Original Research

The psychometric properties of the Indonesian version of the Willingness to use telemedicine questionnaire in pharmacy students

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Abstract

Backgound: The Willingness to Use Telemedicine Questionnaire (WTQ) was translated into Indonesian and cross-culturally adapted with the intention of analyzing the validity and reliability of the surveys. Our study aims to translate, cross-culturally adapt the Willingness to Use Telemedicine Questionnaire (WTQ) into the Indonesian version and analyze the questionnaires' psychometric properties. **Methods:** In Yogyakarta province, 327 pharmacy students were conveniently recruited. Cronbach's alpha coefficient was used to gauge internal consistency. Analyzing the results of 60 patients who were retested one week later allowed for the calculation of the test-retest reliability using the intraclass correlation coefficient. **Results:** Pearson's correlation coefficient (r) was used to assess the construct validity. Additionally, an investigation of the WTQ's exploratory factor analysis and internal consistency for subscores was done. The mean age was 21.68 ±2.43 years. The internal consistency of each item and the overall WTQ score were excellent (>0.80; ranged from 0.856 to 0.977). The test-retest reliability of all items and the WTQ's overall score was between satisfactory and outstanding (0.856–0.977). Strong association (r = 0.923, P 0.001) existed between WTQ and WTPQ. The WTQ has high factor loading scores (0.621–0.843). **Conclusion:** The Indonesian WTQ is reliable and valid among university students.

Keywords: telemedicine; willingness to use; pharmacy students; psychometric; Indonesia

INTRODUCTION

During the past decade, technology has been found to assist various aspects of services both for assessment, remote intervention, monitoring, coaching, consultation, and prevention. Technology-based health services have created a more comfortable service, patients do not have to pay the cost of driving to the clinic. There is no difference between the term's telehealth and telemedicine. According to WHO, telehealth is a deployment approach by, telephone calls, messaging, video conferencing, virtual web-based platforms, or sensor-based applications provide essential convenience for patients who could not access face-to-face health services. The expansion of technology in the health sector, build health services more convenient, especially for those who live in rural areas and have limitations in terms of mobility.[1-3]

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In order to make healthcare services more accessible to people who do not have access to them in their local communities, telemedicine offers a novel way to deliver medical treatment over vast geographic distances. The advantages of telemedicine include: (1) greater accessibility to healthcare; (2) lower personal healthcare expenses; (3) real-time referrals to emergency treatment to prevent complications; and (4) delivery of higher-quality care. The use of telemedicine to deliver healthcare solutions is becoming more popular throughout the world.[4,5]

For those with special needs, telehealth is especially crucial. In addition, remote services might offer economically and geographically disadvantaged people the same chances for face-to-face consultation as in-person services. Telemedicine applications boost the usefulness, satisfaction, and caliber of medical care by keeping track of a patient's functional status, drug prescription, and side effects. Examples of this monitoring include the telephone-based Expanded Disability Status Scale (EDSS) and performance tests based on video conferencing. As a result, remote health services have received increased attention recently.[6-8]

Systematic reviews have recently been published that present the findings of telemedicine research.[6-9] It has been demonstrated that telehealth is helpful in improving patient happiness, exercise engagement, and treatment.[6] There is currently a large body of research showing that telerehabilitation is clinically helpful in enhancing functional activities, tiredness, and quality of life. Recent randomized controlled trials have demonstrated that telemedicine services are a practical means of treating people with chronic illnesses.[7,8]

The level of anticipation, happiness, and usability of telemedicine services, on the other hand, are also crucial in terms of the service's quality.[8,10] The effectiveness of remote care is increased when patient feedback on telehealth services is presented subjectively using standardized Patient Reported Outcome Measures (PROMs). Since telemedicine technologies involve upgradable technology and software, it is important to regularly assess the satisfaction, utility, viability, and usability to determine whether remote health services are superior to in-person consultations or on par with them.

