

**Reliability, Validity, and Responsiveness of The Turkish Version of The Interpersonal Communication Questionnaire in Physiotherapy Students**

Fizyoterapi Öğrencilerinde Kişilerarası İletişim Anketinin Türkçe Versiyonunun Güvenilirliği, Geçerliliği ve Cevaplanabilirliği

Nuray ALACA <sup>1</sup>, Özge KOCAER <sup>1</sup><sup>1</sup> Acıbadem Mehmet Ali Aydınlar University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Istanbul, Turkey.**ABSTRACT**

The purpose of this study is to investigate the psychometric properties including validity, reliability and responsiveness of the Interpersonal Communication Skills Questionnaire (ICQ). ICQ was translated into Turkish as described in international guidelines, and the study enrolled 55 second-year physiotherapy students. Cronbach  $\alpha$  was used to assess internal consistency. Intraclass correlation coefficient (ICC) was used to estimate the test-retest reliability. Construct validity was analyzed with Interpersonal Communication Competence Inventory (ICCI) and the visual analog scale (VAS)-anxiety, stress and confidence (0-10, Likert). Turkish version of the ICQ was found to have acceptable to excellent internal consistency (Cronbach's  $\alpha$  coefficient=0.701–911) and very good test-retest reliability (ICC=0.753–0.772). Construct validity of the ICQ was found to be correlated with empathy skill dimension in the ICCI [communication anxiety ( $r=0.396$ ,  $p=0.020$ ), communication confidence ( $r=-0.446$ ,  $p=0.008$ )]. VAS-anxiety, stress and confidence outcomes were found to be moderately correlated with both subscales of the ICQ ( $r=-0.490-0.631$ ;  $p=0.008-<0.001$ ). The current study showed the ICQ to have acceptable validity, reliability and responsivity for physiotherapy students. The ICQ also showed that simulated patient interaction prior to clinical placement resulted in improved communication confidence and decreased anxiety among second-year physiotherapy students.

**Keywords:** Physiotherapy Students, Communication, Anxiety, Confidence, Interpersonal Communication Skills Questionnaire, Simulated Patient

**ÖZET**

Mevcut çalışmada, fizyoterapi öğrencisinin hasta etkileşimi ile ilgili algılanan kişilerarası iletişim becerilerini değerlendiren kişilerarası iletişim becerileri anketinin (ICQ) geçerlilik, güvenilirlik ve responsiveness (simüle hasta eğitimleri sonrasında) gibi psikometrik özelliklerini araştırmak amaçlanmaktadır. ICQ'nun Türkçe çevirisi uluslararası kılavuzlardaki gibi tamamlandıktan sonra 55 ikinci sınıfta okuyan fizyoterapi öğrencisi çalışmaya alındı. İç tutarlılığı değerlendirmek için Cronbach  $\alpha$  kullanıldı. Test-tekrar test güvenilirliğini belirlemek için Sınıf içi korelasyon katsayısı (ICC) kullanıldı. Geçerliliği Kişilerarası İletişim Yetkinliği Evanteri (KİYE/ICCI) ve Görsel analog skala (VAS)-anksiyete, stress, güven ile analiz edildi (0-10, likert). ICQ'nun Türkçe versiyonun geçerliliği yeterli ile mükemmel arasında saptandı (Cronbach's  $\alpha$  katsayısı = 0.701–911). Test tekrar güvenilirliği ICC ile hesaplanmıştır ve çok iyi (ICC= 0.753-0.772) olarak bulunmuştur. Yapı geçerliliği ICQ ile ICCI anketi arasında empati becerisi ile iletişim anksiyetesi ( $r= 0.396$ ,  $p= 0.020$ ) ve güveni ( $r= -0.446$ ,  $p= 0.008$ ) arasında orta dereceli ilişki bulunmuştur. VAS-anksiyete-stres ve güven sonuçları ICQ'nin her iki alt ölçeği ile orta dereceli ilişkili olarak saptanmıştır ( $r=-0.490-0.631$ ;  $p=0.008-<0.001$ ). Sonuç olarak, çalışmamızda oluşturulan ICQ'nun Türkçe versiyonunun fizyoterapi öğrencileri için kabul edilebilir geçerlilik, güvenilirlik ve cevaplanabilirlik gösterdiği belirlendi. Ek olarak, simüle edilmiş hastalarla etkileşime giren 2. sınıf fizyoterapi öğrencilerinin klinik çalışma öncesinde kendi kendine algılanan güvende istatistiksel olarak anlamlı bir artış ve anksiyetede azalma yaşadığı ICQ anketinin yardımı ile gösterilmiştir.

