

# Development and Validation of the Saudi Telehealth Acceptance Scale Based on the Unified Theory of Acceptance and Use of Technology

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## Abstract

**Background:** Telehealth is in early stages in the Kingdom of Saudi Arabia (KSA). Identifying barriers to using telehealth is an essential step prior to its implementation; however, no theoretically based scales exist for the same purpose.

**Objective:** To design a theory-based scale capable of measuring telehealth users' perceptions of benefits, barriers, and social influence in the KSA.

**Methods:** The Saudi Telehealth Acceptance Scale (STAS) was constructed based on the Unified Theory of Acceptance and Use of Technology and its content validity was determined by eight experts using the modified Delphi process. Only items with a content validity index score of  $\geq 0.83$  were chosen. Finally, the face validity of the questionnaire for healthcare professionals, which was in English, was determined by eight healthcare professionals, and for the patient version, which was in Arabic, by six patients.

**Results:** Initially, 37 items were identified; however, after Round 1, 29 items remained and after Round 2, 24 items were included in the STAS for both healthcare professionals and patients. In the healthcare professionals scale, there were 7 performance expectancy (PE) items, 6 effort expectancy (EE) items, 3 social influence (SI) items, 4 facilitating conditions (FC) items, and 4 behavioral intention (BI) items, while in the scale for patients, there were 9 PE items, 4 EE items, 3 SI items, 4 FC items, and 4 BI items.

**Conclusions:** The two new scales showed evidence of content and face validity. The significance of the two scales is that they were both designed in the context of the healthcare system in the KSA and could provide standardized data collection tools to measure the acceptance of telehealth among HCPs and patients.

**Keywords:** Acceptance, content validity, face validity, healthcare practitioners, patients, psychometrics, telehealth, telemedicine

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## INTRODUCTION

Advancing healthcare services and improving accessibility to the healthcare system are key indicators of a society's

development.<sup>[1]</sup> Providing healthcare services to an increasing number of patients with chronic diseases, especially in rural areas, is a challenge facing governments

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and healthcare systems in many countries.<sup>[2,3]</sup> Rapid advancements in telecommunication technology have made it possible to use the Internet to improve access to healthcare services.<sup>[1]</sup> The use of cell phones, computers, and the Internet to provide and receive healthcare services is known as telehealth.<sup>[4]</sup> Telehealth has the potential to improve access to healthcare services, reduce the cost of healthcare services, improve quality of care, and decrease overall morbidity and mortality.<sup>[5]</sup> With the huge advancements in telecommunications technology, including live video calls, telehealth has advanced in scope and capabilities.<sup>[6]</sup> Moreover, the COVID-19 pandemic accelerated the rate of implementation of telehealth applications despite its historical barriers.<sup>[7-9]</sup>

Telehealth is in early stages in the Kingdom of Saudi Arabia (KSA), with its usage having increased dramatically since the COVID-19 pandemic.<sup>[7,10,11]</sup> However, identifying barriers to using telehealth is a key step in its successful implementation.<sup>[12]</sup> Multiple scales have been developed and used to measure users' perceptions of using telehealth across the world.<sup>[12-18]</sup> In 2019, Almojaibel *et al.* developed two scales intended to measure telerehabilitation acceptance in the United States, one for healthcare practitioners (HCPs) and the other for patients attending pulmonary rehabilitation centers.<sup>[19]</sup> In the KSA, the perception of HCPs about/of using telehealth have been documented in multiple studies before and during the COVID-19 pandemic.<sup>[20-24]</sup> Patients' perceptions of using telehealth in the KSA have also been explored in various studies.<sup>[25-31]</sup> However, in most studies from the KSA, an analysis of users' perceptions of telehealth is limited and has been measured using nontheoretically based scales. Therefore, the goal of this study was to develop a theory-based scale capable of measuring telehealth users' perceptions of benefits, barriers, and social influence in the KSA.