In order to expressly govern the organization of telemedicine, the Minister of Health's Regulation No. 20 of 2019 about the Organization of Telemedicine Services between Health Service Facilities briefly mentions telemedicine in Indonesia. In accordance with MoH Reg 20/2019, telemedicine is the delivery of long-distance health services by health professionals using information and communication technology. It includes information exchange on diagnosis, medication, disease and injury prevention, research and evaluation, and sustainable education of health service providers with the goal of enhancing both individual and societal health. The definition of Telemedicine Services through Health Service Facilities is defined as Telemedicine that is used as consulting between one health services facility and another health services facility to confirm diagnoses, therapy, and/or disease prevention. Only telemedicine services between one health services facility and other health services facilities are covered by MoH Reg 20/2019, as its title suggests.[11] As a result, telemedicine is only gradually becoming more popular in Indonesia.

Previous studies have shown that lack of knowledge, training and skills is part of the application of telemedicine among health workers. International Telehealth Medical Informatics Working Group identified that other obstacles applied in telemedicine are administrative, technical, clinical, and personal.[11] Having sufficient knowledge about telemedicine can increase the willingness of medical personnel to adopt the technology.[12,13] Although these obstacles are experienced by health workers, with the help of health students (clinical or non-clinical) they will assist them in implementing telemedicine for the continuity of health services. The importance of perception, knowledge and awareness for students and professional health professionals related to telemedicine. It is useful to see the perspective of their knowledge and awareness in designing, developing, and implementing telemedicine.[14,15] However, not much. There are studies that try to test students' attitudes about telemedicine, but not many have examined the effectiveness of the tools now used in the country.[6-8] Our research aims to translate, cross-culturally adapt the Willingness to Use Telemedicine Questionnaire (WTQ) into the Indonesian version and analyze the psychometric properties of the questionnaire.

For the purpose of planning, creating, and putting into action capacity-building efforts, it is crucial to comprehend how students who are aspiring healthcare professionals view, understand, and are aware of telemedicine.[6,8] There are studies that attempt to examine students' attitudes regarding telemedicine, but there aren't many that examine the effectiveness of the tools that are now in use in the nation.[6-8] Our study aims to translate, cross-culturally adapt the Willingness to Use Telemedicine Questionnaire (WTQ) into the Indonesian version and analyze the questionnaires' psychometric properties.

MATERIAL AND METHODS

Translation and adaption of questionnaire

The instrument development process was to create or adapt items that addressed specific components as well as willingness to use telemedicine. We used the following steps: Permission was received from the original questionnaire developers to demonstrate the Bahasa cross-cultural adaptations and psychometric properties of WTQ and Telemedicine Perspection Questionnaire (TMPQ).[15,16] The questionnaires were translated and cross-culturally adapted in a total of five phases with internationally accepted translation procedures.[8] In the forward-translation phase, the original English questionnaire was translated into Bahasa independently by two faculty members who are native Bahasa speakers and experts in English. In the second stage, members of the same committee discussed the translations and the relevant correction notes, then synthesized the translations. At this stage, the term "telemedicine application" was preferred instead of "system" in WTQ. On the other hand, the term "health care" was used alternatively to "health-care provider." A single prefinal version of the questionnaires was accomplished by synthesizing the translations. In the third stage, the prefinal version questionnaires were back-translated into Bahasa independently by two native English-speaking translators. The original English questionnaires were compared with the back-translated versions in the fourth phase, whether the Indonesian prefinal versions were conceptually and linguistically accurate. In the last phase, the pilot test was used to question whether the questionnaire was suitable in terms of comprehensibility. A pilot testing was carried out within thirty Indonesian-speaking individuals with a 5-point Likert-type scale. Comprehensibility was excellent in the pilot study. No additional change was required. Finally, the final version of WTQ and TMPQ has been established and achieved a readability level no greater than 8th grade and implement in Bahasa.

Sample size

Based on both a power analysis and a statistical calculation, the sample size was determined. First, Fayers and Machin recommended that the sample size for studies on cross-cultural adaptation be at least 100 and at least five times the number of questionnaires. There are 13 items on the WTQ. A total of 327 participants completed the Telehealth Usability Quiestionnaire (TUQ) questionnaire, which included a number of different items in order to do the psychometric analysis. To ensure repeatability, 60 patients were needed. In order to determine the reliability of the retest, 60 patients had their WTQ filled out again one week after the initial survey.

