Primary Care Physicians' and Specialists' Experiences on acceptance and use of technological innovation: Successful electronic consultation service initiative in Quebec, Canada

Veronique Nabelsi, Annabelle Lévesque-Chouinard

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Table of Contents

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Abstract

Background: Electronic Consultation (eConsult) is an eHealth service that allows primary care providers (PCPs) to electronically consult specialists regarding their patients' medical issues. Many studies have demonstrated that eConsult services improve timely access to specialist care, prevent unnecessary referrals, improve PCPs', specialists' and patients' satisfaction, and therefore have a large impact on costs. However, no studies have evaluated PCPs' and specialists' acceptance of eConsult services in Canada, and worldwide.

Objective: This exploratory study aimed to identify factors affecting eConsult service acceptance by PCPs and specialists in urban and rural primary care clinics across three regions in the province of Quebec, Canada, by integrating the Unified Theory of Acceptance and Usage of Technology (UTAUT) and Task-Technology Fit (TTF) models, and user satisfaction. This research was designed to broaden and assist in scaling up this effective eHealth service innovation across the province.

Methods: A cross-sectional web-based survey was sent to all PCPs (N=263) and specialists (N=62) who used the eConsult Quebec Service between July 2017 to May 2021. We proposed a unified model integrating the UTAUT model and TTF model, and user satisfaction by endorsing eleven hypotheses. The partial least squares (PLS) was used to investigate factors influencing the acceptance of the eConsult Quebec Service.

Results: Of the 325 end users, 41.8% (N=101 or 38% PCPs and N=35 or 56% specialists) responded. The results of the analysis with PLS indicate that 9 of our 11 hypotheses are supported. The direct relationships uniting the various constructs of the model highlighted the importance of several key constructs and predominant correlations. Results suggest that satisfaction (SAT) is the key driver behind the use of the eConsult Quebec Service. Performance expectancy (PE) (P<.001) and effort expectancy (EE) (P<.05) can have a positive impact on behavioral intention (BI), and BI (P<.001) can impact on adoption (ATT). TTF has an influence on PE (P<.001), ATT (P<.05) and SAT (P<.001). However, results show that there is no direct effect between social influence (SI) (P=.064) and BI or between facilitating conditions (FC) (P=.114) and ATT.

Conclusions: This study provides a better understanding of the factors influencing PCPs' and specialists' intention to adopt the eConsult Quebec Service. Furthermore, this study tests a research model and a technology that has never been explored in Quebec until now. Based on the results, the service is a good fit to meet the users' need to improve access to specialized medical advice. Therefore, the results of our study have made a valuable contribution to the implementation of the service by policy-makers in order to maximize acceptance, use, adoption and success across the province of Quebec. In fact, after four successful years, the eConsult Quebec pilot project is now the Conseil Numérique (CN) digital consultation service. Clinical Trial: None.

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Keywords: eConsult; electronic consultation; digital health solutions; primary care providers; specialists; UTAUT; TTF; technology acceptance.

Introduction

Background

Access to specialized services remains a significant issue in Quebec, Canada. The Quebec Ministry of Health and Social Services' (MSSS) 2019–2023 strategic plan identified the improvement of access to specialized services, specifically consultations with a medical specialist, as one of the major objectives on which to focus over the next few years [1]. Health care systems face constant pressure to control health care costs while improving access and providing patients with safe, high-quality care. Developing a more efficient and cost-effective health care system is essential to providing better services and a better patient care experience. As part of the 2017–2027 Quebec Life Sciences Strategy, the province increased its investment in health research and innovation in order to accelerate the adoption of new and innovative practices [2]. In line with the government's digital transformation strategy, the MSSS has already begun this transformation within the health and social services network (HSSN), by implementing digital services that will facilitate access to care as well as through rapid and efficient management of patients' health.

eConsult Services Worldwide

Today, technological advances and the integration of new practices in the health sector offer interesting possibilities to solve the problem of excessive wait times and equitable access to specialists, namely through digital health solutions [3-7]. Digital health solutions can help overcome barriers to health care access and patient care management. This is especially true for patients living in rural or remote areas who often experience inequitable access to services compared to those living in urban areas [8-13].

Traditionally, patients have in-person consultations with their doctor. Virtual care is an alternative method that can be used to improve access and better utilize specialized resources [14]. eConsult or electronic consultation provides an effective and efficient alternative method of assessing a clinical situation without having the patient meet with the specialist in person [3, 15-18]. eConsult services are delivered through secure web-based applications that facilitate asynchronous communication between primary care providers (PCPs) and specialists, allowing a primary care provider to submit a clinical question to a specialist and to get an answer within a week [16, 19-21]. The specialist responds with advice on how to treat the patient, referral recommendations, or a request for additional information about the case. The primary care provider and specialist continue to communicate until the case is resolved.

eConsult services are spreading rapidly around the world [22] and seeing a significant increase in adoption as a result of the coronavirus crisis [23-30]. A large body of published academic research has focused on assessing the relevance, usefulness and impact of eConsult services to reduce wait times for specialist care. Most of the studies were limited to services offering access to a single specialty such as dermatology [31-34], chronic pain [35, 36], obstetrics and gynecology [34, 37, 38], and others [39-45]. Other researchers have studied primary care providers' [46-48] and specialists' [16, 49-51] level of satisfaction with eConsult services [52]. Studies have also been conducted to examine patients' care experience, specifically, with regard to access, efficiency, effectiveness and satisfaction [53-56]. Many studies reported on the impact of the eConsult Service after its implementation, emphasizing growth and sustainability [12, 49, 50, 57-61]. Collected data includes the number of online consultations submitted by a primary care provider, the specialties that were consulted, specialist response time and case outcome. A number of recent studies evaluated the educational value of the eConsult Service for primary care providers [62-65]. Other works also focused on the costs of eConsult services [13, 66-68]. A few studies explored the facilitators and barriers to implementation and adoption of the eConsult Service [23, 47, 69-72]. While other studies focused on the strategies used to disseminate, support and facilitate efforts to scale up a proven innovation, namely the eConsult Service, which has improved access to specialized services in primary care settings [73-76].

Actually, it is a well-established fact in health-related information technology (IT) literature that certain factors can influence physicians' perception of the use of technology such as telemedicine [77-79], electronic medical records (EMR) [80-83], clinical decision support systems [84-86], and mobile health (m-health) applications [87-91]. Behavioral and technology acceptance models are often used to explain user behavior [92-95]. However, no study has ever been conducted on the perceptions and experiences of PCPs and specialists regarding the factors influencing adoption, acceptance and use of eConsult services. Research studies are needed to address this gap by exploring the factors influencing the acceptance of eConsult services among healthcare professionals, thereby contributing to a more comprehensive understanding of technology implementation in healthcare settings.

The aim of this exploratory study was to fill this gap, integrating variables from two models, the United Theory of Acceptance and Use of Technology (UTAUT) and Task-Technology Fit (TTF), as well as user satisfaction to explain user behavior regarding the adoption of the eConsult Quebec Service.

Research Model and Hypotheses

With the development of information technology (IT), many theories and models of the acceptance and use of new technology have been developed or used in order to better understand the factors that influence the acceptance and use of technology [96-101]. Several health sector studies are based mainly on the Technology Acceptance Model (TAM) [93, 102-109]. Other works have enhanced the TAM model by creating integrative models that combine the TAM with other explanatory models of user behavior [95, 98, 110-115]. In view of the multiplicity of existing models on the acceptance and use of technology, Venkatesh et al. (2003) proposed a unified explanatory model of user behavior which is the basis of the Unified Theory of Acceptance and Use of Technology (UTAUT) [100], integrating variables drawn from eight models (including Theory of Reasoned Action or TRA and TAM [116].

The UTAUT model is considered to be one of the most effective [117]. This model has been tested and empirically validated in several fields and in different contexts such as health care in order to study the determining factors in acceptance and use of a technological innovation. Moreover, the

UTAUT model can explain up to 70% of the variance in intention to use technology and about 50% in actual use of the latter, representing a high predictive power [100, 101, 104].

At the same time, “fit” is an important notion in IT. It is defined as “the degree to which a technology assists an individual in performing his or her portfolio of tasks” (Goodhue and Thompson, 1995, p.218) [118]. Task-Technology Fit (TTF) is another theoretical model that has been studied to explain how a new technology leads to performance, to evaluate the impact of adoption, and to assess the relationship between task and technology characteristics. TTF seeks to assess whether the technology’s functionality is well aligned, i.e., compatible with the work done by end users. Studies have shown that technology will be more readily accepted and have a positive impact on individual performance if the technological characteristics match expected tasks [119-126].

As Goodhue and Thompson’s (1995) TTF model assesses the fit between the task and the technology, it appeared highly relevant to combine the TTF and the UTAUT models because they have the potential to further explain PCPs’ and specialists’ acceptance of the eConsult Quebec Service. Additionally, certain studies integrated UTAUT and TTF to understand and predict end-user behavior and intention regarding acceptance and adoption of new health-related technology [127-133].

