Original Paper

Determinants of the Intention to Use Teledermatology: Evidence From Dermatologists and Primary Care Physicians

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Abstract

Background: Teledermatology (TD) is one of the applications of electronic health and telemedicine that involves the use of information and communication technologies (ICTs) for the care of skin diseases. Previous studies on TD indicate that it seems to be effective in diagnosing early malignant pathologies, such as melanoma, and in reducing waiting lists by prioritizing urgent cases of pathology. Despite these advantages, the implementation of TD is still low in many areas.

Objective: Most previous studies on TD have focused on analyzing the results of TD use. However, to completely understand TD, it is necessary to consider the determinants of its use. This study analyzes the factors that motivate medical professionals to use TD in their clinical practice.

Methods: A survey that targeted a total population of 743 medical professionals from health care institutions in Andalusia (Spain) was used. The study sample comprised 223 doctors (87 dermatologists and 136 primary care physicians).

Results: Using an extended Technology Acceptance Model and microdata for the 223 physicians, a cluster analysis (of the user's ICT profile) and binary logistic regression analysis were conducted. This analysis demonstrated the presence of 3 clusters in the sample with respect to the use of technology (cluster 1: advanced use of ICTs; cluster 2: moderate use of ICTs; and cluster 3: scarce use of ICTs). The analysis performed confirmed the model's goodness of fit, which allowed 69% of the variable's variance to be explained. The outcomes revealed that the factors that were most important when implementing a TD system were the user's ICT profile (P=.048), system efficiency (P<.001), and preference of the subjects involved (P=.008; P<.005). The quality of the assistance, the difficulties arising from the use of technology (information security and confidentiality), or interests of the administration were not decisive factors for the implementation of TD. Subsequently, we performed a logistic regression analysis, separating primary care doctors from dermatologists. For the former, the determining factors were the ICT profile and the efficiency of the system, whereas, among dermatologists, only the preference of each individual was considered to be a determining factor.

Conclusions: The use of TD should be accompanied by a comprehensive program of validation and evaluation. These results show that determinants of TD implementation differ depending on the subjects involved. Therefore, it is essential to perform studies before the implementation of a TD system to identify and influence the aforementioned predictive factors.

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KEYWORDS

telemedicine; dermatology; organizational innovation; health care surveys

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Introduction

Background

Information and communication technologies (ICTs) constitute an opportunity for improvement in care quality, both in the effectiveness and efficiency of health services. Incorporating ICTs also contributes to the development of sustainable health systems, justifying its economic and political interest [1,2]. Telemedicine is defined as the use of ICT for the transfer of medical information for diagnostic, therapeutic, and educational purposes [3]. Telemedicine services include assistance applications that aid in the administration and management of patients, as well as provide information and distance training to users and professionals. When this service is used in dermatology, it is referred to as teledermatology (TD), which is probably the most used form of telemedicine.

Despite starting hesitantly, the development and cheapening of information technologies have led to an exponential expansion of TD since the beginning of the 21st century, for example, from having 21 centers that used TD in 2009 to 68 centers in 2014 in Spain [4]. In a recent systematic review, Trettel et al [5] showed that the application of TD increased over the years and is illustrated by the number of countries where digital patient communication is used. Currently, the most used TD model is that of asynchronous TD (one in which clinical data are stored and sent electronically to the dermatologist who responds to the primary care physician with the instructions to follow). This model was the predominant TD modality in 83% of hospitals in 2014 [6].

Previous studies on TD indicate that it seems to be effective when misleading benign or malignant dermatological tumors, improving consultation prioritization by discerning urgent or preferential pathology [5,7]. In addition, TD is also useful as a teaching instrument by facilitating training for primary care physicians and dermatology residents, termed as teletraining [8].