Individual pharmacy students in Yogyakarta province

participated in a prospective cross-sectional study. The developers of the original questionnaires granted permission for the translation of the WTQ into Indonesian. The respondents provided informed consent. The study's inclusion criteria were Indonesian-speaking students over the age of 18. The study's exclusion criteria were having comorbid conditions that interfered with functionality, cognitive disorders, and patients who refused to give consent. Padjajaran University's ethics committee (614/UN6.KEP/EC/2022) approved the study protocol. Students' sociodemographic characteristics were investigated. The first session evaluated 327 students. WTQ and TMPQ were completed by participants. Then, one week later, in the second assessment session, 60 patients completed both questionnaires again.

Willingness to use telemedicine questionnaire (WTQ)

WTQ consists of 13 items, evaluating knowledge, perception, and willingness to use telemedicine. The survey was developed by Malhotra *et al*. in 2020. The survey addresses three factors: *Overall knowledge of the healthcare students about telemedicine and telemedicine applications, perception, and willingness of the students to adopt telemedicine*. WTQ uses 5-point Likert type scale (1 = strongly disagree and 5 = strongly agree). The total score is calculated by summing the 13 items.[15]

Part 1 consisted of questions related to the knowledge of the healthcare students about telemedicine (five items), rated based on a 5-point Likert scale ("1 = very low" to "5 = very high"). The respondents can score a minimum of 5 and a maximum of 25. The questions are "To what extent are you familiar with telemedicine (process and benefits)?,""To what extent are you familiar with telemedicine applications and platforms within the country?," "To what extent are you familiar with use of telemedicine outside country?," "To what extent are you familiar with recent released guidelines of telemed cine in the country?," and "To what extent do you participate in conferences and webinars related to telemedicine?"

Part 2 consisted of questions that investigated the perception of the students toward telemedicine (five items). These include "Telemedicine is a viable approach for providing comprehensive healthcare to the patient," "Telemedicine enables the adoption of techno ogy in healthcare," "Telemedicine saves time and reduces effort (work-load)," "Telemedicine helps in reducing the cost of service," and "There are existing telemedicine applications in the country that can be easily adopted."

Part 3 consisted of the questions including "Will you use telemedicine applications for consultation?" "Will you refer and advise telemedicine interventions to your peers and friends?" "Will you ever include or practice telemedicine in your practice to provide patient care?" "Are you willing to pay for telemedicine applications."

Statistical analysis

All data collected from the research were statistically analyzed using SPSS for Windows v25.0 (SPSS Inc., Chicago, IL, USA). Mean and the standard deviation were given for the quantitative data. Percentages were presented for the qualitative data. In addition, 95% confidence intervals (CI) were accepted for the correlation coefficients.

Reliability

The Cronbach alpha coefficient was estimated to investigate the internal consistency of the WTQ. A greater alpha coeficient means that WTQ have a better consistency. An alpha of ≥0.6 was considered acceptable; ≥0.8 was rated excellent consistency. The intraclass correlation coefficient (ICC: 95% CI) was used to describe reproducibility. ICC was estimated for the total score and items of the WTQ. An ICC ≥0.8 signifies excellent test–retest reliability.

Validity

The construct validity of WTQ with standard questionnaire WTPQ was examined by Pearson's correlation coefficient (*r*). The total of the TUQ and all items were compared with WTPQ. A high correlation coefficient was presumed in terms of convergent validity. The correlation was deemed strong if the coefficient was >0.5; medium if the coefficient was between 0.5 and 0.35; and low if the value was smaller than 0.35. Besides, the internal consistency for the subscores of the WTQ was calculated. In addition, exploratory factor analysis (principal component and varimax rotation) was carried out to investigate the factor structure of the WTQ. The Kaiser–Meyer–Olkin (KMO) test was applied to estimate sample competence, and the Bartlett test of sphericity was used to explore the correlation matrix.

RESULTS

A total of 327 subjects were approached through email and social media. Out of these, 30% were men and 70% were women. The mean age of the study participants was 21.68 ± 2.43 years. Nearly 52.6% respondents were undergoing year 1 and year 2 of the study level. The rest (50.5%) were from year 3 and year 4 bachelor's degrees. Almost half of the students (48.9%) hailed from non-Java areas, while 25.1% of respondents were from Yogyakarta areas. The sociodemographic details of the respondents are represented in Table 1. One major finding of the study is that 30.6% of study participants were using telemedicine applications and using their smartphone 1-2 hours a day (45.9%) (Table 2).