**Anahtar Kelimeler:** Fizyoterapi Öğrencileri, İletişim, Anksiyete, Güven, kişilerarası iletişim becerileri anketi, simüle hasta

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## INTRODUCTION

The purpose of healthcare services is to protect individuals from disease and heal them. Achieving this goal requires healthcare professionals including doctors, physiotherapists, dietitians, and nurses to possess adequate professional knowledge and skills as well as knowledge of good communication with people (Thom et al., 2002; Trachtenberg et al., 2005). Physiotherapists make a significant use of communication skills when conducting assessments, delivering exercise and therapy, and educating patients. Quality and appropriate communication competence, which is an important professional competence, serves as the basis of effective physiotherapy and is highly valuable for individuals who seek physiotherapy (Health & Council, 2013; May et al., 1995; Parry, 2004). The positive impacts of physiotherapists' communication skills on treatment have also been documented in stroke rehabilitation or in outpatients with musculoskeletal diseases (Health & Council, 2013; May et al., 1995; Parry, 2004; L. Roberts and Bucksey, 2007). Therefore, it has been suggested that physiotherapy students should be assessed in terms of effective communication skills and that development of effective communication skills should be a vital component of the entry-level physiotherapy curriculum worldwide (Jones, 2019).

Hands-on training, also called clinical placement, fieldwork, or internship, is a vital component in the education of healthcare professionals (Thomson et al., 2014), and forms a large part of the training of physiotherapists. In Turkey, physiotherapy students are required to complete at least 1000 hours of clinical placement as part of their education ("Physiotherapy and Rehabilitation Core Training Program," 2016). Clinical placement provides students with opportunities for experiential learning and observation, reflection, application of abstract concepts and new skills (Gallasch et al., 2022; Judd et al., 2016). However, studies conducted with physiotherapy students have reported that students' perceived stress, anxiety levels and motivations are adversely affected in anticipation of clinical placement, which is their first face-to-face interaction with patients. This negative influence has been associated with communication anxiety, self-confidence and unpreparedness (Alaca et al., 2020; Black and Marcoux, 2002; Cunningham et al., 2018; Lewis et al., 2008; F. Roberts and Cooper, 2019). Based on this, it has been reported that providing opportunities for students to practice various kinds of physiotherapy skills as realistically as possible can help reduce anxiety in students' practices, improve their performance and overall learning in clinical placement settings. Simulation trainings, especially before clinical placement, have been recommended to achieve this. The American Physical Therapy Association has accepted the use of simulation training in undergraduate education as part of its strategic plan (Adamo, 2003; Alaca et al., 2020; F. Roberts and Cooper, 2019). While peer simulation and role-playing are considered low-quality simulations, use of simulated patients and high-quality manikins have been designated as high-quality simulation. Evidence on the impact and use of these simulations has been well documented in medical and nursing education (Barrows, 1993; Jefferies et al., 2021; Pilnick et al., 2018; Walsh and Murphy, 2017). In physiotherapy, on the other hand, only two studies (Lewis et al., 2008; F. Roberts and Cooper, 2019) have investigated the effect of simulation-based training on communication skills, but their level of evidence was found to be low (Black and Marcoux, 2002). Thus, several authors have emphasized the need for high-quality studies measuring the effect of simulation-based training on communication skills in physiotherapy students (Black and Marcoux, 2002; Lewis et al., 2008; F. Roberts and Cooper, 2019). The only randomized controlled study conducted in Türkiye on this issue by our first author found that the use of simulated patients reduced students' anxiety and stress in communicating and interacting with patients and increased their motivation prior to clinical work (Alaca et al., 2020). That study (Alaca et al., 2020) evaluated these combinations using qualitative questions and Likert statements (like a visual analog scale, 0-10 points) as suggested in the literature (Black and Marcoux, 2002; Lewis et al., 2008; F. Roberts and Cooper, 2019), because there was no assessment instrument with validated psychometric properties in Turkish language that could be used to specifically evaluate these aspects in physiotherapy students.

It is essential to assess effective communication skills of healthcare workers and students, as well as areas in which they need further improvement and support. Although various questionnaires and instruments of assessment have been developed for these purposes (Alaca et al., 2020; Hojat et al., 2013; Pilnick et al., 2018; F. Roberts and Cooper, 2019; Swain and Gale, 2014), a questionnaire measuring communication skills in physiotherapy students in interaction with patients has not been developed until recent years (Lewis et al., 2008). To fill this gap in the literature, Lewis et al. (2008) developed an "interpersonal communication skills questionnaire (ICQ)", to measure physiotherapy students'

perceived interpersonal communication skills regarding patient interaction. This questionnaire provides a self-report assessment of students' communication anxiety and confidence before clinical placement. The same study also found that simulated patient training before clinical placement had positive effects on student anxiety and confidence (Lewis et al., 2008). However, there is no Turkish version of this questionnaire with documented validity and reliability. In the light of the above information, the current study seeks to investigate the psychometric properties such as validity, reliability and responsiveness (post-simulated patient training) of the ICQ, which evaluates physiotherapy students' perceived communication skills regarding patient interaction.