Some studies focused on explaining user behavior based on other individual variables such as satisfaction. Resistance to the implementation of new IT can have a negative impact on user satisfaction [134, 135]. Resistance may be caused by the perceived risk of performance loss and dissatisfaction following use of the new IT [136]. The user of an IT seeks to improve their performance by improving the way they work, perform their tasks and achieve their objectives [122, 137, 138]. Other studies in the field of health have focused on the application of the TTF model based on end-user satisfaction [126, 139].

The models’ diversity reflects the existence of several factors influencing IT use behavior, which is a complex and multidimensional phenomenon. Consequently, our study integrated and adapted the Unified Theory of Acceptance and Usage of Technology (UTAUT) and Task-Technology Fit (TTF) models and end-user satisfaction with the eConsult Quebec Service.

The integrated research framework is presented in Figure 1, and the 11 hypotheses are listed in Table 1.

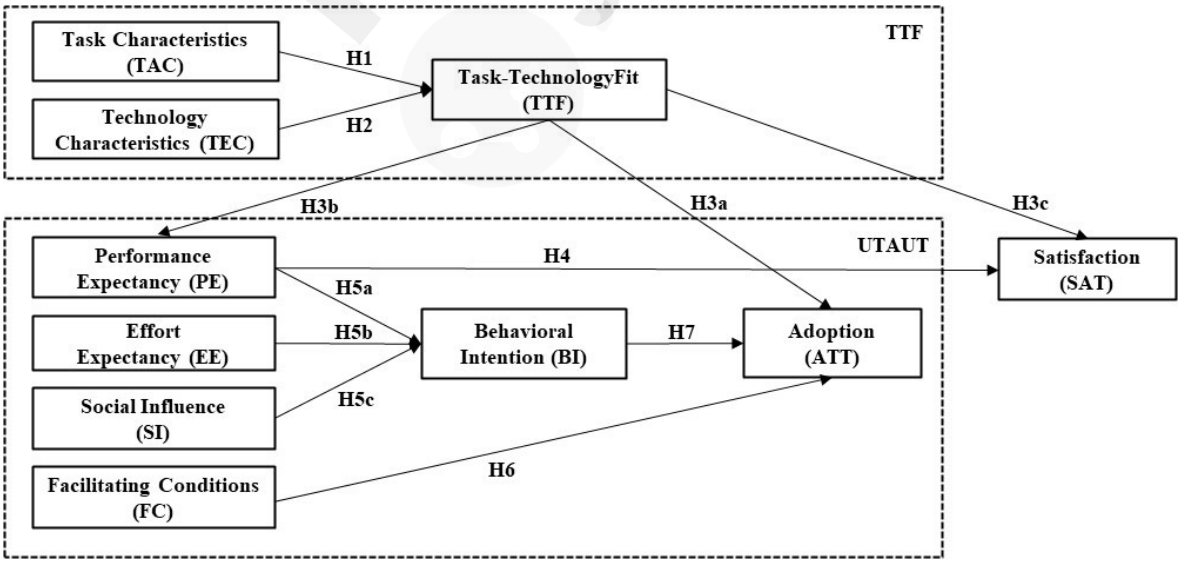

Figure 1. The proposed research model based on UTAUT and TTF, and user satisfaction.

The proposed integrated model includes 10 constructs that have been refined and adapted to the context of the study. The relationships between the variables were hypothesized by referring to previous studies.

Table 1. Hypotheses list.

Label	Hypothesis
H1	Task characteristics (TAC) have a positive impact on task-technology fit (TTF).
H2	Technology characteristics (TEC) have a positive impact on task-technology fit (TTF).
H3a	Task-technology fit (TTF) has a positive impact on performance expectancy (PE).
H3b	Task-technology fit (TTF) has a positive impact on adoption (ATT) of the eConsult Quebec Service.
H3c	Task-technology fit (TTF) has a positive impact on satisfaction (SAT).
H4	Performance expectancy (PE) has a positive impact on satisfaction (SAT),
H5a	Performance expectancy (PE) has a positive impact on behavioral intention (BI) to use eConsult Quebec Service.
H5b	Effort expectancy (EE) has a positive impact on behavioral intention (BI) to use of the eConsult Quebec Service.
H5c	Social influence (SI) has a positive impact on behavioral intention (BI) to use of the eConsult Quebec Service.
H6	Facilitating conditions (FC) has a positive impact on adoption (ATT) of the eConsult Quebec Service.
H7	Behavioral intention (BI) to use eConsult Quebec Service has a positive impact on adoption (ATT) of the eConsult Quebec Service.

Methods

Development of the eConsult Quebec Service

In Ontario, Canada, the Champlain eConsult Base™ (Building Access to Specialists through eConsultation) service was initially launched in 2009 to address the issue of long wait times for patients requiring non-urgent care and specialist advice [14, 16, 140]. The service has demonstrated significant success in reducing wait times, improving access to specialist care, and enhancing patient and provider satisfaction. Given its success in Ontario and in other parts of Canada, the eConsult Quebec Service was based on the Champlain Base™ business model and was replicated on an existing telehealth platform within the Quebec health network [3].

Simultaneously, the Quebec team was part of the Canadian Foundation for Healthcare Improvement (CFHI) Connected Medicine collaborative, in partnership with Canada Health Infoway, the College of Family Physicians of Canada and the Royal College of Physicians and Surgeons of Canada over a period of 18 months from 2017 to 2018 in seven Canadian provinces (British Columbia, Alberta, Saskatchewan, Manitoba, Quebec, New Brunswick, Newfoundland and Labrador), to roll out remote consultation services to improve access to specialist medical advice in primary care settings. [141].

Design of the eConsult Quebec Service

The eConsult Quebec Service was adapted to the platform as an additional trajectory among other

similar digital consulting trajectories already in operation since 2006. This made it possible to comply with Quebec's context and security requirements, and to offer a simplified user experience, especially for users who were already active on a telehealth platform and did not need to adapt to an additional tool. The new trajectory was integrated into the primary care providers' (PCPs) and specialists' existing clinical workflow.

Like the Champlain Base™ eConsult service, eConsult Quebec functions as a platform facilitating communication between primary care providers (PCPs) and specialists. This secure web-based application enables PCPs to submit inquiries to specialists, seeking guidance on the best management plan for their patients.

The platform begins with a PCP submitting a clinical question via a standardized, secure web form (Figure 2). This form is intentionally kept simple and focused to ensure ease of use and favorable user adoption. A centralized coordinator manages all PCPs requests, efficiently dispatching them to specialists of the appropriate specialty. This streamlines the process and ensures timely responses. Upon receiving an email notification, the specialist has a 7-day window to respond to the request, and is remunerated at a rate of Can $200 per hour, prorated based on their self-reported time needed to address the eConsult.

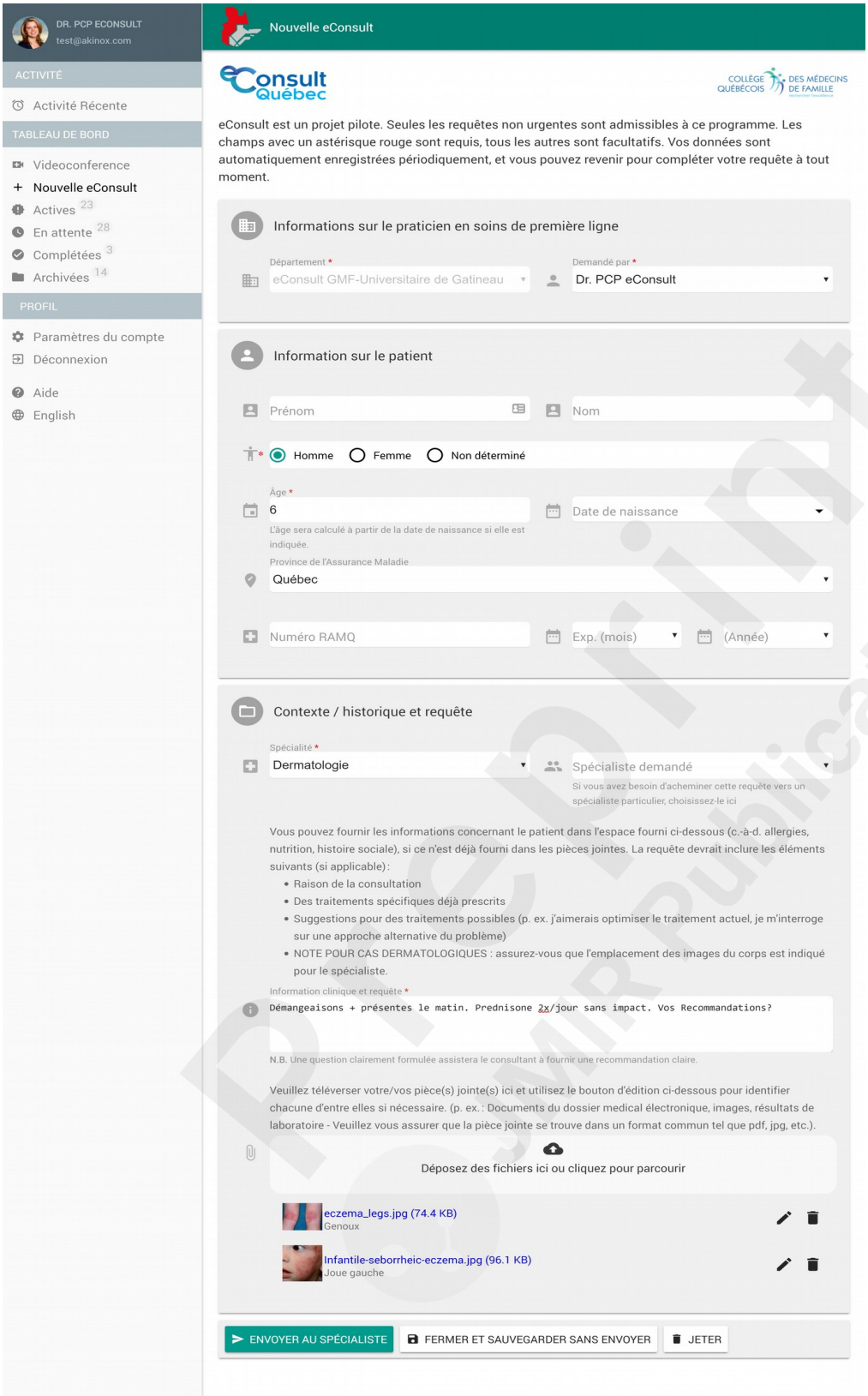

Figure 2. Creation of a new eConsult and submission of a clinical question to the specialist

