cognitive and social communication skills in patients with TBI, and their attitudes toward interdisciplinary work are favorable. Furthermore, it was found that nurses frequently use strategies that support the cognitive and social communication skills of patients with TBI.

It is believed that this study will serve as a guide for nurses and interdisciplinary teams working in PMR hospitals or clinics. Findings show that among the routine tasks of nurses, neuroprotective care, integration of treatments, protecting the patient, and educating and providing emotional support to the patient and their family are included in the care process.<sup>5-7</sup> Finally, our study can be seen as a resource for nurses' behaviors and attitudes in the area of cognitive and social communication in clinical practice.

Future studies may investigate comparisons between different hospitals by conducting this study with several different PMR hospitals. The inclusion of homogeneously distributed groups in terms of education and years of experience may also provide valuable insight into future studies. Based on our findings that nurses are interested in training/courses on the cognitive and social communication skills of TBI patients, training programs can be offered and their effectiveness can be measured. Similar studies carried out in various clinics/departments would be valuable for comparing findings between different areas of practice. The present study and previous studies<sup>10,17</sup> may provide the basis for later transdisciplinary studies among nurses and SLPs. In addition, comparisons between experts can be planned since physical therapists, occupational therapists, and physiatrists are part of the interdisciplinary team. Furthermore, research can be conducted to evaluate the communication skills of TBI patients and/or their relatives with healthcare professionals. Finally, it would be noteworthy to examine the effects of COVID-19 on the social and cognitive communication skills between nurses and patients.

**Ethics Committee Approval:** The study was approved by the Ethics Committee of Ankara Yıldırım Beyazıt University (Approval No: 43, 03.15.2021-2021/113, Date: 03.15.2021).

**Informed Consent:** Informed consent was obtained from all participants in the study.

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