Although most studies have focused on analyzing the results of TD use, to completely understand TD, it is necessary to consider its determinants of use. Despite the advantages of TD and its rapid development, implementation of TD is still low. Only 1% of dermatology consultations are by TD [9], and it has been implemented only in 26% of the hospitals in their reference areas [6]. These data seem to be contradictory, given the good acceptance and the concept of utility regarding TD that both primary care physicians and dermatologists share [6].

Some previous studies have tried to analyze the determinants of TD implementation [10-12]. However, this issue remains unclear, and further research is needed to explain the determinants of TD adoption. In our immediate environment, a study was conducted to analyze the factors associated with the adoption of ICT and its barriers in Andalusia. However, TD itself was not an object of study in this research [13].

Objective

The objective of this work was to identify factors influencing intention to use TD by professionals of the Andalusian Health Service and the typology of the professional according to the use and expectations of the ICT. Subsequently, we proceeded to analyze what factors influence and to what extent these factors can enhance or inhibit the use of telemedicine in the organization where the professionals work.

Methods

Hypothesis and Model

The Technological Acceptance Model (TAM), proposed by Davis in 1989, is the most widely accepted model to assess the acceptance of an information technology within a given organization [11]. The model is based on the theory of reasoned action (TRA) [14]. Since its publication, it has been cited on numerous occasions, being one of the most widely used instruments to assess users' technology acceptance.

This model states that technology acceptance depends mainly on 2 variables: perceived utility (PU) and perceived ease of use (FUP). The PU refers to the belief that a technology system can improve the professional activity. This utility may refer to improving the quality of clinical practice or reducing economic costs, time, or resources. On the other hand, the FUP indicates the perception that the use of a particular system implies less effort to perform their tasks.

From this model, we obtained the following 2 hypotheses:

- H1. The PU of TD influences the professionals' intention to use.
  - H1.1. Improving the quality of care influences the intention to use TD.
  - H1.2. Reduction of costs and resources in the distance influences the intention to use TD.
- H2. The FUP of TD influences professionals' intention to use.

The TAM has been used to predict how the adoption of multiple technologies will behave, including the acceptance of telemedicine by health professionals [15]. It is a model shown to be suitable for both sex, different age groups, and most cultures [16].

Despite the aforementioned advantages, the TAM shows certain limitations. Some authors have pointed out the need to include additional variables to improve model predictions [17,18]. There are a number of variables including social, geographical, economic, and legal context that may influence users when accepting a new technology in our environment. These variables that are summarized in the social influence or *subjective norm* are included in the TRA and the theory of planned behavior. On the basis of these theories, the subjective norm can be included in our model. This rule corresponds to the directors of health care institutions, rest of the doctors, and the patients themselves.

In addition to the subjective norm, a patient's technological profile also determines how they will accept a new telemedicine tool. That profile may be defined according to the patient's use of electronic tools in their daily lives, both for recreational and work-related use. These tools include email, social networks, and the internet. The use of these tools by the subject determines

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its perception of usefulness and therefore can define a predisposition to accept or reject a new technology. For this reason, for an adequate study of intention to use TD, we consider it necessary to include the user's ICT profile in our variables. There are models, such as the theory of Grewal and Parasuraman on technological preparation [19], that allow variable incorporation relating the user profile of a professional with the intention of using ICTs in their work.

After including these variables (subjective norm and ICT profile) that we thought could influence the model, 2 more hypotheses were obtained:

- H3. The subjective norm (influence exerted by the administration, managers, doctors, and patients) influences the intention to use TD.
  - H3.1. The support of professionals and patients for TD influences the intention to use.
  - H3.2. The institution's support for TD influences its intention to use.
- H4. The ICT profile of a user influences the intention to use TD.

Figure 1 summarizes the TAM for TD, adding the hypotheses that have been discussed in this section.