Also, the platform facilitates clear communication between PCPs and specialists through email prompts and allows for ongoing correspondence until the PCP closes the request. This ensures that all parties involved are kept informed throughout the consultation process. In addition, the patient data is encrypted and accessible only to the physicians involved in the eConsult or their delegated

staff through role-based access control. This ensures the confidentiality and security of patient information.

The platform features a user-friendly dashboard interface that consolidates all requests across various communication types, including eConsults, patient forms and messages, teleconsultations, and transfer requests (Figure 3). The view filters and possible actions on the dashboard are dynamically adapted according to user roles and permissions. This ensures that users only see relevant information and functionalities based on their level of access. Users have the option to choose between card view or table view. The main status filters include Active (for pending actions), Waiting (for requests awaiting response), Completed (for finished actions), and Archived (optional storage for completed items).

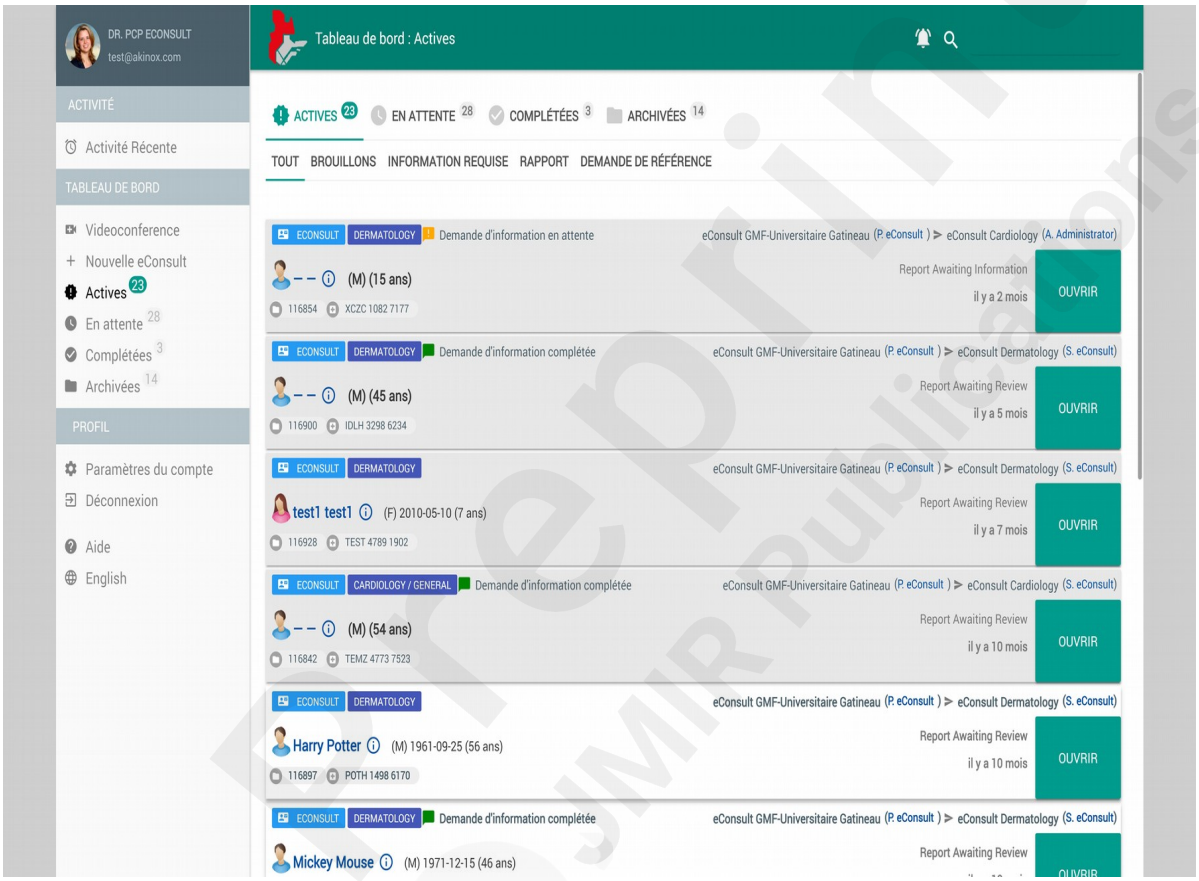

Figure 3. The interface of the PCPs dashboard

This adaptation ensured alignment with Quebec's context and security standards while providing a streamlined user experience, particularly for those already familiar with the telehealth platform. By integrating this new trajectory into the existing clinical workflows of PCPs and specialists, the service facilitated seamless engagement without the need for additional tool adaptation. It's important to note that “there are variations in the design of the eConsult service because Quebec is different from the other jurisdictions in Canada on a number of fronts, including policy and regulations (eg, licensing, privacy, and liability), financing (eg, provider remuneration) and, of course, language, where French is the national language as opposed to English elsewhere [3].

Study Design and Setting

Given our objective, we adopted a cross-sectional data collection approach. Kumar (2014) explains

that cross-sectional design is adequate to study the prevalence, or the occurrence, of a phenomenon, situation or attitude within a subset of a given population at a certain point in time [142]. In light of this, the study of users' perceptions, attitudes and continuance intention with regard to technological innovations lends itself to a cross-sectional study approach.

We conducted a survey-based multicenter cross-sectional study across three regions in the province of Quebec (Outaouais, Abitibi-Témiscamingue and Mauricie-et-du-Centre-du-Québec) as part of the eConsult Quebec pilot project. The online survey was sent to all PCPs (N=263) and specialists (N=62) who used the service between July 7, 2017, and May 17, 2021, in order to assess acceptance and use of the service.

Instrument

To ensure measurement validity, all items of each model variable were developed based on the Unified Theory of Acceptance and Usage of Technology (UTAUT), and Task-Technology Fit (TTF), and end-user satisfaction. Variables were measured using reliable items that had already been used by previous studies; we adapted certain items to our study context. The first version of the survey was translated from English into French by a group of researchers and validated by a professional translator to ensure that the content had not lost any of its original meaning. The second and final version of the survey was validated with four primary care providers (PCPs) and two specialists who had already used the eConsult Quebec Service. They were asked to identify any issues that might lead to confusion.

The survey was administered in French to all users of the eConsult Quebec Service. The survey comprised two parts. The first part consisted of demographic information (area of origin, profession, and specialty group [for specialists]). The second part included 10 constructs and 38 items, including task characteristics (TAC), technology characteristics (TEC), task-technology fit (TTF), performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), behavioral intention (BI), adoption (ATT) and satisfaction (SAT), to measure PCPs' and specialists' perception regarding the use of the eConsult Quebec Service. All items were measured on a 5-point Likert scale (1. Strongly disagree, 2. Somewhat disagree, 3. Neutral, 4. Somewhat agree, 5. Strongly agree). Table 2 presents the items of each construct.

Table 2. Items used in the research model.

Construct and item	Measurement
Task Characteristics (TAC)	
JF1	Using the eConsult Service impacts my work performance.
JF2	Using the eConsult Service can significantly improve the quality of the results of my work.
JF3	Using the eConsult Service can improve my level of efficiency in the performance of my tasks.
Technology Characteristics (TEC)	
FMT1	The way elements are arranged on the eConsult Service screen makes it easy to read the information.
FMT2	The information in the eConsult Service is clear.
FMT3	Overall, the information is presented in a useful format.
SEC1	The risk of an unauthorized third party accessing the eConsult Service is low.
SEC2	I believe that only the appropriate people have access to information.