Construct validity of the WTQ was also calculated using factor analysis. Sample adequacy was evaluated for the analysis. The KMO test was calculated (0.913), and the significance level of Bartlett's Test of Sphericity was < 0.001. Table 3 presents the WTQ items and their factor loadings on principal component analysis-derived measures. The extraction communality scores were high (0.621–0.843). Three factors were extracted with eigenvalues of 1 accounting for 86.2% of the variance. Five items of the TSQ were loaded on factor 1, the other five items were loaded on factor 2, and the last three items were loaded on factor 3. The first factor, Knowledge, included 5 items and explained 33.5% of the variance. Five items comprising the second factor, Perception, explained 32.3% of the variance, and three items comprising the third factor, Willingness to use,

Table 1. Characteristics of study sample and comparisons between public and private university students (N=327)							
Variable	**Category**	**Public university (N=172), n(%)**		**Private university (N=155), n(%)**		**Total (N=372), n(%)**	
Gender	male	35	20.3	63	40.6	98	30.0
	female	137	79.7	92	59.4	229	70.0
Age (mean,SD)		21.25 (2.23)		22.67 (2.42)		21.68 (2.43)	
Year of study	1 and 2	89	51.7	83	53.5	172	52.6
	3 and 4	93	54.1	72	46.5	165	50.5
Origin	Yogyakarta	45	26.2	37	23.9	82	25.1
	Java	53	30.8	32	20.6	85	26.0
	non-java	74	43.0	86	55.5	160	48.9
Parent's education	secondary	78	45.3	86	55.5	164	50.2
	tertiary	94	54.7	69	44.5	163	49.8
Social economy status	low	45	26.2	32	20.6	77	23.5
	medium	56	32.6	58	37.4	114	34.9
	high	71	41.3	65	41.9	136	41.6
Living with parents	yes	56	32.6	35	22.6	91	27.8
	no	116	67.4	120	77.4	236	72.2
Student expense (monthly IDR)	<1 million	58	33.7	73	47.1	131	40.1
	1-2 million	69	40.1	45	29.0	114	34.9
	>2 million	45	26.2	37	23.9	82	25.1
Experience in chronic diseases	yes	35	20.3	25	16.1	60	18.3
	no	137	79.7	130	83.9	267	81.7
Distance from pharmacies	<1 km	75	43.6	56	36.1	131	40.1
	1-3 km	64	37.2	58	37.4	122	37.3
	>3 km	33	19.2	41	26.5	74	22.6
Frequency of using a smartphone	1-2 hours/day	82	47.7	68	43.9	150	45.9
	3-5 hours/day	45	26.2	56	36.1	101	30.9
	>5 hours/day	45	26.2	31	20.0	76	23.2
Currently using telemedicine	yes	60	34.9	40	25.8	100	30.6
	no	112	65.1	115	74.2	227	69.4

Table 2. Readability level of Willingness to use telemedicine questionnaire (WTQ)		
	Item	**Readability Level (Flesch-Kincaid grade levels)**
	Knowledge	
1	How much do you know about telemedicine (process and benefits)?	11.5
2	How well are you familiar with domestic telemedicine applications and platforms?	12.0
3	To what extent are you familiar with the use of telemedicine abroad?	10.7
4	To what extent are you aware of the telemedicine guidelines recently released in the country?	12.4
5	To what extent do you participate in telemedicine-related conferences and webinars?	12.3
	Perception	
6	Telemedicine is a viable approach to providing comprehensive healthcare to patients	11.4
7	Telemedicine enables technology adoption in healthcare	11.6
8	Telemedicine saves time and reduces workload	10.7
9	Telemedicine helps reduce service costs	9.5
10	There are telemedicine applications that exist in the country that can be easily adopted	10.6

	Willingness to use	
11	Will you be using the telemedicine app for a consultation?	8.5
12	Would you like to refer and suggest telemedicine interventions to your colleagues and friends?	8.9
13	Are you willing to pay for a telemedicine app?	4.6

(1strongly disagree to 5 strongly agree)