## MATERIALS AND METHODS

### Translation

The study received ethical approval from the local ethics committee of Acıbadem University and Acıbadem Healthcare Institutions Medical Research Ethics Committee (reference no. ATADEK-2022/08/01), and was registered with the US National Library of Medicine Clinical Trial, no. NCT05405036. The study was carried out in accordance with the Declaration of Helsinki and participating students provided informed verbal and written consent. The ICQ was adapted to the Turkish language in accordance with five stages recommended by Beaton et al. (Beaton et al., 2000), which serves as a guide for studies investigating psychometric properties of questionnaires. The design of the study is shown in Figure 1.

- Stage one (Forward translation): The original questionnaire in English was translated into Turkish by a physiotherapist (informed of the study) and by a translator (not informed of the study), both bilingual in English and Turkish. Translations were made independently of each other.
- Stage two (Synthesis of translations): The translations were synthesized, and the post-synthesis version was reviewed by someone fluent in both languages to find any conceptual errors or inconsistencies.
- Stage three (Back translation): The Turkish questionnaire created was translated back into English by two persons blind to the study (neither aware nor informed of the study) with English as their mother tongue and good command of Turkish.
- Stage four (Consensus): The original English questionnaire and the back-translated English questionnaire were compared and reports were made of the results. The reports and questionnaire were evaluated and finalized by an expert committee (comprising methodologists, health professionals, language professionals, four translators).
- Stage five (Test of the prefinal version): The final stage was the pretest, conducted with 20 volunteer third-year students ( $n = 20$  students, 16 females, 4 males) studying at Acıbadem Mehmet Ali Aydınlar University Physiotherapy and Rehabilitation Department. Students were asked to read the questions and evaluate the items in terms of intelligibility. The sentences and words they found difficult to understand were noted by the researchers. Students were also allowed to suggest various items for word deletion or replacement.

### Participants

The study recruited 58 volunteer second-year students studying at Acıbadem Mehmet Ali Aydınlar University Physiotherapy and Rehabilitation Department who provided informed consent [ $n = 58$  students, 41 females, 17 males, [Age (years; mean  $\pm$  standard deviation) =  $20.30 \pm 1.07$ ; Body Mass Index ( $\text{kg}/\text{m}^2$ ) =  $22.30 \pm 2.95$ ]. The study excluded students ( $n = 3$ ) who had a diagnosed psychological disorder and/or received psychological treatment (Figure 1).

### Questionnaires

The ICQ questionnaire used by Lewis et al. (Lewis et al., 2008) to measure physiotherapy students' perceived communication skills regarding patient interaction consists of two subscales that measure communication anxiety and communication confidence. The total score of the first four items indicates communication anxiety, while the last four items indicate communication confidence. Each item is scored on a 5-point Likert scale between 1 = strongly disagree 5 = strongly agree. The item six is reverse-scored. A Likert scale designed in this manner has been shown to objectively measure changes in attitude

(Lesage et al., 2012). A higher score of communication anxiety indicates increased anxiety (4-20 points), while a higher score of communication confidence indicates increased confidence (4-20 points) (Lewis et al., 2008). The Turkish version of the questionnaire is shown in Supplemental Materials Section.

The Interpersonal Communication Competence Inventory (ICCI) was developed by Huang and Lin (2018) to assess communication competence in college students. The Questionnaire comprises subscales for assessing the listening skill (item 1, 2, 3 and 4), social relaxation skill (item 5, 6, 7 and 8), empathy skill (item 9, 10, 11 and 12) and expressiveness skill (item 13, 14 and 15). Items 10 and 13 are reverse-scored. The questionnaire is scored on a 5-point Likert scale (1 = Definitely unlike me, ..., 5 = Definitely like me). The questionnaire is scored in a range of 15-75 points, with higher scores indicating a high level of interpersonal communication competence (Çikrikci and Çinpolat, 2021; Huang and Lin, 2018).

A visual analog scale (VAS) between 0 and 10 was used to evaluate anxiety, stress and confidence that students may experience in clinical practice and patient interaction, with zero indicating “none at all” and ten indicating “much as I can think of”. Use of a self-reported VAS for stress in a clinical setting has been shown to be equally reliable and valid as other questionnaires (Alaca et al., 2020; Lesage et al., 2012).

### **Simulated patient trainings**

Students received simulated patient sessions for four weeks. The content of the training covered communication with patients, history taking and evaluation of the musculoskeletal system by region of the body (cervical, lumbar, shoulder and knee). Each week, two hours of theoretical lectures were delivered, followed by simulated patient sessions two days later. Cases were: C5-C6 protruding herniated disc in the first week, lumbar spinal stenosis in the second week, impingement in the third week, and gonarthrosis in the fourth week.