Questionnaire and Validation

Data Collection

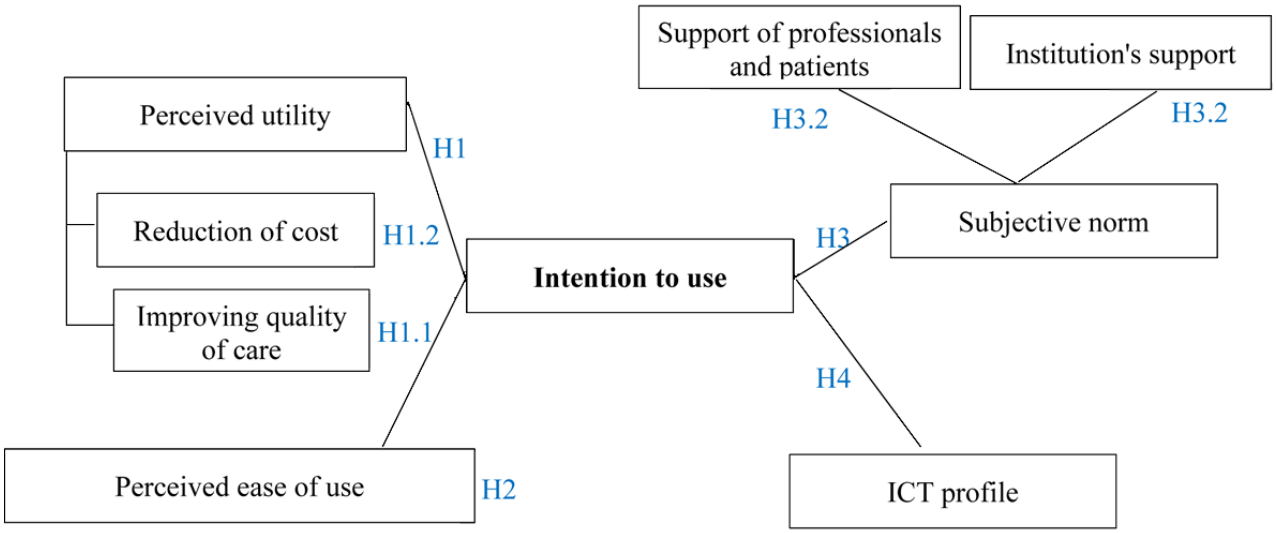
A specific questionnaire based on the TAM and its subsequent derivatives was designed by adapting a general questionnaire on telemedicine acceptance validated by the literature [11]. The final questionnaire is included in Multimedia Appendix 1. Different items that appear in the questionnaire have been formulated to measure variables that we expected to find in the model. In addition, we considered adding questions to these items to get participants' personal characterization (age, sex, professional category, experience, and type of center in which they are currently working). All these data would be used to build participants' technological profile, as described later.

Altogether, 18 questions, divided into 3 blocks, were included in the questionnaire: (1) demographic and professional characterization; (2) adoption of a TD system, and (3) Implementation of a TD system. Questions included in blocks 2 and 3 were based on a Likert scale of 10 points, from 1 (*nothing important* /*nothing agree*) to 10 (*very important* /*s* trongly agree).

An electronic version of the questionnaire was constructed and distributed through email using a corporate distribution list of the Andalusian Health System. This distribution list comprised all dermatologists and primary care physicians with a corporate mail in 5 centers with different complexity levels (from county hospitals to third-level centers) from Andalusia. We received answers from professionals (both dermatologists and general practitioners [GPs]) from all of the invited centers.

The questionnaire was addressed to both dermatologists and GPs, whether they were consultants or residents. A total of 574 general medicine physicians and 187 dermatologists were invited to participate (Textbox 1). Between May 25 and June 25, 2018, 2 reminders were sent to participants. Of 761 participants, 223 responses from professionals (29.4% of all invited) were obtained and included in the database leading to this study. Considering the amount of data, the profile of professionals who participated, and the centers involved, the final sample should be considered as representative of the Andalusian Health Service.

Figure 1. Model and hypotheses. H: hypothesis; ICT: information and communication technology.