SEC3	I believe that the eConsult Service is secure enough to handle sensitive information.
Task-Technology Fit (TTF)	
ACC1	The patient information received through the eConsult Service is accurate.
ACC2	I am satisfied with the accuracy of the information in the eConsult Service.
ACC3	Overall, I believe the information provided is free of errors.
Performance Expectancy (PE)	
PU1	Using the eConsult Service helps me make clinical decisions or offer advice faster.
PU2	I believe that using the eConsult Service enables me to make safer decisions or offer safer advice.
PU3	I believe that using the eConsult service enables me to make more accurate clinical decisions or offer more accurate advice.
PU4	Using the eConsult Service makes my job easier.
PU5	Overall, I find the eConsult Service to be useful in supporting my clinical decision-making or when offering advice.
Effort Expectancy (EE)	
PEOU1	Learning to use the eConsult Service is easy for me.
PEOU2	My interactions with the eConsult Service are clear and understandable.
PEOU3	I think that the eConsult Service meets my needs.
PEOU4	Overall, I find the eConsult Service easy to use.
Social Influence (SI)	
SF1	I use the eConsult Service because the majority of my colleagues use it.
SF2	My organization facilitated the use of the eConsult Service.
SF3	My association supports my use of the eConsult Service.
SF4	The organization generally supported my use of the eConsult Service.
Facilitating Conditions (FC)	
FC1	I have the knowledge required to use the eConsult Service.
FC2	My organization supports the use of the eConsult Service.
FC3	I have the necessary resources to use the eConsult Service.
Behavioral Intention (BI)	
BI1	I will continue to use the eConsult Service.
BI2	I plan to use the eConsult Service frequently.
BI3	Overall, I think using the eConsult Service is beneficial.
BI4	I would recommend the eConsult Service to my colleagues.
Adoption (ATT)	
ATT1	Using the eConsult Service is a smart idea.
ATT2	Using the eConsult Service is a safe experience.
ATT3	I am in favor of using the eConsult Service.
Satisfaction (SAT)	
SAT1	Using the eConsult Service meets my needs.
SAT2	I am happy with my use of the eConsult Service.

SAT3	I am extremely satisfied with my use of the eConsult Service.

Data Collection

The survey was developed using online survey software Survey Monkey. The survey was distributed to all users on May 19, 2021, as an electronic letter through the eConsult Quebec Service electronic mailbox system. The letter included the context, study objective, guarantee of confidentiality, duration and the link to access the online survey. A reminder letter was sent via the electronic mailbox system one month after the initial invitation to maximize the response rate. All participants gave their consent electronically before beginning the survey. Participation was anonymous and voluntary.

Participants

In the end, 136 respondents from the three regions of Quebec took part in the survey, representing a response rate of 41.8%. The sample is composed of 101/263 PCPs and 35/62 specialists.

Data Analysis

Several authors argue that the partial least squares (PLS) method is appropriate for exploratory projects and data in various fields [143-147]as well as for the formative measurement of variables that require the operationalization and conceptualization of various concepts [148] in order to:

“Predict and explain a key target construct and/or to identify its relevant antecedent constructs. In other words, this approach generates latent variable scores that maximize within-sample prediction in terms of the dependent latent variable’s R^2 value. As such, the estimated coefficients depict the relevance of constructs in a certain model that directly, indirectly and totally contribute to the explanation of a target construct of interest” (Chin et al., 2020, p.2162) [149].

In addition, PLS is appropriate to evaluate relatively new measurement models. Thus, PLS is a promising method for research projects related to information systems and emerging technologies [146], as is the case here. Moreover, this method is especially useful for smaller samples [144] where it may be more difficult to obtain a large number of respondents and where “the goal is to predict and explain the key target constructs or identify the key driver constructs” [150]. This data analysis method is commonly used in research projects based on the Unified Theory of Acceptance and Usage of Technology (UTAUT) [151], as well as in studies that combine UTAUT and Task-Technology Fit (TTF) due to the complexity of the model with several constructs [132, 152]. For this reason, this study uses PLS to examine the research model and test the 11 hypotheses. Data was analyzed using SmartPLS 4.0 software.

To begin, as per recommendations from Bagozzi and Phillips (1982) [153], and Venkatraman and Grant (1986) [154] concerning the preliminary verification of constructs, an evaluation of their validity and reliability was established. Then, the measurement model was evaluated by examining reliability, internal consistency, and convergent validity of measurements. For exploratory research, a Cronbach’s alpha coefficient of 0.50 is considered an acceptable value [155-157]. As for the composite reliability (CR) index, it must be equal to or greater than 0.70 [158]. Although Hair et al. (2010) recommend a factor loading greater than 0.50 to be considered significant [156]. A factor loading greater than 0.40 in the exploratory phase was considered to be a significant contribution [159]. During the reliability test, two items (SEC1-The risk of an unauthorized third party accessing the eConsult Service is low and SF1- I use the eConsult Service because the majority of my colleagues use it) were removed from our research model for data analysis. The validity of constructs

was verified using the average variance extracted (AVE) index, the value of which must be equal to or greater than 0.50. [160].

Lastly, the structural model was evaluated by coefficients of determination (R^2), and path coefficients and their significance by running 5000 bootstrap subsamples. Finally, the research hypotheses must be statistically proven with a *t* value greater than 1.96 and a *P* value less than 0.05.

Research Ethics

Ethical approval was obtained from the Research Ethics Committee of the Outaouais Integrated Health and Social Services Centre before the beginning of the study (ref. number 2016-183_88), in Quebec, Canada.

Results

Measurement Model Evaluation

As shown in Table 3, for our research model, all factor loading values for all items are greater than 0.40 (0.413 to 0.931), all Cronbach alpha values are greater than 0.50 (0.591 to 0.891), composite reliability (CR) values exceed 0.70 (0.783 to 0.928), and all average variance extracted (AVE) values are greater than 0.50 (0.550 to 0.812). These results indicate good reliability and validity of the constructs.

Table 3. The measurement model evaluation.

Construct and item	Loadings (>0.40)	Cronbach alpha (>0.50)	Composite reliability (>0.70)	Average variance extracted (>0.50)
Task Characteristics (TAC)		0.659	0.806	0.604
JF1	0.413			
JF2	0.913			
JF3	0.898			
Technology Characteristics (TEC)		0.790	0.853	0.548
FMT1	0.822			
FMT2	0.843			
FMT3	0.884			
SEC2	0.563			
SEC3	0.507			
Task-Technology Fit (TTF)		0.837	0.903	0.758
ACC1	0.904			
ACC2	0.913			
ACC3	0.789			
Performance Expectancy (PE)		0.891	0.920	0.696
PU1	0.837			
PU2	0.838			
PU3	0.818			
PU4	0.789			
PU5	0.886			
Effort Expectancy (EE)		0.886	0.920	0.741
PEOU1	0.861			
PEOU2	0.811			
PEOU3	0.872			

PEOU4	0.896			
Social Influence (SI)		0.742	0.853	0.660
SF2	0.764			
SF3	0.799			
SF4	0.871			
Facilitating Conditions (FC)		0.591	0.783	0.550
FC1	0.695			
FC2	0.657			
FC3	0.856			
Behavioral Intention (BI)		0.869	0.911	0.720
BI1	0.850			
BI2	0.750			
BI3	0.868			
BI4	0.917			
Adoption (ATT)		0.728	0.844	0.644
ATT1	0.764			
ATT2	0.775			
ATT3	0.866			
Satisfaction (SAT)		0.883	0.928	0.812
SAT1	0.849			
SAT2	0.931			
SAT3	0.920			

Hypothesis Testing

As mentioned, to test our hypotheses, we used the partial least squares (PLS) method because it is widely used to test complex causal models, incorporating several latent variables. Sample size constraints are also more flexible and measurement scales do not require broad approval. Thus, the PLS method is well suited to exploratory analyses. In our structural equation model, path coefficients (β), *t* values, and *P* values are examined in order to distinguish the relationships between the constructs of our research model. Additionally, we examined the variance in the dependent variables explained by the independent variables to evaluate the explanatory and predictive power of the structural model (R^2) [161]. According to Falk and Miller (1992), the coefficient of determination (R^2) should be greater than 0.10 [162].

The results of the hypothesis tests on our model Integrating the Unified Theory of Acceptance and Use of Technology (UTAUT), Task-Technology Fit (TTF), and user satisfaction with the eConsult Quebec Service are summarized in Table 4 and depicted in Figure 4.