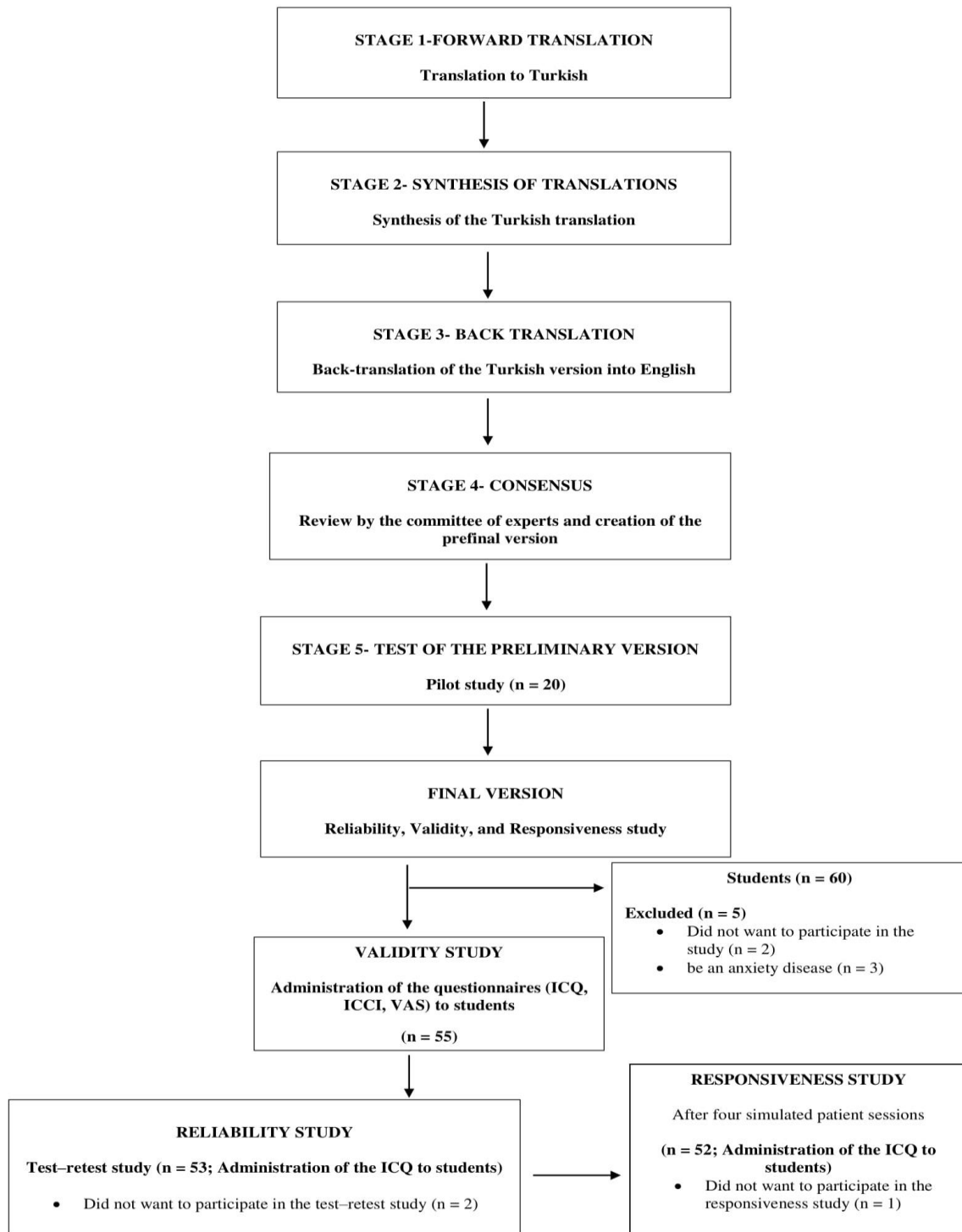
Simulated patients consisted of role players (four conservatory students) who had been attending the same module for the last three years. The impact of simulated patients on students and their responses to student questions need to be standardized. This was achieved by using a standardized case study and role play scenario given to simulated patients to familiarize them with the clinical signs and symptoms they need to present (Uslu, 2019). A 30-minute meeting was held with each simulated patient individually before interaction with students to provide standardized answers to subjective questions and to reproduce behaviors in objective tests. This approach has been shown to increase the reliability and validity of simulated patients' behavior and responses to students (Haydon III et al., 1994). Each student conducted a 10-minute evaluation and history-taking interview with the simulated patient on their own. This interview was observed by the trainer from behind a one-way mirrored glass (the student and the patient unable to see the trainer) (Alaca et al., 2020).

### **Validity**

Validity was measured through assessment of content and construct validity and floor and ceiling effects. Content validity was assessed using the method described by Popham (1978). Based on method, all items of the questionnaire finalized after the pretest were evaluated by members of the expert committee. Any change requested during this evaluation was incorporated into the questionnaire. The finalized questionnaire was reviewed by members of the expert committee assigning a percentage score (0-100%) based on whether each item was appropriate and relevant to the basic structure of the questionnaire. At the end, percentage points assigned by the experts for each item were averaged. Also, content validity is measured using ceiling and floor effects. The floor and ceiling effects of the ICQ were evaluated by calculating the ratio of those who received minimum and maximum scores from the scale to the total number of students after the form was filled for the first and second times. Scores between 0% and 10% were considered minimum scores, and scores between 90% and 100% were considered maximum scores. If > 30% of the students were scored within the limits of the scale, the questionnaire was considered to have floor and ceiling effects (Kulunkoglu and Celik, 2019; Nunnally, 1994; Kane, 2006).