## METHODS

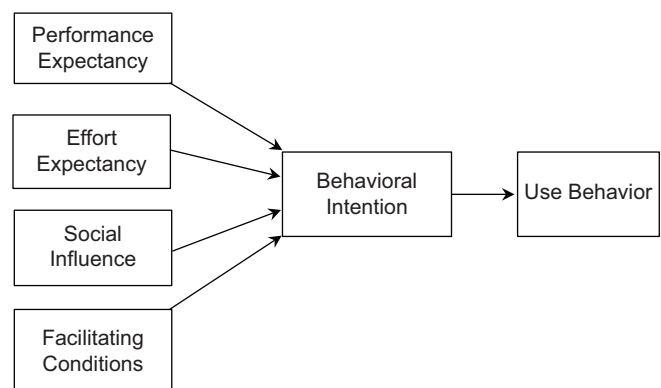
The development process of the Saudi Telehealth Acceptance Scale had three objectives: 1) construct a modified scale based on the Unified Theory of Acceptance and Use of Technology (UTAUT), 2) determine the content validity of the generated items, and 3) determine the face validity of the new scale. The data collection process and analysis were conducted between April 2021 to November 2022.

This study received ethical approval from the Institutional Review Board of Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia.

## Instrument construction

The Saudi Telehealth Acceptance Scale was based on UTAUT. UTAUT was developed by Venkatesh and Davis in 2003 to evaluate the likelihood of successful implementation of new technologies and to understand the variables of acceptance.<sup>[32]</sup> UTAUT consists of four variables: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) [Figure 1]. PE is the user's perceived benefits of the system in use. EE is the user's perceived ease of use of the system. SI is the user's perception of the "important others believe he or she should use the new system." FCs are defined as the user's belief that "organizational and technical infrastructure exists to support the use of the system." Behavioral Intention (BI) is defined as the likelihood of using telehealth and is determined by the four variables of UTAUT. Additional variables such as age, gender, experience, and voluntariness of use moderate the impact of these variables on BI.

The first step in the scale development process was to generate the item pool. The item pool for the Saudi Telehealth Acceptance Scale was generated based on UTAUT and previous studies that measured telehealth acceptance using UTAUT. The initial items were written neutrally to be used by both HCPs and patients. The second step of the scale development process was to establish content validity. To evaluate the content, at least five content experts should participate in the content validity assessment.<sup>[33]</sup> For this scale, eight content experts were invited to review the relevance of the items to the scale's domains, wording, layout, and clarity. Seven reviewers were academicians from multiple healthcare disciplines (community medicine, respiratory care, health informatics, rehabilitation, telehealth, physiotherapy, and sleep medicine), and one was an HCP (a respiratory therapist). To be included in the HCP content expert panel,



**Figure 1:** The unified theory of acceptance and use of technology constructs

the experts was required to have one of the following criteria: a doctorate or postgraduate degree in healthcare or any related health fields; a study published in a field related to telehealth, health informatics, or scale development methodology; or working experience with telehealth. This study utilized a modified Delphi method that started with some items from the literature concerning measuring telehealth acceptance.<sup>[34]</sup>

The modified Delphi process in this study consisted of two rounds. In Round 1, content experts were invited by email to evaluate the initial items for relevance to the UTAUT constructs. The items were presented to each reviewer in an evaluation survey format with a 4-point Likert scale. Content experts provided comments and suggestions on improving the relevance and clarity of the suggested items if it was not relevant or needed major revision. The item content validity index (I-CVI) is defined as the number of reviewers who give a rating of either moderately relevant or very relevant divided by the total number of reviewers. Only items with high scores on the I-CVI ( $\geq 0.83$ ) from the evaluation were added to the final version of the scale.<sup>[35]</sup> In Round 2, items that received I-CVI scores of  $\geq 0.83$  from Round 1 were emailed to the reviewers as an evaluation survey to be judged for inclusion. In this round, the reviewers were also asked to evaluate the translation process of the scale items to Arabic, which was to be used in the scale for patients. For both the English and Arabic versions, each item was presented with a two-option scale for inclusion (yes or no).