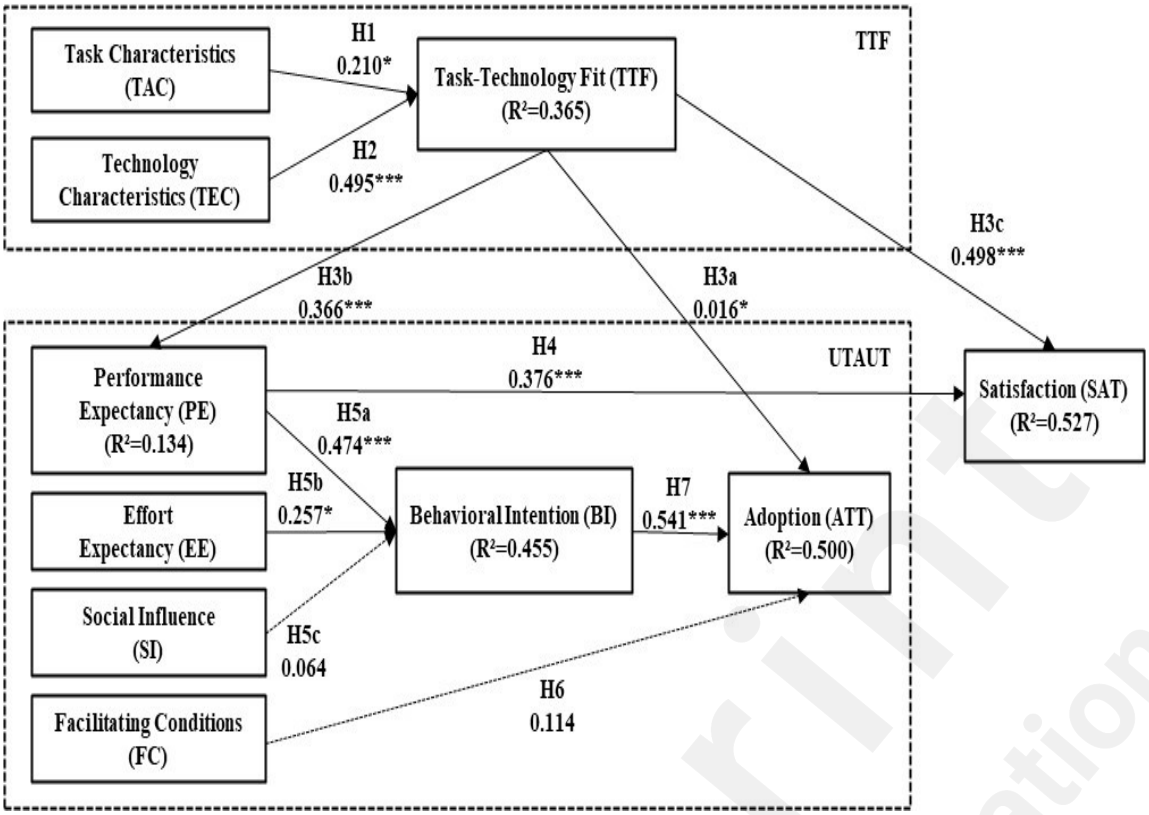

Figure 4. Partial least squares results and R^2 values (N=136), ***P<.001, **P<.01, *P<.05.

Based on Table 4, the statistical result of each path in the research model indicated that most of the hypotheses were supported, except H5c effect of social influence (SI) on behavioral intention to use (BI) and H6 effect of facilitating conditions (FC) on adoption (ATT) of the eConsult Quebec Service because the *P* value was greater than 0.05 and the *t* value was less than 1.96.

Both task characteristics (TAC) and technology characteristics (TEC) were found to positively influence task-technology fit (TTF), supporting H1 (*t* value=2.243, P<.05) and H2 (*t* value=6.119, P<.001). The calculated R^2 values (Figure 2) showed that 36.5% of the variance in TTF was explained by TEC and TAC, with TEC having the strongest influence (*t* value=6.119, P<.001). Meanwhile, TTF directly affects adoption (ATT), performance expectancy (PE), and satisfaction (SAT). Thus, H3a (*t* value=3.823, P<.001), H3b (*t* value=2.415, P<.05) and H3c (*t* value=5.604, P<.001) were supported. PE has a positive impact on SAT, supporting H4 (*t* value=4.259, P<.001). Additionally, TTF and PE explain 52.7% of the variance in SAT. Moreover, PE and effort expectancy (EE) have a direct effect on behavioral intention (BI). Thus, H5a (*t* value=4.247, P<.001) and H5b (*t* value=2.234, P<.05) were supported. The two variables explain 45.5% of the variance in BI. Finally, BI significantly influences ATT, supporting H7 (*t* value=4.861, P<.001), and explaining 50% of the variance in ATT. In this model, all the R^2 values of the endogenous variables indicate an acceptable level respecting the lower limit of 0.10 (TTF: R^2=0.365; PE: R^2=0.134; BI: R^2=0.455; ATT: R^2=0.500; SAT: R^2=0.527). Overall, 9 of 11 hypotheses were supported in the research model.

Table 4. Hypothesis analysis results.

Hypothesis	Path	β	*t* value	*P value*	Results
H1	TAC[a] → TTF[b]	0.210	2.243	0.025	Supported
H2	TEC[c] → TTF	0.495	6.119	0.000	Supported
H3a	TTF → PE[d]	0.366	3.823	0.000	Supported

H3b	TTF → ATT[e]	0.234	2.415	0.016	Supported
H3c	TTF → SAT[f]	0.498	5.604	0.000	Supported
H4	PE → SAT	0.376	4.259	0.000	Supported
H5a	PE → BI[g]	0.474	4.247	0.000	Supported
H5b	EE[h] → BI	0.257	2.234	0.026	Supported
H5c	SI[i] → BI	0.064	0.871	0.384	Not supported
H6	FC → ATT	0.114	1.368	0.171	Not supported
H7	BI → ATT	0.541	4.861	0.000	Supported

[a]TAC: task characteristics
[b]TTF: task-technology fit
[c]TEC: technology characteristics
[d]PE: performance expectancy
[e]ATT: adoption
[f]SAT: satisfaction
[g]BI: behavioral intention
[h]EE: effort expectancy
[i]SI: social influence
[j]FC: facilitating conditions

Discussion

Principal Results

Theoretical support

To our knowledge, this study is the first to validate both models, namely United Theory of Acceptance and Use of Technology (UTAUT) and Task-Technology Fit (TTF), along with user satisfaction to explain user behavior regarding the adoption of the eConsult Quebec Service. The aim of our exploratory study was to identify the factors that predict acceptance of the service by primary care providers (PCPs) and specialists in urban and rural primary care clinics across three regions in Quebec, Canada. Results of the partial least squares (PLS) analyses indicate that 9 of the study's 11 hypotheses are supported. To explain the adoption of the service by PCPs and specialists, the direct relationships uniting the various constructs of the model highlighted the importance of several key constructs and predominant correlations, thus confirming the majority of research hypotheses. The research model's variables influencing each endogenous variable explain 36.5% of the variance in TTF, 13.4% of the variance in performance expectancy (PE), 45.5% of the variance in behavioral intention (BI), 50% of the variance in adoption (ATT), and 52.7% of the variance in satisfaction (SAT) with regard to the adoption of the eConsult Quebec Service.

First, results suggest that satisfaction (SAT) has a solid foundation as a key driver behind the use of the eConsult Quebec Service (R^2=0.527). A few studies in the field of healthcare technology acceptance have highlighted the pivotal role of satisfaction in predicting individuals' willingness to adopt technology. [95, 163, 164]. From the perspective of the Information Systems Success Model (ISSM), individuals' level of satisfaction can significantly influence the acceptance and use of a particular system [95, 117, 165-167]. Another study demonstrated that user satisfaction is the strongest predictor of perceived benefits and technology continuance usage intention [164, 167, 168]. Our model shows that this construct is powered by two other constructs that explain 52.7% of the variance: Task-technology fit (TTF) and performance expectancy (PE). Studies have shown that PE has a significant impact on satisfaction [169]. According to Bhattacherjee (2001), when user expectations are confirmed, they will be satisfied [113]. Thus, PE will affect user satisfaction with a system. Individual productivity is defined as a respondent's belief in their effectiveness and

efficiency, and in the quality of their work [122, 170]. A user's perceived feeling of performance in making more accurate and safer clinical decisions or offering more accurate and safer advice (PU2-I believe that using the eConsult Service enables me to make safer decisions or offer safer advice and PU3-I believe that using the eConsult service enables me to make more accurate clinical decisions or offer more accurate advice) can influence the adoption of the eConsult Quebec Service, how they use it and the level of satisfaction resulting from their experience with the service. People are happier and more productive when the technology they are using is adapted to their daily tasks. Thus, the better the technology meets the primary care providers' (PCPs) and specialists' information-related needs when making clinical decisions related to the health of their patients, the more satisfied they are. This correlation shows that the role of task-technology fit affects end-user satisfaction. Results suggest that with high levels of task-technology fit (TTF) and performance expectancy (PE), PCPs and specialists experience higher levels of satisfaction (SAT).

The results indicate that task characteristics (TAC) and technology characteristics (TEC) explain 36.5% of the variance in task-technology fit (TTF) for the eConsult Quebec Service. This suggests that both the nature of the tasks being performed, and the features and capabilities of the technology platform play crucial roles in determining the overall TTF. Notably, TEC emerged as the factor with the most direct and significant influence on users, as indicated by H2 (P<.001). This underscores the importance of the eConsult platform's functionality, user-friendliness, and features in facilitating effective communication and collaboration between primary care providers (PCPs) and specialists. On the other hand, task characteristics (TAC) has a less significant influence, as indicated by H1 (P<.05). While the nature of the tasks being performed is still important, it suggests that the technology's capabilities and features are more influential in determining the overall fit and user satisfaction with the eConsult Quebec Service.