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Textbox 1. Study specifications.

Universe:

- 574 general medicine physicians; 187 dermatologists

Sample:

- 138 general medicine physicians; 85 dermatologists

Margin of error:

- 5.52% (p=q) 95% CI

Data collection method:

- Questionnaire

Sampling method:

- Random

Fieldwork:

- Between May 25, 2018, and June 25, 2018

Variables and Statistical Analysis

First, we wanted to analyze the user's ICT profile, owing to several items of the questionnaire measuring the intensity of internet use. A hierarchical cluster analysis was performed for this purpose. Cluster analysis is a multivariate technique that seeks to group objects to form object conglomerates or clusters, with a high degree of internal homogeneity and external heterogeneity. After obtaining 3 clusters in our sample to define 3 levels of the ICT profile, an analysis of variance (ANOVA) test was applied in the obtained clusters.

On the other hand, to test the hypotheses proposed in the model (see hypothesis and model), different contrast tests were used on the variables of the study. Through the questionnaire items, multiple variables could be obtained. First, these variables required an exploratory factorial analysis (EFA) to be defined and calculated. The EFA is a technique that allows to explore the set of latent variables or common factors explaining the answers to the items of a test. Therefore, it is one of the most frequently applied techniques in studies related to the development and validation of tests.

All the variables of the study (the ICT profile and those obtained after the EFA) are summarized in Table 1. All these variables could be framed in the hypotheses we had obtained from the TAM (see point 2.1 hypothesis and model) as is shown in Table 2.

Subsequently, an exploratory factor analysis was carried out, constructing as many metric variables as the EFA had revealed. All these, together with the dependent variable, constituted the final multivariate analysis. A logistic regression was performed to analyze the independent influence in the TD implementation of each factor showed in the EFA. Finally, we wanted to distinguish between factors that were more important for GPs to gain a better acceptance of this technology and those more important for dermatologists.

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Table 1. Study variable.

Variable	Explanation
User's ICT[a] profile	Numerical variable obtained from the cluster analysis. This variable measures the use of the internet and social networks at a personal and professional level. The original variables included in the analysis were measured using a 5-point Likert scale
Quality of care	Numerical variable obtained from an exploratory factor analysis. It defines the quality of the medical act as an influencing factor for the implementation of TD[b]. This variable was obtained from questions 15.1-15.4 (see Multimedia Appendix 1) after EFA[c]. The original variables included in the analysis were measured on a 10-point Likert scale
System efficiency	Numerical variable obtained from an exploratory factor analysis. It defines the influence of efficiency (including workload and expenses) on the implementation of TD. This variable was obtained from questions 15.5-15.7 (see Multimedia Appendix 1) after an EFA. The original variables included in the analysis were measured on a 10-point Likert scale
Technological difficulties	Numerical variable obtained from an exploratory factor analysis. It refers to the complications related to technological systems (complexity of the devices, need for training, and security). This variable was obtained from questions 16.1-16.6 (see Multimedia Appendix 1) after an EFA. The original variables included in the analysis were measured on a 10-point Likert scale
Preference of the subjects directly involved	Numerical variable obtained from an exploratory factor analysis. It explains how preferences of professionals and patients influence the implementation of TD. This variable was obtained from questions 17.1-17.3 (see Multimedia Appendix 1) after an EFA. The original variables included in the analysis were measured on a 10-point Likert scale
Interest of the administration	Numerical variable obtained from an exploratory factor analysis. It defines the influence of administrations (including financing capacity or resources that they would have to devote to) on the implementation of TD systems. This variable was obtained from questions 17.4-17.7 (see Multimedia Appendix 1) after an EFA. The original variables included in the analysis were measured on a 10-point Likert scale

[a]ICT: information and communication technology.

[b]TD: teledermatology.

[c]EFA: exploratory factorial analysis.