Table 3. Means, factor loadings and explained variance					
	Item	Mean (SD)	Knowledge	Perception	Willingness to use	Variance explained
1	How much do you know about telemedicine (process and benefits)?	4.6 (0.54)	0.843			
2	How well are you familiar with domestic telemedicine applications and platforms?	4.5(0.62)	0.812			
3	To what extent are you familiar with the use of telemedicine abroad?	4.3(0.61)	0.736			
4	To what extent are you aware of the telemedicine guidelines recently released in the country?	4.2(0.59)	0.721			
5	To what extent do you participate in telemedicine-related conferences and webinars?	4.5(0.53)	0.635			
						33.5%
6	Telemedicine is a viable approach to providing comprehensive healthcare to patients	4.6(0.52)		0.785		
7	Telemedicine enables technology adoption in healthcare	4.5(0.67)		0.763		
8	Telemedicine saves time and reduces workload	4.5(0.62)		0.693		
9	Telemedicine helps reduce service costs	4.4(0.42)		0.678		
10	There are telemedicine applications that exist in the country that can be easily adopted	4.3(0.48)		0.632		
						32.3%
11	Will you be using the telemedicine app for a consultation?	4.3(0.62)			0.654	
12	Would you like to refer and suggest telemedicine interventions to your colleagues and friends?	4.2(0.69)			0.642	
13	Are you willing to pay for a telemedicine app?	4.1(0.61)			0.621	
						20.4%
	Total Percent Variance Explained					86.2%

Extraction method: Principal component analysis; rotation method: Varimax with Kaiser normalization. n: number of patients

explained 20.4% of the variance. The factor analysis results proved that the items of the WTQ composed of three domains.

The Cronbach's alpha coefficient was calculated for the items and total scores of the WTQ. Internal consistency of all items and the total score of the WTQ were excellent (>0.80; ranged from 0.856–0.977). The ICC of the WTQ items and the total score ranged from 0.741 to 0.894. The reproducibility of the total score for the WTQ was excellent (>0.80) [Table 4]. The test–retest reliability of all items and the total score of the WTQ were within limits ranging from acceptable to excellent (0.856–0.977) [Table 4]. The reliability of the total score for the TSQ was excellent (0.956).

The validity of the WTQ was demonstrated with the internal consistency of subscores and a correlation with TMPQ. The internal consistency of all subscales of the WTQ was excellent (>0.80) [Table 4]. The correlation between WTQ and TMPQ was strong ($r = 0.923$, $P < 0.001$. In addition, there was a strong

relationship between the subscales of the WTQ and the total score of the TMPQ ($r > 0.80$, $P < 0.001$) [Table 5].

DISCUSSION

The present study was purposed to demonstrate the translation, cross-cultural adaptation, reliability, and validity of the WTQ in pharmacy students in Yogyakarta province. Consequently, the Indonesian version of the WTQ as proved to be a valid and reliable initial tool for evaluating Indonesian-speaking population. Given the lack of Indonesian assessment tools to evaluate telehealth services' willingness to use, the questionnaire is unique assessment tools for the Indonesian community. The translation and adaptation of the WTQ into Indonesian are also essential for Indonesian residents who live in remote areas. Considering the rapid increase in telemedicine in recent years and the importance of remote health services

Table 4. Test-retest reliability and internal consistency

	Mean (SD)		ICC (95% CI)	α
	Test	Re-test		
Item 1	4.72 ± 0.23	4.79 ± 0.23	0.823 (0.47-0.95)	0.976
Item 2	4.63 ± 0.25	4.56 ± 0.21	0.812 (0.52-0.93)	0.976
Item 3	4.42 ± 0.31	4.43 ± 0.37	0.824 (0.62-0.94)	0.975
Item 4	4.50 ± 0.39	4.56 ± 0.32	0.816 (0.57-0.91)	0.974
Item 5	4.51 ± 0.23	4.57 ± 0.27	0.872 (0.62-0.96)	0.982
Item 6	4.67 ± 0.22	4.56 ± 0.22	0.811 (0.61-0.92)	0.882
Item 7	4.55 ± 0.37	4.34 ± 0.36	0.768 (0.68-0.90)	0.823
Item 8	4.53 ± 0.62	4.48 ± 0.34	0.834 (0.63-0.91)	0.933
Item 9	4.47 ± 0.42	4.53 ± 0.32	0.842 (0.57-0.91)	0.956
Item 10	4.39 ± 0.48	4.56 ± 0.28	0.822 (0.61-0.92)	0.912
Item 11	4.35 ± 0.62	4.48 ± 0.22	0.782 (-.59-0.87)	0.868
Item 12	4.28 ± 0.69	4.37 ± 0.64	0.741 (0.57-0.83)	0.856
Item 13	4.18 ± 0.61	4.12 ± 0.53	0.894 (0.66-0.92)	0.977
Total score	4.57 ± 0.32	4.63 ± 0.24	0.825 (0.62-0.92)	0.956