With regard to the United Theory of Acceptance and Use of Technology (UTAUT) model, performance expectancy (PE), effort expectancy (EE), and social influence (SI) explain 45.5% of the variance in behavioral intention (BI). BI is the third positive and significant predictor of eConsult Quebec Service use. The most significant direct correlation is between PE (H5a, ***P<.001) and intention to use the technology. The most widely studied relationship in the field of health is that between performance expectancy and the intention to use a technology [104, 171-179]. Thus, when clinicians' performance expectancy was achieved, it positively influenced their intention to use the system. Based on our empirical observations, in the context of voluntary adoption, the correlation between performance expectancy and intention to use the technology is the strongest. The second most frequently measured correlation concerns the impact of effort expectancy on intention to use the system, which has proven to be positively significant in several studies [109, 172-175, 178, 180-183]. In this study, the correlation is weaker, but remains positive and significant (H5b, *P<.05). In other words, when considered alone, the user-friendliness of a technology does not totally influence the intention to use a technology, it must also be perceived as useful. Based on our field data, we expected to see a weaker correlation between effort expectancy (EE) and behavioral intention (BI) to use the eConsult Quebec Service than between performance expectancy (PE) and behavioral intention to use the service. Regarding the role of social influence (SI) in relation to intention to use the system, the reviewed studies tested a positive correlation between these two constructs [184]. Note that social influence (SI) has no direct effect on this factor (H5c) in our study. As a first line of thought, it is possible that physicians as self-employed workers within the public health system in Quebec are less sensitive to social pressure when using technology. As a second explanation, it is possible that this finding reflects the voluntary context of the adoption and use of the eConsult Quebec Service by primary care providers (PCPs) and specialists. As a third explanation, it is possible that healthcare professionals may rely more on their individual judgments and preferences rather than being influenced by social factors. In certain contexts, the influence of peers or colleagues on decision-making may be limited.

Adoption (ATT) is the second predictor of the use of the eConsult Quebec Service. Our model demonstrates that this construct is powered by three other constructs that explain 50% of the variance: Behavioral intention (BI), facilitating conditions (FC) and task-technology fit (TTF). The most significant direct correlation is BI (H7; ***$P<.001$). Some studies have noted that a person's emerging intention represents a critical point during the adoption of a technology, which may be considered as the moment when the decision is made to accept the change and modify their behavior [104, 171, 173, 185]. Thus, attitude toward technology lies in the intention to use the technology. The second direct but weaker correlation is TTF (H3a; *$P<.05$). Several studies have confirmed the importance of TTF in the adoption of a new technology [119-121, 127, 186]. Generally, the compatibility of the IT with the preferred work style and current work practices would influence adoption of the IT [130]. As for the last construct, facilitating conditions (FC) have no effect on the adoption of a system (H6: 0.114). Therefore, this result suggests that PCPs and specialists are comfortable with the technology, have confident in the availability of support measures to assist them in case of issues, and feel adequately informed and competent when adopting the eConsult Quebec Service.

User Adoption

This construct was defined as the user's perception of the factors in the work environment that promote adoption and use of the service, namely with regard to the available support, coaching and training provided. This means that all the barriers hindering the adoption of a technology were eliminated by the team during the roll out of the eConsult Quebec Service. Initially, the pilot project was launched in the Outaouais region with one clinic; other clinics were added during the deployment phase in this region. This approach made it possible to control recruitment and, above all, it facilitated primary care providers' (PCPs) and specialists' ownership of the use of the service as well as enabling validation of monitoring mechanisms. Secondly, the project was rolled out in several clinics simultaneously in two other regions (Mauricie-et-Centre-du-Québec and Abitibi-Témiscamingue).

Operation of the service is very simple and user-friendly [3]. More precisely, the platform begins with a primary care provider submitting a clinical question via a standardized, secure web form. This form is intentionally kept simple and focused to ensure ease of use and favorable user adoption. A centralized coordinator manages all PCPs requests, efficiently dispatching them to specialists of the appropriate specialty. This streamlines the process and ensures timely responses. Also, the platform facilitates clear communication between PCPs and specialists through email prompts and allows for ongoing correspondence until the PCP closes the request. This ensures that all parties involved are kept informed throughout the consultation process. In addition, the patient data is encrypted and accessible only to the physicians involved in the eConsult or their delegated staff through role-based access control. This ensures the confidentiality and security of patient information.

The platform features a user-friendly dashboard interface that consolidates all requests across various communication types, including eConsults, patient forms and messages, teleconsultations, and transfer requests. The view filters and possible actions on the dashboard are dynamically adapted according to user roles and permissions. This ensures that users only see relevant information and functionalities based on their level of access.

Given the user-friendliness of the platform and available tools (video, PowerPoint presentation and test platform), no specific training is required. Users contact the resources responsible for the project in their region, as needed. Therefore, the system itself requires little user support. As part of the pilot project, the team made sure that users could operate with maximum autonomy. Thus, PCPs and

specialists were comfortable using the eConsult Quebec Service.

Integrating theoretical models

The relationship between the Task-Technology Fit (TTF) model and the United Theory of Acceptance and Use of Technology (UTAUT) model is demonstrated by the influence of task-technology fot (TTF) on performance expectancy (PE). Indeed, TTF has a positive and significant effect on PE (H3b; ***P<.001), and TTF explains 13.4% of the variance in PE. This finding is similar to other studies [130, 187]. Thus, the authors found that a technology can have a positive impact on performance, when it is used and aligned with the supported task [118].

In the context of this study, the higher the TTF level, the more primary care providers (PCPs) and specialists perceived the eConsult Quebec Service as useful and conducive to making work easier. Thus, the technology's fit to user requirements would directly influence their expectations. During the pilot project, integration of the eConsult Quebec Service into health care practices was identified by PCPs and specialists as an important issue likely to affect clinical practices, as well as the safety and the quality of care provided to patients. Studies carried out in health care settings clearly indicate that during its adoption, the compatibility of a technology influences performance expectancy [122, 138, 172, 175, 179, 188-191].

To this end, deployment of the service made it possible, namely, to optimize the consultation process following an eConsult and to provide the patient with optimal care management following an eConsult, and in the majority of cases, the PCP's action plan was improved. Overall, PCPs and specialists found the eConsult Quebec Service to be useful in supporting their clinical decision-making or when offering advice (PU5). Moreover, the correlation between the two models is presented by the influence of tack-technology fit (TTF) on adoption (ATT). The greater the alignment between the technology and the task at hand, the more likely the user will be to adopt and use the technology. As mentioned, results indicate that TTF contributes little to explaining the attitude toward actual use of the eConsult Quebec Service (H3a: P<.05). Note that user perception can be affected by various factors, namely the voluntary nature of adopting a technology. Also, as part of the pilot project, adopting the eConsult Quebec Service was not mandatory, so PCPs and specialists used it on a voluntary basis.

Limitations and Future Research

This study has some limitations that can be addressed in future studies. Firstly, the results of this study may be difficult to generalize since the study was conducted in only three regions across Quebec. Additionally, the Quebec Ministry of Health and Social Services' (MSSS) selected these three regions for the pilot project with the aim of improving access to specialized medical advice. In future studies, it would be relevant to extend the scope to a larger population of primary care providers (PCPs) and specialists from different regions in Quebec to increase the generalizability of the findings. This would help to confirm the model and its research variables relating to the use of the eConsult Quebec Service on a larger scale.

Secondly, this study did not compare the user groups, i.e., PCPs and specialists, because the objective was to study the applicability of the model integrating Unified Theory and Acceptance and Usage of Technology (UTAUT) and Task-Technology Fit (TTF), and end-user satisfaction with the eConsult Quebec Service. However, perception of the service may be different from one group to another.

Thirdly, this study did not delve into the demographic characteristics of the participants. It would be interesting to explore in future research whether the factors motivating the adoption of eConsult

Quebec Service differ among different groups of healthcare professionals.
Fourthly, the research design utilized in this study was cross-sectional, capturing PCPs' and specialists' overall experience at a specific point in time. A longitudinal study would enhance the robustness of our findings by tracking experiences over extended period. This longitudinal study would not only strengthen the validation of our research model but also allow for a deeper understanding of how perceptions and utilization of eConsult Quebec Service evolve over time.

Fifthly, this study did not find support for the effect of social influence (SI) on behavioral intention (BI) to use of the eConsult Quebec Service (H5c), nor did it find support for the effect of facilitating conditions (FC) on adoption (ATT) of the eConsult Quebec Service (H6). In future research, it would be relevant to explore these two factors through interviews with PCPs and specialists in Quebec.
Sixthly, all the reliability and validity analyses demonstrated satisfactory results, with the exception of two items: one from the social influence (SI) construct (SF1-I use the eConsult Service because the majority of my colleagues use it), and the other from the technology characteristics (TEC) construct (SEC1-The risk of an unauthorized third party accessing the eConsult Service is low), which were withdrawn due to low factor loading.

Finally, this study did not investigate potential barriers to the adoption of eConsult Quebec Service. Thus, future studies should identify these barriers, as doing so could provide valuable insights for policymakers and healthcare administrators. By understanding the obstacles hindering adoption, effective strategies can be developed to address them.