Table 2. Relationship between the hypotheses based on Davis' Technological Acceptance Model (TAM) and study variables (obtained after an exploratory factorial analysis [EFA] and a cluster analysis [information and communication technology (ICT) profile]).

Variables according to the modified TAM	Study hypothesis according to the modified TAM	Variables obtained after EFA and hierarchical cluster analysis
Perceived utility	H1. The perceived utility of TD[a] influences the professionals' intention to use; H1.1. Improving the quality of care influences the intention to use TD; H1.2. Reduction of costs and resources in the distance influences the intention to use TD	Quality of care (H1.1); System efficiency (H1.2)
Perceived ease of use	H2. The perceived ease of use of TD influences professionals' intention to use	Technological difficulties (H2)
Subjective norm	H3. The subjective norm (influence exerted by the administration, managers, doctors, and patients) influences the intention to use TD; H3.1. The support of professionals and patients for TD influences the intention to use; H3.2. The institution's support for TD influences its intention to use	Preference of the subjects directly involved (H3.1); Interest of the administration (H3.2)
User's ICT profile	H4. The ICT profile of a user influences the intention to use TD.	User's ICT profile (H4)

[a]TD: teledermatology.

Results

Demographic and Professional Characteristics

A total of 223 responses were obtained, including family doctors and dermatologists (29.3% rate of response). In addition, 135 (61%) were women. The professionals' average age was 43.7 years. In our sample, 38% comprised dermatologists (among them, 6% dermatology residents and the rest dermatology specialists). In addition, 61% corresponded to GPs, 14% of these being general medicine residents. The remaining 1.34% corresponded to other professional categories, such as occupational physicians or aesthetic doctors. Moreover, 54.71% of the participants were TD users (60.87% of GPs and 44.71% of dermatologists), and 40.36% of them had been TD users for more than 2 years. Demographic and social characteristics of the sample are summarized in Table 3.

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Table 3. Demographic factors.

Variable	Value, n (%)
Age (years)	
25-34	80 (35.9)
35-44	39 (17.5)
45-54	48 (21.5)
>54	56 (25.1)
Sex	
Male	88 (39.5)
Female	135 (60.5)
Professional category	
Dermatology resident	14 (6.23)
Dermatologist (eventual or interim)	39 (17.5)
Dermatologist (owner)	31 (13.9)
General practitioner resident	32 (14)
General practitioner (temporary or interim)	35 (15.7)
General practitioner (owner)	69 (30.9)
Others	3 (1.3)
Working time in sanitary field (years)	
≤1	22 (9.9)
2-10	73 (32.7)
11-20	52 (23.3)
21-30	51 (11.2)
>30	25 (11.2)
Working time in the same center (years)	
≤1	54 (24.2)
2-10	106 (47.5)
11-20	47 (21.2)
21-30	14 (6.3)
>30	2 (0.9)

Information and Communication Technology Profile

To define the user's ICT profile, we used a hierarchical clustering analysis. This analysis showed the presence of 3 clusters in the sample with respect to the use of technology (cluster 1: advanced use of ICTs; cluster 2: moderate use of ICTs; and cluster 3: scarce use of ICTs). The result was compared with an ANOVA test that was statistically significant ($P<.001$). Advanced ICT users had a slightly lower average age (41.86 years) compared with intermediate users (45.65 years) and beginners (42.99 years). However, these findings were not statistically significant ($P=.21$). The number of components in each cluster was well balanced, as shown in Tables 4 and 5.

Table 4. Hierarchical clustering analysis (information and communication technology user's profile).

Cluster number	Distances between clusters		
	1	2	3
1	—[a]	3.419	3.306
2	3.419	—	4.777
3	3.306	4.777	—

[a]Data not aplicable.

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Table 5. Number of cases in each cluster.