Construct validity is mostly measured based on correlation with similar questionnaires with proven validity and reliability (Alaca et al., 2020; Kulunkoglu and Celik, 2019). To this end, students

completed ICQ, along with ICCI and VAS (anxiety, stress, and confidence; 0-10 points) during the initial assessment.



**Figure 1.** Stages of the Study

## Reliability

Reliability was assessed using the test-retest method; 10-14 days after the questionnaire was completed, students were asked to fill in the ICQ again (n = 54) (Figure 1). A sample size of 50 was considered as adequate in determining test-retest reliability (Alaca et al., 2022; Terwee et al., 2012).

## Responsiveness and Agreement

Responsiveness assesses whether a questionnaire finds any difference after a treatment or intervention. It is evaluated by effect size (Cohen's d) (De Vet et al., 2003; Polat et al., 2017). Agreement is assessed based on standard error of measurement (SEM) and minimum detectable change (MDC) (Polat et al., 2017; Terwee et al., 2012).

## Statistical Analysis

The data obtained in the study were analyzed using the SPSS statistics software suite version 21.0 (Statistical Package for Social Sciences Inc, Chicago, IL, USA). The data were checked for normality of distribution using the Shapiro-Wilk test. Data were found to be parametrical and expressed in mean  $\pm$  standard Deviation (SD). Intragroup changes were evaluated using paired-t test. Statistical significance was set at  $p \leq 0.05$  (two-sided) in all analyzes.

Construct validity was analyzed using Spearman's correlation analysis. A correlation coefficient (r) value of 0.01 – 0.29 was classified as low, 0.30 – 0.70 moderate, 0.71 – 0.99 high, 1.00 excellent level of correlation (Ratner, 2009).

Internal consistency is determined using Cronbach's alpha coefficients (excellent  $> 0.80$ ; acceptable 0.70-0.79; poor  $< 0.70$ ) (Terwee et al., 2007).

Test-retest reliability was analyzed using intraclass correlation coefficient (ICC). A coefficient between 0.81-1.00 is classified as excellent; 0.61-0.80 very good; 0.41-0.60 good; 0.21-0.40 fair and 0.00-0.20 poor (Landis and Koch, 1977; Marx et al., 2003).

The effect size (Cohen's d), used for responsiveness, was determined based on the differences in average scores after the test-retest and simulated patient session, divided by the first standard deviation. Effect size is categorized small if between 0.20 and 0.50, moderate between 0.51 and 0.80, and large if  $> 0.80$  (Cohen, 1977).

While performing agreement calculations, ICC was used to calculate the standard error of measurement (SEM), an index of measurement accuracy. SEM is calculated as the SD of the scores based on the square root of (1-ICC) [ $SD \approx \sqrt{1 - ICC}$ ]. Minimum detectable change (MDC) refers to the minimum amount of change that falls outside the measurement error. SEM was used to determine the minimum detectable change (MDC) at 95% confidence interval and was calculated based on the formula: SEM times 1.96 times the square root of 2 ( $1.96 \times \sqrt{2} \times SEM$ ) (Polat et al., 2017; Terwee et al., 2012).

## RESULTS

### Pretest and Content validity

During pretest, students provided some feedback: they suggested that the name of the questionnaire should be changed into a questionnaire of communication about the patient, and some language corrections should be made including use of Turkish language word endings and pronouns to make the questionnaire easier to understand. These corrections were made, and the members of the expert committee reviewed other feedback: they concluded that although there are numerous validated communication questionnaires in Turkish, the questionnaire should have a more specific name to make it clear that it is intended for students, not for patients. Thus, the Turkish name of the questionnaire was changed into "Perceived Interpersonal Communication Skills Questionnaire in Interaction with Patients". To ensure relevance in Turkish language, the expert committee changed some word endings and pronouns and scored each item using a percentage point. The questionnaire was found to have an aggregate content validity of 95% on average.

### Validity

Item and subscale scores of the questionnaire after the test, test-retest and simulated patient sessions are shown in Table 1. The internal consistency of the questionnaire as determined by Cronbach's alpha was found to be between 0.701 and 0.911 (Table 2). Content validity was calculated using ceiling and floor effects, yielding a ceiling effect of 24% and a floor effect of 19%.

Construct validity results are shown in Table 3. ICQ and ICCI questionnaires were found to have a moderate correlation in the empathy skill and communication anxiety ( $r = 0.396$ ,  $p = 0.020$ , Table 3) and communication confidence ( $r = -0.446$ ,  $p = 0.008$ , Table 3), but no correlation was found with the other sub-parameters of the ICCI questionnaire ( $p = 0.065-0.721$ , Table 3). VAS-anxiety-stress and confidence results were found to be moderately correlated with both subscales of the ICQ ( $r = -0.490-0.631$ ;  $p = 0.008- < 0.001$ , Table 3).