ICC: Intra-class correlation coefficient, CI: Confidence interval, α: Cronbach's alpha, SD: Standard deviation

Table 5. Correlation between Willingness to use telemedicine questionnaire and Telemedicine perception questionnaire (TMPQ)

Willingness to use telemedicine questionnaire (13 item)	Telemedicine perception questionnaire (TMPQ) (17 item)
Knowledge	0.843*
Perception	0.856*
Willingness to Use	0.913*
Total score	0.923*

*P<0.001. Telemedicine perception questionnaire (TMPQ) 17 item assessing patient acceptability via perception of risk & benefits of in-home telehealth

in the COVID-19 pandemic, the Indonesian version of the WTQ questionnaire could significantly contribute to clinical practice or intervention studies. The pilot study of the WTQ and TMPQ revealed that the tool was proper in terms of comprehensibility. Accordingly, no other modifications were required for the pretest. The internal consistency for the total score and all items of the WTQ and TMPQ was excellent (α > 0.80). The results demonstrated that WTQ and TMPQ are consistently evaluating the perception of the telemedicine services, respectively.

In addition, the items of both questionnaires are compatible within themselves. Besides, the Cronbach's alpha of all subscores of the WTQ (knowledge, perception, and willingness to use) was highly consistent (> 0.80). Three factors of the questionnaire clearly represent their assessment purpose. WTQ development study was presented Cronbach's alpha scores of the subscales. The standardized alpha values of the subdomain scores ranged from 0.81 to 0.93. Their calculation results conformed to our study (α > 0.80). The WTQ development

study only presented the total scores' alpha value (0.93). The results of Ihzam *et al* and Badea et al were also similar to our study.[9,14] All studies' results have demonstrated a consensus about the internal consistency of the WTQ and TMPQ.[17-20]

The test–retest reliability for the total scores of the WTQ was excellent (ICC >0.80). In addition, all items of the questionnaire have both moderate to excellent reproducibility (>0.60). This score has greatly increased the questionnaires' reliability as an advantage of the widespread use of technology and telemedicine service for our study. Our study findings related to perception are consistent with the findings of other studies, where telemedicine and its use is effective for both patients and health professionals.[21-23] Telemedicine provides excellent benefits in the covid era, telemedicine can provide good information consultation from health workers to patients.[24] All stakeholders, from government policymakers to ordinary citizens, need to work together to build trusting partnerships to realize the benefits that telemedicine has to offer so that this technology can work.[25-27]

Construct validity was analyzed by comparing the WTQ and TMPQ scores. The correlation between WTQ and TMPQ was strong (*r* = 0.882, *P* < 0.001). In addition, there was a strong relationship between the subscales of the WTQ and the total score of the WTQ (*r* > 0.5, *P* < 0.001). The present study was preferred to adapt two common telemedicine-specific questionnaires and compare them with each other. According to the calculation results of our study, both questionnaires were found to be valid. Utilizing factor analysis, the construct validity of the WTQ was also determined. The scores for extraction communality were high (0.814–0.919). The WTQ's whole item pool was put onto three factors. The outcomes of the factor analysis demonstrated that there were three distinct domains for each item in the WTQ.

The study does have certain limitations that should be acknowledged. The current study did not analyze responsiveness analysis. Further explanations of the construct validity of usability scales are possible. However, it could be taxing to ask the participants more questions. Additionally, it may prevent accurate data collection.

CONCLUSION

The Indonesia version of the WTQ is reliable and valid tool to assess knowledge, perception, and willingness to use telemedicine in pharmacy students. The questionnaire is reliable and valid for exploring the adoption of telemedicine service in Indonesia.

DISCLOSURE

The authors report that they have no conflicts of interest for this article.

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