The process of translating the scale items from English to Arabic was conducted in three steps. First, two content experts translated the items into Arabic. Unclear items, as identified by the two experts, were documented and resolved. Second, the results of the two versions of the Arabic scale were then synthesized into one version. Third, the final version of the Arabic scale was reviewed by each of the eight content experts for approval or modifications. The Arabic version of the scale was emailed to Reviewer 1 to evaluate the items and suggest modifications based on the Arabic conceptual definitions of each subscale. The feedback, including modifications, was then sent to Reviewer 2, and the same step was repeated until Reviewer 7. The HCP version and the patient's version of the scale were based on UTAUT and included the same key variables: PE, EE, SI, and FC. The scales also included the BI to use telehealth items as the dependent variable.

### Face validity

For this scale development study, face validity was conducted to assess whether the scale's items represented

the factors affecting the acceptance of telehealth in the KSA and to ensure that the scales were clear and readable. For the HCP version, a convenient sample of eight HCPs from different health disciplines participated in this assessment, including two physicians, three nurses, and three respiratory therapists working in the KSA. The participants for face validity received the survey link via WhatsApp and gave their feedback over the phone. For the patient's version of the scale, a convenient sample of six patients who are under the care of Eastern Health Clusters #1 or #2 in the KSA agreed to answer the survey and gave their feedback about the scale's clarity. During in-person interviews with four participants, and phone calls with two, each participant answered the online version of the specific survey including the study information and demographic questions. All patients provided informed consent. Participants in the face validity assessments provided general feedback about the scales' clarity and readability.

## RESULTS

### Content validity

Based on the review panel feedback in Round 1, the I-CVI was calculated for each item [Table 1]. Items with a CVI of  $\geq 0.83$  were included in the next evaluation (Round 2); accordingly, 29 of 37 items with CVIs  $\geq 0.83$  were included for evaluation in Round 2. In Round 2, seven experts reviewed the items for the HCP scale and the patient's scale. The review panel agreed to omit item 2 of the PE subscale because it was similar to item 1 after the modifications from Round 1. The majority of the experts suggested removing item 16 of the PE subscale because it was irrelevant to HCPs. The reviewers also suggested removing item 5 of the EE subscale, item 2 of the SI subscale, and item 5 of the FC subscale because these concepts were covered by other items. Therefore, the final version of the HCP scale included 24 items: 7 PE items, 6 EE items, 3 SI items, 4 FC items, and 4 BI items [Table 2].

For the patient's version of the Saudi Telehealth Acceptance Scale, which was in Arabic, the review panel suggested removing three items from the EE subscale and one item from the SI subscale because they were irrelevant to the constructs. The final version of the patient's scale included 24 items: 9 PE items, 4 EE items, 3 SI items, 4 FC items, and 4 BI items [Table 3].

### Face validity

The face validity evaluations of the newly developed scales were conducted by a convenient sample of HCPs and patients. Eight HCPs who were currently practicing were asked to answer the HCP version of the survey questions, including

**Table 1: Item's content validity indexes and S-content validity indexes for each subscale from Round 1**

Item number	Items pool	CVI
	PE items	
1	Telehealth will allow me to accomplish my clinical tasks more quickly	1.00
2	Telehealth will allow me to accomplish more than face-to-face clinic visit	1.00
3	Telehealth will give me greater control over disease symptoms	0.75
4	Telehealth will save me time	0.88
5	Telehealth will improve access to healthcare services	0.75
6	Telehealth will improve my clinical performance	0.63
7	Telehealth will increase the quality of healthcare services	1.00
8	Telehealth will decrease the cost of healthcare services	0.88
9	Telehealth will give me the feeling of being safe	0.63
10	Telehealth will improve the healthcare plan	0.63
11	Telehealth will overcome transportation difficulties when going to the healthcare center	0.75
12	Telehealth will facilitate the monitoring of the disease	1.00
13	Telehealth will help me provide/receive healthcare services more quickly	0.75
14	Telehealth is useful for the healthcare system	0.88
15	Telehealth will improve the relationship between the healthcare provider and the patient	0.88
16	Telehealth will save me time of travelling to the healthcare center	1.00
	S-CVI=0.84	
	EE items	
1	Telehealth will be flexible to interact with	1.00
2	Learning to operate the telehealth equipment will be easy for me	1.00
3	It will be easy for me to fix the telehealth technical issues	0.88
4	I will find telehealth easy to use	1.00
5	Using telehealth will be easy to understand	0.88
6	It will be easy for me to become skillful in using the telehealth	0.88
7	Using telehealth will be simple	0.88
	S-CVI=0.93	
	SI items	
1	Most people who are important to me think I should use telehealth	0.88
2	Most people who are important to me would want me to use telehealth	0.88
3	People whose opinions I value would prefer me to use telehealth	0.88
4	The management would motivate me to use telehealth	0.88
5	Most people around me use telehealth	0.75
	S-CVI=0.85	
	FC items	
1	I have the resources necessary to use telehealth	1.00
2	I have the knowledge necessary to use telehealth	0.88
3	Telehealth is compatible with other systems I use	0.88
4	Technical support is available for assistance with telehealth difficulties	1.00
5	Management provided the necessary help and resources for telehealth	1.00
	S-CVI=0.95	
	BI items	
1	I am positive toward using telehealth	0.88
2	I will use telehealth when it becomes available	0.88
3	I am willing to use telehealth to provide/receive healthcare services	0.88
4	I will use telehealth to provide/receive healthcare services as often as needed	1.00
	S-CVI=0.91	