### Reliability

There were  $10.85 \pm 1.86$  days between the test and test-retest day. The ICC results used for the test-retest reliability analysis of the questionnaire are shown in Table 2 (ICC=0.753-0.722, Table 2).

### Responsiveness and Agreement

Table 1 shows the effect sizes and statistical significance results of the questionnaire after simulated patient sessions. After the simulated patients session, ICQ-communication anxiety ( $p = 0.028$ , effect size = 0.40) and confidence ( $p = 0.037$ , effect size = 0.60) showed a statistically significant improvement according to the test-retest day score (Table 1). These changes were found to be significant for questions one, five and six ( $p = 0.011- < 0.001$ , effect size = 0.31-0.68, Table 1).

SEM (0.477 and 0.546) and MDC (1.32 and 1.51) results for questionnaire subscales are shown in Table 2.

**Table 1.** Test, test–retest and post-simulated patient scores from the Interpersonal Communication Questionnaire

Components (scores)	Test scores	Test–retest scores	Post-simulated patient scores	Effect size <sup>a</sup>	
	Mean ± SD	Mean ± SD	Mean ± SD		p <sup>a, b</sup>
<b>1. The thought of assessing patients makes me nervous</b>	2.48 ± 1.07	2.58 ± 1.09	1.84 ± 0.91	0.68	<b>&lt;0.001</b>
<b>2. I am not sure that I will find talking to patients ok</b>	1.79 ± 0.71	1.81 ± 0.76	1.65 ± 0.90	0.21	0.500
<b>3. I worry about having to speak to patients</b>	1.93 ± 0.86	1.95 ± 0.87	1.65 ± 0.82	0.34	0.118
<b>4. I am not quite sure of myself when interacting with patients</b>	2.20 ± 0.93	2.33 ± 0.94	2.13 ± 0.98	0.21	0.164
<b>5. I feel confident that I can interact with patients</b>	3.81 ± 0.60	3.77 ± 0.84	4.23 ± 0.73	0.54	<b>0.003</b>
<b>6. Having to talk with patients is a frightening prospect</b>	3.98 ± 0.66	4.19 ± 0.71	4.41 ± 0.85	0,31	<b>0.011</b>
<b>7. I am positive that assessing patients will not be a problem</b>	3.58 ± 0.61	3.56 ± 0.79	3.89 ± 1.03	0,42	0.140
<b>8. I think that talking to patients will be a positive experience</b>	4.17 ± 0.69	4.51 ± 0.77	4.41 ± 0.85	0.12	0.487
<b>The Interpersonal Communication Questionnaire-Communication anxiety</b>	8.42 ± 2.78	8.63 ± 3.34	7.28 ± 3.22	0,40	<b>0.028</b>
<b>The Interpersonal Communication Questionnaire - Communication confidence</b>	15.71 ± 1.76	15.88 ± 2.20	17.2 ± 2.60	0.60	<b>0.037</b>

<sup>a</sup> Based on the difference between the test-retest score and the post-simulated patient score;

<sup>b</sup> Paired-samples t-test;

SD, standard deviation;

effect size= < 0.20 small, 0.20-0.50 moderate, > 0.80 large.

Bold values indicate statistical significance within the group.



**Table 2.** Results of Reliability, Validity and Agreement of the Interpersonal Communication Questionnaire

<b>The Interpersonal Communication Questionnaire</b>	<b>Cronbach's <math>\alpha</math> Test scores</b>	<b>Cronbach's <math>\alpha</math> Test-retest scores</b>	<b>Intraclass correlation coefficient (ICC) 95% Confidence Interval (lower-upper)</b>	<b>SEM</b>	<b>MDC</b>
<b>The Interpersonal Communication Questionnaire-Communication anxiety</b>	0.874	0.911	0.772 (0.544-0.886)	0.477	1.32
<b>The Interpersonal Communication Questionnaire - Communication confidence</b>	0.701	0.710	0.753 (0.505-0.877)	0.546	1.51

SEM, standard error of measurement; MDC, Minimum detectable change; Internal consistency was assessed by using Cronbach's alpha coefficient (> 80, excellent; 0.70-0.79, acceptable; and <70, unacceptable; Test-retest reliability was analyzed using intraclass correlation coefficient (ICC,  $r = 0.81-1.0$ , excellent; 0.61- 0.80, very good; 0.41-0.60, good; 0.21-0.40, fair; and 0.00-0.20, poor).