Cluster	Frequency (n)
Cluster 1 (high use)	98
Cluster 2 (moderate use)	52
Cluster 3 (scarce use)	73
Valid	223
Lost	0

Determinants of Teledermatology Use

After the EFA, 5 independent variables were obtained (see Table 1) to which a numerical value was assigned. The factors obtained were classified as quality of care, system efficiency, technological difficulties, preference of the subjects directly involved (which included patients and professionals), and interest of the administration. All variables of the correlation matrix showed high correlation, with a determinant value of .000005989. The value of Kaiser-Meyer-Olkin was 0.843 and that of Bartlett's spherical test was 2575.479 with a significance of <.001 This analysis explained 69.238% of the variance (see Table 6). The values of Cronbach alpha in the factors between 0.782 and 0.894 confirmed the reliability of the results obtained.

After extracting the factors involved in the implementation of TD through the EFA, a multivariate analysis was performed, specifically, a logistic regression to obtain variables showing an independent impact. The results of this analysis are shown in Table 7, which provided the following statistics: χ^2_6=25.1; *P*<.001; Hosmer-Lemeshow test=9.481; *P*=.30; R^2 of Nagelkerke=0.155.

The ICT profile of the users (*P*=.048), the efficiency of the system (*P*<.001), and the preferences were found to be influential factors when implementing a TD system (*P*=.008). The remaining factors obtained after the EFA (assistance quality, the possible technological difficulties, and the administration interest) did not show an independent influence in the multivariate analysis.

In this way, based on our results, we were able to accept hypotheses H1.2, H3.1, and H4, whereas H1.1, H2, and H3.2 could not be accepted.

Subsequently, the same analysis was carried out by separating the sample into 2 different groups: GPs (both residents and consultants) and dermatologists (both residents and consultants). A logistic regression was performed including only GPs (the results are shown in Table 8), which provided the following statistics: χ^2_6=4.8; *P*=.57; Hosmer-Lemeshow test=6.562; *P*=.59; R^2 of Nagelkerke=0.054.

In this subgroup, the ICT profile was influenced by the TD implementation implantation (*P*=.03) and system efficiency (*P*=.002). The same analysis was then carried out in the subgroup of dermatologists, finding that only the preference of the subjects directly involved was a significant variable (Table 9). It provided the following statistics: χ^2_6=16.2; *P*=.012; Hosmer-Lemeshow test=7.402; *P*=.39; R^2 of Nagelkerke=0.238.

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Table 6. Exploratory factor analysis results.

Item	Quality of care	System efficiency	Technological difficulties	Preference of the subjects directly involved	Interest of the administration
How important are they in the implementation of teledermatology?					
15.1. Quality of care	0.864	__[a]	—	—	—
15.2. Patient health	0.877	—	—	—	—
15.3. Therapeutic compliance	0.844	—	—	—	—
15.4. Frequency of face-to-face consultation	0.712	—	—	—	—
15.5. The workload of professionals	—	0.742	—	—	—
15.6. Health expenditure	—	0.787	—	—	—
15.7. Paperwork/bureaucracy	—	0.790	—	—	—
How much do you worry about the following problems related to teledermatology?					
16.1. Security and confidentiality of patient data	—	—	0.674	—	—
16.2. Complexity of the devices to carry out teledermatology	—	—	0.803	—	—
16.3. Registration of professional's actions	—	—	0.745	—	—
16.4. The need for specific formation	—	—	0.703	—	—
16.5. Technical difficulties related to the use of ICT	—	—	0.783	—	—
16.6. The time required to perform a teledermatology consultation	—	—	0.714	—	—
How do you think the following factors affect the implementation of teledermatology in usual clinical practice?					
17.1. Patients' preference for face-to-face consultations	—	—	—	0.836	—
17.2. Professionals' preference for face-to-face consultations	—	—	—	0.759	—
17.3. Technological skills of patients	—	—	—	0.763	—
17.4. Technological skills of professionals	—	—	—	—	0.720
17.5. Time dedicated to each patient	—	—	—	—	0.692
17.6. Technological equipment suitable for the teledermatology project	—	—	—	—	0.855
17.7. Financing of the teledermatology program	—	—	—	—	0.723
Variance explained by each factor (%)	17.636	16.458	12.997	11.318	10.889
Cumulative variance (%)	17.636	34.094	47.091	58.409	69.298
Cronbach alpha	.801	.894	.801	.858	.782

[a]Values lower than 0.5 have been suppressed to facilitate reading.