CVI – Content validity index; S-CVI – The proportion of items that achieved a rating of 3 or 4 by all the reviewers; S-CVI Ave – Average of the I-CVIs; BI – Behavioral intention, FC – Facilitating conditions; SI – Social influence; EE – Effort expectancy; PE – Performance expectancy

demographic questions and telehealth acceptance items. For the patient's version of the scale, six patients (residing in the KSA) were asked to answer the patient's version, including demographic questions and telehealth acceptance items. Both versions of the Saudi Telehealth Acceptance Scale were deemed appropriate and clear by the participants, and no further modifications were suggested.

## DISCUSSION

The demand for telehealth is increasing worldwide, and the KSA is not excluded from this movement.<sup>[25]</sup> Understanding

the factors that might affect the acceptance of telehealth is crucial for implementing and improving current services.<sup>[36]</sup> Multiple studies have used the UTAUT framework to design telehealth acceptance scales worldwide.<sup>[17,37-39]</sup> Several studies have measured telehealth acceptance in the KSA.<sup>[25,29,40,41]</sup> However, in only two studies, the data collection instruments were based on behavioral theory, but no scale development process details were mentioned in these studies.<sup>[10,42]</sup> Alaboudi *et al.* investigated the challenges and barriers to using telehealth in the KSA only among decision-makers.<sup>[42]</sup> In their study, UTAUT was one of the multiple behavioral theories that guided question

**Table 2: Item's content validity indexes and S - content validity indexes for each subscale from Round 2**

Item number	Items pool	CVI
	Telehealth PE items	
1	Telehealth will allow me to accomplish my clinical tasks more quickly	1.00
4	Telehealth will save me time	0.88
7	Telehealth will increase the quality of the healthcare services	1.00
8	Telehealth will decrease the cost of the healthcare services	0.88
12	Telehealth will facilitate the monitoring of the disease	1.00
14	Telehealth is useful for the healthcare system	0.88
15	Telehealth will improve the relationship between the healthcare provider and the patient	0.88
	S-CVI=0.93	
	Telehealth EE items	
1	Telehealth will be flexible to interact with	1.00
2	Learning to operate the telehealth equipment will be easy for me	1.00
3	It will be easy for me to fix the telehealth technical issues	0.88
4	I will find telehealth easy to use	1.00
6	It will be easy for me to become skillful in using the telehealth	0.88
7	Using telehealth will be simple	0.88
	S-CVI=0.94	
	Telehealth SI items	
1	Most people who are important to me think I should use telehealth	0.88
3	People whose opinions I value would prefer me to use telehealth	0.88
4	The management would motivate me to use telehealth	0.88
	S-CVI=0.88	
	Telehealth FC items	
1	I have the resources necessary to use telehealth (e.g., Computer with camera and headphone, smartphone, Internet)	1.00
2	I have the knowledge necessary to use telehealth	0.88
3	Telehealth is compatible with other operation systems I use (e.g., Windows, Mac/iOS, or Android)	0.88
4	Technical support is available for assistance with telehealth difficulties	1.00
	S-CVI=0.94	
	BI to use telehealth items	
1	I am positive toward using telehealth	0.88
2	I will use telehealth when it becomes available	0.88
3	I am willing to use telehealth to provide healthcare services	0.88
4	I will use telehealth to provide healthcare services as often as needed	1.00
	S-CVI=0.91	