Conclusions

This study employs an extended model combines the Unified Theory of Acceptance and Usage of Technology (UTAUT) and Task-Technology Fit (TTF), along with user satisfaction, to delve into the factors influencing the intention of primary care providers (PCPs) and specialists in three regions across Quebec to adopt the eConsult Quebec Service. In addition, this study tests a research model and a technology that has not previously been explored in Quebec, Canada. Given that most of our research hypotheses were validated by the study's outcomes, it can be asserted that our integrated research model is highly relevant to the study's context. In this regard, the eConsult Quebec Service is well suited to the users' need to improve access to specialized medical advice.
By integrating well-established theoretical models such as the UTAUT and TTF, our study offers a comprehensive theoretical perspective to understand the factors influencing the acceptance of the eConsult Quebec Service. By grounding our analysis in these frameworks, we are able to identify and explore the factors shaping acceptance behavior among healthcare providers. This study has demonstrated the significance of certain factors that contribute heavily to actual use of the service. Indeed, our results indicate that task characteristics (TAC), technology characteristics (TEC), task-technology fit (TTF), performance expectancy (PE), effort expectancy (EE), behavioral intention (BI), adoption (ATT) and satisfaction (SAT) have an effect on users of the eConsult Quebec Service, whereas social influence and facilitating conditions have no significant impact. Note that satisfaction is a significant predictor, essential to evaluating acceptance of the eConsult Quebec Service. PE and EE can positively predict BI, and BI can impact ATT. In addition, TTF has an influence on PE, ATT and SAT.

Also, by focusing on PCPs and specialists in both urban and rural settings across different regions of Quebec, our study provides valuable insights into the specific factors influencing acceptance within this diverse healthcare landscape. This context-specific understanding is important for tailoring interventions to address the unique needs and challenges faced by healthcare providers in different settings.

The main conclusion of this study emphasizes the significance of identifying the key factors influencing the adoption of the eConsult Quebec Service before scaling up the service. This has implications for improving patient access to specialist care, enhancing care coordination, and optimizing healthcare resource utilization. Our study findings directly have provided policymakers with valuable insights before the service's implementation across Quebec, aiming to enhance its acceptance, use, adoption and success. In fact, after four successful years, the eConsult Quebec pilot project is now the Conseil Numérique (CN) digital consultation service. This new service, launched in December 2021, has been rolled out across Quebec by the Ministry of Health and Social Services (MSSS). The Conseil Numérique (CN) digital consultation service promotes swift communication between PCPs and specialists by providing timely access to specialist medical advice. Thus, it contributes to better case management by the primary care provider. So far, more than 30,000 cases have been processed following the scaling-up of the consultation service since December 2021. In over 40% of electronic consultation cases, an in-person visit to the specialist was considered but deemed unnecessary following the electronic consultation. This reduced unnecessary wait times for patients and freed up specialist resources for patients who needed them most. When a patient needed a visit with a specialist, those visits were often more efficient and productive due to the steps or treatment initiated through the electronic consultation prior to the in-person visit.

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Author's Contributions

VN conceptualized and designed the study. VN collected the data, conducted the statistical analysis, and wrote the first draft of the manuscript. All the authors (VN and ALC) have read, revised and approved the final manuscript.

Conflicts of Interest

None declared.

Abbreviations

ATT: adoption
AVE: average variance extracted
BASE: Building Access to Specialists through eConsultation
BI: behavioral intention
CFHI: Canadian Foundation for Healthcare Improvement
CN : Conseil Numérique
CR: composite reliability
eConsult: electronic consultation
EE: effort expectancy
EMR: electronic medical records
FC: facilitating conditions
HSSN: health and social services network
IT: information technology
m-health: mobile health
MSSS: Ministry of Health and Social Services

MUHC: McGill University Health Centre
PCPs: primary care providers
PE: performance expectancy
PLS: partial least squares
SAT: satisfaction
SI: social influence
TAC: task characteristics
TAM: technology acceptance model
TEC: technology characteristics
TTC: Telehealth Coordination Centre
TTF: task-technology fit
UTAUT: Unified Theory of Acceptance and Usage of Technology

References

1. MSSS, *Plan stratégique du ministère de la Santé et des Services sociaux 2019-2023*, Ministère de la santé et des services sociaux (MSSS), Editor. 2021: Gouvernement du Québec. p. 38. https://publications.msss.gouv.qc.ca/msss/document-002438/
2. MSSS, *Stratégie québécoise des sciences de la vie 2017-2027 - L'innovation prend vie*, Ministère de la santé et des services sociaux (MSSS), Editor. 2017: Gouvernement du Québec. p. 87. https://www.msss.gouv.qc.ca/professionnels/documents/bureau-innovation-sante-et-services-sociaux/strategie-quebecoise-sciences-vie_2017-2027.pdf
3. Nabelsi, V., et al., *Improving the Referral Process, Timeliness, Effectiveness, and Equity of Access to Specialist Medical Services Through Electronic Consultation: Pilot Study.* JMIR medical informatics, 2019. **7**(3): p. e13354. PMCID: PMC6652123
4. Mold, F., et al., *Electronic Consultation in Primary Care Between Providers and Patients: Systematic Review.* JMIR Med Inform, 2019. **7**(4): p. e13042. PMCID: PMC6918214
5. Liddy, C., et al., *A Systematic Review of Asynchronous, Provider-to-Provider, Electronic Consultation Services to Improve Access to Specialty Care Available Worldwide.* Telemed J E Health, 2019. **25**(3): p. 184-198. PMID: 29927711
6. Payne, T., et al., *The Use of Electronic Consultations in Outpatient Surgery Clinics: Synthesized Narrative Review.* JMIR Perioper Med, 2022. **5**(1): p. e34661. PMID: 35436223
7. Kurek, A.A., et al., *Implementation of E-Consults in an Integrated Health System for a Value Population.* Popul Health Manag, 2023. PMID: 37471229
8. Bradford, N.K., L.J. Caffery, and A.C. Smith, *Telehealth services in rural and remote Australia: a systematic review of models of care and factors influencing success and sustainability.* Rural Remote Health, 2016. **16**(4): p. 4268. PMID: 27744708
9. Liddy, C., et al., *Improving access to specialists in remote communities: a cross-sectional study and cost analysis of the use of eConsult in Nunavut.* Int J Circumpolar Health, 2017. **76**(1): p. 1323493. PMID: 28570207
10. Liddy, C., et al., *Improving Equity of Access Through Electronic Consultation: A Case Study of an eConsult Service.* Front Public Health, 2019. **7**: p. 279. PMID: 31637228
11. Jong, M., I. Mendez, and R. Jong, *Enhancing access to care in northern rural communities via telehealth.* Int J Circumpolar Health, 2019. **78**(2): p. 1554174. PMID: 31066652
12. Helmer-Smith, M., et al., *The Feasibility of Using Electronic Consultation in Long-Term Care Homes.* J Am Med Dir Assoc, 2020. **21**(8): p. 1166-1170.e2. PMID: 32360222
13. Job, J., et al., *An eConsultant versus a hospital-based outpatient consultation for general (internal) medicine: a costing analysis.* BMC Health Services Research, 2023. **23**(1): p. 478. PMID: 37170265

14. Keely, E., C. Liddy, and A. Afkham, *Utilization, benefits, and impact of an e-consultation service across diverse specialties and primary care providers.* Telemed J E Health, 2013. **19**(10): p. 733-8. PMID: 23980939
15. Stoves, J., et al., *Electronic consultation as an alternative to hospital referral for patients with chronic kidney disease: a novel application for networked electronic health records to improve the accessibility and efficiency of healthcare.* Qual Saf Health Care, 2010. **19**(5): p. e54. PMID: 20554576
16. Liddy, C., et al., *Building access to specialist care through e-consultation.* Open Med, 2013. **7**(1): p. e1-8. PMID: 23687533
17. Kim-Hwang, J.E., et al., *Evaluating electronic referrals for specialty care at a public hospital.* J Gen Intern Med, 2010. **25**(10): p. 1123-8. PMID: 20512531
18. Vimalananda, V.G., et al., *Electronic consultations (e-consults) to improve access to specialty care: a systematic review and narrative synthesis.* J Telemed Telecare, 2015. **21**(6): p. 323-30. PMID: 25995331
19. Gleason, N., et al., *Adoption and impact of an eConsult system in a fee-for-service setting.* Healthcare (Amsterdam, Netherlands), 2017. **5**(1-2): p. 40-45. PMID: 27469441
20. Wrenn, K., et al., *Analysis of an electronic consultation program at an academic medical centre: Primary care provider questions, specialist responses, and primary care provider actions.* Journal of Telemedicine and Telecare, 2016. **23**(2): p. 217-224. PMID: 26940797
21. Pecina, J.L. and F. North, *Early e-consultation face-to-face conversions.* J Telemed Telecare, 2016. **22**(5): p. 269-76. PMID: 26395892
22. Joschko, J., et al., *Electronic Consultation Services Worldwide: Environmental Scan.* J Med Internet Res, 2018. **20**(12): p. e11112. PMID: 30578187
23. Baines, R., et al., *Barriers and Enablers in Implementing Electronic Consultations in Primary Care: Scoping Review.* J Med Internet Res, 2020. **22**(11): p. e19375. PMID: 33035177
24. Camoni, N., et al., *COVID-19 Pandemic and Remote Consultations in Children: A Bibliometric Analysis.* Int J Environ Res Public Health, 2022. **19**(16). PMID: 36011421
25. Leyton, C., C. Zhang, and S. Rikin, *Evaluation of the Effects of the COVID-19 Pandemic on Electronic Consultation Use in Primary Care.* Telemed J E Health, 2022. **28**(1): p. 66-72. PMID: 33794114
26. Mazón-Ramos, P., et al., *Impact of the COVID-19 pandemic upon a universal electronic consultation program (e-consultation) between general practitioners and cardiologists.* Rev Clin Esp (Barc), 2023. **223**(6): p. 350-358. PMID: 37146749
27. Shaver, J., *The State of Telehealth Before and After the COVID-19 Pandemic.* Prim Care, 2022. **49**(4): p. 517-530. PMID: 36357058
28. Singh, J., et al., *Evaluation of an Electronic Consultation Service for COVID-19 Care.* Ann Fam Med, 2022. **20**(3): p. 220-226. PMID: 35606132
29. Singh, J., et al., *The Utilization of an Electronic Consultation Service During the Coronavirus Disease 2019 Pandemic.* Telemed J E Health, 2022. **28**(7): p. 994-1000. PMID: 34861116
30. Stephens, J. and G.M. Greenberg, *Asynchronous Telehealth.* Prim Care, 2022. **49**(4): p. 531-541. PMID: 36357059
31. O'Toole, A., et al., *The association between question type and the outcomes of a Dermatology eConsult service.* International journal of dermatology, 2017. **56**(8): p. 836-841. PMID: 28585722
32. Seiger, K., et al., *Pediatric dermatology eConsults: Reduced wait times and dermatology office visits.* Pediatric Dermatology, 2020. **37**(5): p. 804-810. PMID: 32544276
33. Su, M.Y. and S. Das, *Expansion of asynchronous teledermatology during the COVID-19*