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Table 7. Results of the logistic regression (global sample).

Variable	B	Standard error	Wald	df	*P* value	Exp (B)
User's ICT[a] profile	0.430	0.234	3.926	1	*.048* [b]	1.589
Quality of care	0.021	0.194	0.012	1	.91	1.021
System efficiency	0.858	0.197	19.047	1	*<.001*	0.986
Technological difficulties	−0.14	0.199	0.005	1	.95	0.986
Preference of the subjects directly involved	−0.557	0.211	6.982	1	*.008*	0.573
Interest of the administration	0.148	0.195	0.579	1	.45	1.160
Constant	0.928	0.442	4.400	1	.04	2.529

[a]ICT: information and communication technology.

[b]Italicized values mean statistical significance.

Table 8. Results of the general practitioners' subgroup of the logistic regression.

Variable	B	Standard error	Wald	df	*P* value	Exp (B)
User's ICT[a] profile	1.160	0.535	4.708	1	*.03* [b]	3.191
Quality of care	−0.212	0.455	0.216	1	.64	0.809
System efficiency	1.356	0.447	9.202	1	*.002*	3.883
Technological difficulties	0.002	0.330	0.000	1	.995	1.002
Preference of the subjects directly involved	−0.394	0.387	1.038	1	.31	0.674
Interest of the administration	0.090	0.376	0.057	1	.81	1.094
Constant	283	0.804	0.124	1	.73	1.327

[a]ICT: information and communication technology.

[b]Italicized values mean statistical significance.

Table 9. Results of the dermatologists' subgroup of the logistic regression between the factors obtained after an exploratory factorial analysis.

Variable	B	Standard error	Wald	df	*P* value	Exp (B)
User's ICT[a] profile	0.350	0.282	1.324	1	.25	1.384
Quality of care	0.098	0.233	0.178	1	.67	1.103
System efficiency	0.202	0.277	0.531	1	.47	1.224
Technological difficulties	0.040	0.271	0.021	1	.88	1.041
Preference of the subjects directly involved	−0.807	0.353	5.226	1	*.02* [b]	0.446
Interest of the administration	0.167	0.257	0.421	1	.52	1.182
Constant	0.579	0.639	0.819	1	.37	1.784

[a]ICT: information and communication technology.

[b]Italicized values mean statistical significance.

Discussion

Principal Findings

The objective of this study was to identify factors influencing the intention to use TD in a group of GPs and dermatologists. The influence of the typology of the professional (based on the use and expectations of the use of ICT) was also analyzed. To this end, an expanded TAM containing 5 scales that were previously validated [11,12,20] was used. To our knowledge, there are few previous studies regarding the use of TD in a health institution. The study evaluating influencing factors in the intention to use telemedicine by a group of professionals of the Andalusian Health Service deserves special mention. In this study, Villalba-Mora et al [13] concluded that telemedicine was fully adopted. According to these authors, utility perceived by professionals was the main factor related to telemedicine adoption. However, they did not focus on TD implementation, but in all forms of telemedicine in this region, it was found that financial issues remain as a major barrier even with a strong

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policy commitment from the government. In 2018, Romero et al [6] published a study analyzing TD models in Spanish real practice, focusing on the organization, the technical aspects, and the perceived advantages/disadvantages of Spanish dermatologists but were not able to establish variables influencing their implementation. In their study, TD is being described as implanted in 26% of Spanish hospitals and their health areas. Dermatologists' overall satisfaction with TD is good, scoring a 6.9 on a scale up to 10 [6].