CVI – Content validity index; S-CVI – The proportion of items that achieved a rating of 3 or 4 by all the reviewers; S-CVI Ave – Average of the I-CVIs; BI – Behavioral intention, FC – Facilitating conditions; SI – Social influence; EE – Effort expectancy; PE – Performance expectancy

generation during the interviews. To the best of the author's knowledge, the current study is the first to design and validate a psychometric instrument to measure telehealth acceptance in the KSA based on UTAUT as a theoretical framework and to translate it into Arabic. It is based solely on the four constructs of UTAUT to generate the item pool and design the scales.

Two versions of the Saudi Telehealth Acceptance Scale were developed in this study: one for HCPs (in English) and the other for patients (in Arabic). The scale development process started only with the HCP version. After the first round of the review process, the content experts suggested creating an Arabic version of the scale, as Arabic is the official language in the KSA. Round 2 of the content validity procedure included translating the telehealth acceptance scale into Arabic and modifying the items to be appropriate for the patient population. Creating an Arabic version of the scale targeting patients is unique in this study because it made the data collection tool more relevant to the target population. The translation of the scale to Arabic was guided mainly by the "Guidelines for the Process of

Cross-Cultural Adaptation of Self-Report Measures."<sup>43]</sup>

The step of back translation to English was not attainable at this stage, as recommended by the guidelines. However, the author believes that the review of the translation by seven content experts in the two rounds was of high quality and reflected the context of using telehealth in the KSA.

The validity of the newly developed Saudi Telehealth Acceptance Scale was supported by the theoretical base of UTAUT and the systematic revisions and modifications by the content experts. The initial item pool was generated from previous studies that explored telehealth acceptance in multiple health disciplines. Starting from this well-established pool made it even clearer for the content reviewers to evaluate the items, leading to minor modifications from Round 1 to Round 2. The author also utilized Round 2 to confirm the experts' evaluations by presenting each item with two options: either to include the item in the final version or not. This step increased the level of confidence that the final items were extensively reviewed and agreed upon by most of the reviewers.