**Table 3.** Content validity results of the ICQ questionnaire

Parameters	Mean $\pm$ SD	ICQ-Communication anxiety (r)	ICQ-Communication anxiety (p)	ICQ-Communication confidence (r)	ICQ-Communication confidence (p)
ICCI- Listening skill	19.29 $\pm$ 1.51	0.064	0.721	-0.085	0.631
ICCI - Social relaxation skill	16.86 $\pm$ 3.15	- 0.078	0.662	0.175	0.323
ICCI - Empathy skill	17.27 $\pm$ 2.69	0.396*	<b>0.020</b>	- 0.446**	<b>0.008</b>
ICCI - Expressiveness skill	13.00 $\pm$ 1.55	- 0.320	0.065	0.188	0.288
ICCI- all score	66.44 $\pm$ 5.52	0.072	0.687	- 0.082	0.644
VAS-anxiety	3.31 $\pm$ 2.14	0.605**	<b>&lt;0.001</b>	- 0.445	<b>0.008</b>
VAS-stress	3.33 $\pm$ 2.40	0.631**	<b>&lt;0.001</b>	- 0.472	<b>0.005</b>
VAS-confidence	7.08 $\pm$ 1.83	- 0.490**	<b>0.003</b>	0.582	<b>&lt;0.001</b>

ICQ, The Interpersonal Communication Questionnaire;

ICCI, Interpersonal Communication Competence Inventory;

VAS, visual analog scale;

SD, standard deviation,

\*, p < 0.05;

\*\* , p < 0.01;

Bold values indicate statistical significance

## DISCUSSION

This study sought to investigate the reliability, validity and responsiveness of the ICQ; it found the questionnaire to have acceptable-to-excellent internal validity and consistency, and very good test-retest reliability. Construct validity analysis for the questionnaire showed that the ICQ and ICCI were correlated only in the empathy skill, while VAS-anxiety, stress, and confidence scores were all found to be correlated with the subscales of the ICQ.

Physiotherapy students have been shown to experience high levels of stress and anxiety during clinical placement. This may be, among other things, due to the demands of the clinical placement setting. It may also be due to communication anxiety and low confidence in students and perceived low level of knowledge (Dalwood et al., 2018; Gallasch et al., 2022; Jacob and Einstein, 2017; Judd et al., 2016; Macauley et al., 2018). Thus, it is crucial to reduce stress and anxiety, especially for students new to practice, at clinical placement settings, which require effective analysis of knowledge and a high performance. Simulated patients are widely used for students to practice history taking, physical examination, communication skills, and for assessing clinical competence in healthcare programs. Actually, students reported no difference between interacting with simulated or real patients (Sansou-Fisher and Poole, 1980; Wykurz and Kelly, 2002). Using simulated patient training before clinical practice has also been reported to potentially reduce communication anxiety and stress among students (Alaca et al., 2020; Lewis et al., 2008). The present study achieved a result consistent with the literature (Alaca et al., 2020; Lewis et al., 2008), in that simulated patient sessions were found to have a positive effect on communication anxiety and confidence. This change in attitude was most obvious in changes in responses to the question one (The thought of assessing patients makes me nervous), fifth (I feel confident that I can interact with patients) and sixth (Having to talk with patients is a frightening prospect) of the ICQ. Lewis et al. (Lewis et al., 2008), who created the original questionnaire, also found that the questions with the greatest change in results were questions five and six, which is consistent with our study. They also found a difference in the results of the question three, while our study found a positive change in the results of the question one. The first and third questions also inquire about anxiety. The third question is about anxiety when talking to patients (I worry about having to speak to patients), while the first question inquires about a general anxiety relating to patient assessment (The thought of assessing patients makes me nervous). This difference may be firstly due to our training program's inclusion of an assessment training and, unlike the study by Lewis et al. (Lewis et al., 2008), delivery of four simulated patient sessions, instead of one session. Indeed, students had four sessions with the same simulated patient and thus may have considered this as something other than just talking to the patient. In conclusion, our study found simulated patient sessions to lead to a positive change in communication anxiety and confidence. This means the Turkish version of the questionnaire has an acceptable responsiveness.

Self-report questionnaires are important instruments for clinical assessments and research. Using self-report outcome measures in several languages allows comparison of results, facilitating the collection of reliable data for studies conducted in different countries. Thus, it is crucial to determine the psychometric properties of questionnaires such as validity and reliability. This provides comparable measurement of the same parameters in different cultures and countries (Kulunkoglu and Celik, 2019; Polat et al., 2017). In our study, the results of the pretest and suggestions from expert committee members have resulted in a more specific name for the questionnaire: "Perceived Interpersonal Communication Skills Questionnaire in Interaction with Patients". This is expected to distinguish the questionnaire from other communication questionnaires. This prediction is based on the construct validity analysis of the questionnaire that found no correlation between the ICQ and subscales except for empathy dimension of the ICCI, which measures interpersonal communication skills of college students. In other words, traits of individual communication skills (other than empathy) did not make a difference in communication with patients. Our study also found the ICQ to be moderately correlated with VAS-anxiety, stress and confidence scores. This may be because the formulated VAS questions probe into anxiety, stress and confidence in interaction with patients.