Furthermore, 3 variables of the study showed an influence on the intention to use TD in the global analysis with statistical significance: the user's ICT profile, system efficiency, and preferences of the subjects involved. Regarding the first, as expected, the personal and professional level of use of the internet and social networks of the user makes them prone to the use of telemedicine methods. This result is concordant with that of Pereyra et al [10], where the user's ICT profile was also considered to be a significant factor to established telemedicine use. In addition, another study [13] on the factors associated with the adoption of ICT in Andalusia concluded that the doctor's PU was related to telemedicine adoption. The preferences of the subjects involved have also been a determining variable so that the acceptance and support of professionals and patients is one of the factors that would most influence the implementation of the TD system.

In terms of efficiency, understood as cost reduction, the doctor's PU also showed significance as a determining variable for the implementation of TD. These results overlap those of the acceptance of telemedicine in Malaysia's public hospitals [21]. Cost-effectiveness of TD has been analyzed widely [7]. In 2018, Vidal-Alaball et al [22] carried out a cost-saving analysis comparing TD with dermatology face-to-face visits in Bages, Spain. They demonstrated how TD could save money from administrations, improving the efficiency of the system.

It is important to highlight the lack of significance in terms of the administrations' interest in TD system implementation. In most previous studies [11,21,23], this was a determining factor. Pereyra et al established the administrations' interest as the most related factor in the use of telemedicine through the studied institution [10].

Regarding the analysis by subgroups, it is highlighted that the only significant variable in the group of dermatologists was the preference of the subjects involved. Perhaps, the efficiency was not very decisive in this subgroup because it is not the dermatologist who makes the referral (the efficiency was significantly variable in the group of GPs). On the other hand, the ICT profile was only significant in the group of GPs probably because they perform most activities involved at this level, such as taking photographs, editing them, sending the teleconsultation, receiving the answer, and acting accordingly.

However, there are several limitations to consider in this study. First, the questionnaire distribution method consisted mainly of a Web-based tool that may have facilitated the response among users with greater familiarity in the use of ICTs, therefore implying a selection bias. Although paper questionnaires were also delivered, the answers through this format were scarce in number (32 vs 201). In addition, some user subgroups were underrepresented in our sample, such as dermatology residents (only 14 participants).

However, even considering the previously mentioned limitations, we could establish some recommendations to implement a TD system. Priority should be given to projects associating efficient, agile, and easy-to-use systems, resulting in a reduction of both economic and temporary costs in the medical practice. Projects that implement the ICT profile of users adapting to them to facilitate the implementation of the TD should also be encouraged.

Given the large differences expected in each population or health system (economic, social, cultural factors, and use of ICT), the determining variables to implement a TD or telemedicine system are likely to show great variability. It is therefore necessary to carry out more studies before the implementation of these systems. This will allow better adaptability to different target populations, thus multiplying acceptance and usefulness possibilities.

Conclusions

Despite its many advantages, the implementation of teledermatology (TD) is still low in some areas. To better understand this phenomenon, it is necessary for a comprehensive program of TD determinants of use. On the basis of an extended TAM, we obtained the following after an EFA of 3 determinants of TD use: user's information and communication technology profile, system efficiency, and preference of the subjects involved. According to our results, the quality of assistance, the difficulties because of the use of technology, and the interest of the administration were not decisive factors for the implementation of TD. Given the large differences expected in each population or health system, the determining variables to implement a TD show great variability. As a consequence, further studies are needed to better adapt TD to target populations.

Conflicts of Interest

None declared.

Multimedia Appendix 1

Final questionnaire.

[DOCX File, 21KB - derma_v2i1e14459_app1.docx]

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Abbreviations

ANOVA: analysis of variance
EFA: exploratory factorial analysis
GP: general practitioner
ICT: information and communication technology
PU: perceived utility
TAM: Technological Acceptance Model
TD: teledermatology
TRA: theory of reasoned action

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