**Table 3: The final items in the Saudi Telehealth Acceptance Scale for patients**

مقياس تقبل استخدام خدمات الرعاية الصحية عن بعد	
تعريف الرعاية الصحية عن بعد: هي استخدام الوسائل الإلكترونية لتقنية المعلومات والاتصالات وذلك يشمل الانترنت والحاسوب الشخصي أو المحمول أو الهواتف الذكية، للوصول للخدمات الصحية عن بعد بحيث أن مقدم الخدمات الصحية يتواجد في مكان آخر بعيد. تسمى أيضا (الطب عن بعد) (الاتصالي) أو (الصحة الرقمية) أو (العيادات الافتراضية).	
الفوائد المتوقعة من استخدام الرعاية الصحية عن بعد	
1 الرعاية الصحية عن بعد سوف تمكنني من الحصول على خدمات صحية أكثر مقارنة بالطريقة التقليدية	1
2 الرعاية الصحية عن بعد سوف توفر وقتي	2
3 الرعاية الصحية عن بعد سوف تمكن المريض من الحصول على الخدمات الصحية بشكل أسهل	3
4 الرعاية الصحية عن بعد سوف تزيد من جودة الخدمات الصحية	4
5 الرعاية الصحية عن بعد سوف تقلل التكلفة المالية للخدمات الصحية	5
6 الرعاية الصحية عن بعد سوف تساعدني في مراقبة الوضع الصحي للمرض عن بعد	6
7 الرعاية الصحية عن بعد ستكون مفيدة لمنظومة الخدمات الصحية	7
8 الرعاية الصحية عن بعد سوف تحسن العلاقة بيني وبين مقدم الرعاية الصحية	8
9 الرعاية الصحية عن بعد سوف توفر علي وقت الانتقال للمركز الصحي أو المستشفى	9
الصعوبات المتوقعة عند استخدام الرعاية الصحية عن بعد	
1 سيكون من السهل علي تعلم تشغيل أجهزة الرعاية الصحية عن بعد	1
2 سيكون من السهل علي إصلاح المشكلات التقنية لأجهزة الرعاية الصحية عن بعد	2
3 سيكون من السهل علي استخدام الرعاية الصحية عن بعد	3
4 سيكون من السهل علي أن أصبح ماهرا في استخدام الرعاية الصحية عن بعد	4
التأثير الاجتماعي في استخدام الرعاية الصحية عن بعد	
1 أغلب الأشخاص المهمين بالنسبة لي (العائلة أو الأصدقاء) يعتقدون أنه يجب علي استخدام الرعاية الصحية عن بعد	1
2 الأشخاص الذين أقر أنهم يفضلون أن أستخدم الرعاية الصحية عن بعد	2
3 الجهات الصحية المسؤولة تحفزني على استخدام الرعاية الصحية عن بعد	3
العوامل المساعدة لاستخدام الرعاية الصحية عن بعد	
1 أمتلك الأدوات اللازمة لاستخدام الرعاية الصحية عن بعد مثل جهاز كمبيوتر مزود بكاميرا وسماعة، هاتف ذكي، وإنترنت	1
2 أمتلك المعرفة الكافية لاستخدام الرعاية الصحية عن بعد	2
3 الرعاية الصحية عن بعد متوافقة مع أنظمة التشغيل التي أستخدمها مثل ويندوز، ماك، أندرويد وغيرها	3
4 الدعم الفني متوفر للمساعدة عند مواجهة أي صعوبات أثناء استخدام الرعاية الصحية عن بعد	4
نية استخدام الرعاية الصحية عن بعد	
1 لدي شعور إيجابي نحو استخدام الرعاية الصحية عن بعد	1
2 سأستخدم الرعاية الصحية عن بعد إذا أصبحت متاحة	2
3 سأستخدم الرعاية الصحية عن بعد بدلا من زيارة المركز الصحي أو المستشفى	3
4 سأستخدم الرعاية الصحية عن بعد كلما دعت الحاجة لذلك	4

The outcomes of this study can be used to measure the level of telehealth acceptance among potential users, in KSA or in other countries, and to understand the factors that might affect telehealth acceptance such as age, level of education, and distance from a healthcare facility. Future studies should measure telehealth acceptance among HCPs and patients using the two versions of the scale. Further evidence of the reliability and construct validity of the newly developed scales also needs to be provided.

### Limitations

This study had a few limitations. First, the data collection plan was designed to meet all eight content experts to explain the content validation process; however, this could not be achieved with all experts because of distance barriers and transportation. Nonetheless, face-to-face meetings were held with four experts, and no difference in

the data collection process was observed compared with those contacted by email. All the data collection processes were conducted by email. Second, the plan was to use a native English speaker to translate from Arabic to English. However, this was not achieved due to the unavailability of a reviewer who met this criterion during the data collection period.

### CONCLUSIONS

This study provides empirical evidence of the content and face validity of the Saudi Telehealth Acceptance Scale. The new scales were based on UTAUT and considered the Saudi healthcare system and cultural context during development. The scale development process yielded two versions of the Saudi Telehealth Acceptance Scale. The first scale was developed with a focus on HCPs in the KSA, and the second version was developed for patients. The Saudi Telehealth Acceptance Scale showed evidence of content and face validity, as provided by a panel of content experts and a group of patients in the KSA. These tools could provide standardized data collection tools to measure telehealth acceptance for HCPs and patients in the KSA.

### Ethical considerations

This study received ethical approval from the Institutional Review Board of Imam Abdulrahman Bin Faisal University (Ref. no.: IRB-2021-03-149; date: April 4, 2021). All study participants provided written consent before inclusion in the study. The study adhered to the principles of the Declaration of Helsinki, 2013.

### Peer review

This article was peer-reviewed by two independent and anonymous reviewers.

### Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

### Author contributions

A.A.A was solely involved in the Conceptualization, Methodology, Data analysis, and Writing of the manuscript. The author has read and agreed to the published version of the manuscript.

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### Conflicts of interest

There are no conflicts of interest.

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