Our study found the Turkish version of the questionnaire to have acceptable construct and content validity. In addition, Cronbach's alpha value, which indicates internal consistency, was found to be between 0.874 and 0.911 in test and retest scores for communication anxiety, which is the first subscale. Cronbach's alpha value was slightly lower in the original article (Cronbach's alpha = 0.72)

(Lewis et al., 2008). Communication confidence, on the other hand, was found to be 0.701, which is quite similar to the result in the original article (Cronbach's alpha = 0.70).

Test-retest reliability refers to the degree to which an instrument consistently gives the same scores to individuals twice in succession. In addition, the time interval between test-retest measurements is important in evaluating test-retest reliability. In general, if the situation is expected to change rapidly, the time interval between the initial measurement and the test-retest should be short (3-7 days). However, Marx et al. (Marx et al., 2003) showed that a test-retest interval ranging from 2 to 14 days may not affect the reliability tests of assessment instruments in clinically stable populations. Our study has thus used a time interval of 10-14 days. The original study used an interval of 14 days for the retest, and found no significant change in the questions (Lewis et al., 2008). Our study, unlike the original questionnaire, calculated test-retest reliability using ICC and found it to be very good (ICC = 0.753-0.772). We also assessed agreement and calculated SEM and MDC values to guide future studies using this questionnaire. Since the questionnaire was not available in any language other than Turkish, these results could not be discussed. This is the major limitation of our study.

Mai et al. (Mai et al., 2014) measured communication skills using the ICQ questionnaire. That study investigated the difference in communication anxiety and confidence between physiotherapy students who received an integrated clinical experience versus students who did not receive such a training at the time of clinical placement. The ICQ questionnaire showed that physiotherapy students who received an integrated clinical experience had decreased communication anxiety and increased confidence during clinical placement. The authors of that study also emphasized the need for an assessment instrument, in addition to ICQ, for measuring communication skills in real time (Mai et al., 2014). Indeed the ICQ questionnaire only provides a measure of students' self-perceived confidence and anxiety regarding patient communication. It is not known to what extent students' self-concept affects the quality of their interaction with real patients (Lewis et al., 2008). Although this is one of the limitations of the questionnaire, it is difficult to this measure in practice (Connell et al., 1993; Luck and Peabody, 2002). However, measuring students' self-perceived outcomes can still guide educators. In addition, a new 10-item adaptation intended for using the ICQ questionnaire in nursing students (Kwong, 2011) shows that this questionnaire can be a guide for other healthcare students.

## CONCLUSION

In conclusion, our study showed the ICQ to have acceptable validity, reliability and responsiveness for physiotherapy students. Our study also demonstrated, based on the ICQ, that second-year physiotherapy students interacting with simulated patients experienced positive changes in self-perceived communication confidence and anxiety prior to clinical placement.

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## Conflict of Interest

The authors declare no conflicts of interest

## Author Contributions

**Plan, design:** NA, ÖK; **Material, methods and data collection:** NA, ÖK; **Data analysis and comments:** NA, ÖK; **Writing and corrections:** NA, ÖK.

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**Supplemental Material 1. Turkish Version of the Interpersonal Communication Questionnaire****HASTA İLE ETKİLEŞİMDE ALGILANAN KİŞİLERARASI İLETİŞİM ANKETİ**

**Hastalarla iletişim hakkında ne hissettiğinizi bilmek istiyoruz.**

Lütfen aşağıdaki soruları cevaplayın ve ölçekte uygun cevaba çarpı işareti koyarak her bir ifadeye ne derecede katıldığınızı belirtiniz.

SORULAR	1 = Kesinlikle katılmıyorum 5 = Kesinlikle katılıyorum				
	1 Kesinlikle katılmıyorum	2 Katılmıyorum	3 Kararsızım	4 Katılıyorum	5 Kesinlikle katılıyorum
1. Hastaları değerlendirme düşüncesi beni tedirgin ediyor.					
2. Hastalarla konuşabileceğimden emin değilim.					
3. Hastalarla konuşmak zorunda olmak beni endişelendiriyor.					
4. Hastalarla etkileşime girdiğim zaman kendimden tam olarak emin olamayabilirim.					
5. Hastalarla etkileşime girme konusunda kendimi güvende hissediyorum.					
6. Hastalarla konuşma zorunluluğu korkutucu bir hissiyattır.					
7. Hastaları değerlendirme konusunda bir problem yaşamayacağıma inanıyorum.					
8. Hastalarla konuşmanın bana olumlu bir deneyim sunacağını düşünüyorum.					

**PUANLAMA SİSTEMİ****Alt Ölçekler**

*İletişim Endişesi* = 1+2+3+4 (4-20 puan), puanın artması kaygısının arttığına işaret eder

*İletişim Güveni* = 5+6+7+8 (4-20 puan), 6. Soru tersten puanlanır, puanın artması iletişim güveninin arttığına işaret eder.