pandemic. J Am Acad Dermatol, 2020. **83**(6): p. e471-e472. PMID: 32822793
34. Shehata, F., et al., *Evaluation of an Electronic Consultation Service in Obstetrics and Gynecology in Ontario.* Obstet Gynecol, 2016. **127**(6): p. 1033-1038. PMID: 27159757
35. Liddy, C., et al., *Improving Access to Chronic Pain Services Through eConsultation: A Cross-Sectional Study of the Champlain BASE eConsult Service.* Pain Medicine, 2016. **17**(6): p. 1049-1057. PMID: 27040667
36. Liddy, C., et al., *Supporting Better Access to Chronic Pain Specialists: The Champlain BASE™ eConsult Service.* The Journal of the American Board of Family Medicine, 2017. **30**(6): p. 766-774. PMID: 29180551
37. Corbetta-Rastelli, C.M., et al., *Experiences in Electronic Consultation (eConsult) Service in Gynecology from a Quaternary Academic Medical Center.* J Med Syst, 2021. **45**(5): p. 58. PMID: 33825075
38. Buddemeyer, K., et al., *Implementation and Evaluation of A Gynecology eConsult Service Within A Large Health System [A287].* Obstetrics & Gynecology, 2022. **139**(1): p. 83S-83S. doi: 10.1097/01.AOG.0000825708.98732.2b
39. Sakanovic, A., et al., *The effect of eConsult on the provision of orthopaedic services in Nunavut.* International journal of circumpolar health, 2022. **81**(1): p. 2151551. PMID: 36451521
40. Liddy, C., et al., *Expanding the scope of an eConsult service: acceptability and feasibility of an optometry-ophthalmology pilot project.* Canadian Journal of Ophthalmology/Journal canadien d'ophtalmologie, 2022. PMID: 35131208
41. Hadden, W.J., *Access to orthopedic specialist service in Ontario via eConsult.* Canadian journal of surgery. Journal canadien de chirurgie [Can J Surg] NLMUID: 0372715, 2022. **65**(5): p. 643. PMID: 36170983
42. Carroll, J.C., et al., *Use of eConsult to enhance genetics service delivery in primary care: A multimethod study.* Genetics in Medicine, 2022. **24**(10): p. 2034-2041. PMID: 35947109
43. Pun, N., et al., *Comparing the content of traditional faxed consultations to eConsults within an academic endocrinology clinic.* Journal of Clinical & Translational Endocrinology, 2021. **24**. PMID: 34195010
44. Leduc, J.-G., et al., *Improving primary care access to respirologists using eConsult.* International Journal for Quality in Health Care, 2021. **33**(3). PMID: 34270723
45. Keely, E., et al., *A comparison of faxed referrals and eConsult questions for rheumatology referrals: a descriptive study.* CMAJ open, 2021. **9**(1): p. E38-E43. PMID: 33436454
46. Zhu, C., et al., *Implications for Telemedicine for Surgery Patients After COVID-19: Survey of Patient and Provider Experiences.* Am Surg, 2020. **86**(8): p. 907-915. PMID: 32805123
47. Deeds, S.A.M.D., et al., *Implementing an Opt-in eConsult Program at Seven Academic Medical Centers: a Qualitative Analysis of Primary Care Provider Experiences.* Journal of General Internal Medicine, 2019. **34**(8): p. 1427-1433. PMID: 31197734
48. Liddy, C., et al., *Impact of and Satisfaction with a New eConsult Service: A Mixed Methods Study of Primary Care Providers.* J Am Board Fam Med, 2015. **28**(3): p. 394-403. PMID: 25957372
49. Liddy, C., et al., *Assessment of the Generalizability of an eConsult Service through Implementation in a New Health Region.* J Am Board Fam Med, 2019. **32**(2): p. 146-157. PMID: 30850451
50. Keely, E., A. Afkham, and C. Liddy, *Insights into Specialists' Participation and Self-Reported Billing Times in a Multispecialty eConsult Service: Correlating Response Length with Outcomes and Satisfaction.* Telemed J E Health, 2020. **26**(4): p. 419-425. PMID: 31059380
51. Keely, E., et al., *Specialist Perspectives on Ontario Provincial Electronic Consultation*

Services. Telemedicine and e-Health, 2018. **25**. PMID: 29746210
52. Rodriguez, K.L., et al., *Veteran, primary care provider, and specialist satisfaction with electronic consultation.* JMIR Med Inform, 2015. **3**(1): p. e5. PMID: 25589233
53. Singer, A., et al., *Evaluation of BASE eConsult Manitoba: patient perspectives on the use of electronic consultation to improve access to specialty advice in Manitoba.* BMC Health Serv Res, 2023. **23**(1): p. 131. PMID: 36755243
54. Ackerman, S.L., N. Gleason, and S.A. Shipman, *Comparing Patients' Experiences with Electronic and Traditional Consultation: Results from a Multisite Survey.* Journal of General Internal Medicine, 2020. **35**(4): p. 1135-1142. PMID: 32076987
55. Joschko, J., et al., *Just a click away: exploring patients' perspectives on receiving care through the Champlain BASETM eConsult service.* Fam Pract, 2018. **35**(1): p. 93-98. PMID: 28968806
56. Whited, J.D., et al., *Patient and clinician satisfaction with a store-and-forward teledermatology consult system.* Telemed J E Health, 2004. **10**(4): p. 422-31. PMID: 15689645
57. Anderson, D., et al., *Impact of endocrinology eConsults on access to endocrinology care for Medicaid patients.* Telemedicine and e-Health, 2020. **26**(11): p. 1383-1390. PMID: 32023182
58. Wang, R.F., et al., *Improved patient access and outcomes with the integration of an eConsult program (teledermatology) within a large academic medical center.* J Am Acad Dermatol, 2020. **83**(6): p. 1633-1638. PMID: 31678336
59. Vimalananda, V.G., et al., *Electronic consultations (E-consults) and their outcomes: a systematic review.* J Am Med Inform Assoc, 2020. **27**(3): p. 471-479. PMID: 31621847
60. Olayiwola, J.N., et al., *Electronic consultation impact from the primary care clinician perspective: Outcomes from a national sample.* J Telemed Telecare, 2019. **25**(8): p. 493-498. PMID: 29991315
61. Liddy, C., et al., *Sustainability of a Primary Care–Driven eConsult Service.* Annals of Family Medicine, 2018. **16**(2): p. 120-126. PMID: 29531102
62. Kwok, J., et al., *Electronic consultation system demonstrates educational benefit for primary care providers.* J Telemed Telecare, 2018. **24**(07): p. 465-472. PMID: 28614974
63. Liddy, C., et al., *eConsults and Learning Between Primary Care Providers and Specialists.* Fam Med, 2019. **51**(7): p. 567-573. PMID: 31287902
64. Archibald, D., et al., *Development of eConsult reflective learning tools for healthcare providers: a pragmatic mixed methods approach.* BMC Primary Care, 2023. **24**(1): p. 15. PMID: 36647016
65. Hakimjavadi, R., et al., *Electronic Consultation by Advanced Practice Nurses to Improve Access to Specialist Care for Older Adults.* Journal of gerontological nursing, 2022. **48**(4): p. 33-40. PMID: 35343843
66. Anderson, D., et al., *Reduced cost of specialty care using electronic consultations for Medicaid patients.* Health Affairs, 2018. **37**(12): p. 2031-2036. PMID: 30633678
67. Anderson, D., et al., *A cost-effectiveness analysis of cardiology eConsults for Medicaid patients.* Am J Manag Care, 2018. **24**(1): p. e9-e16. PMID: 29350511
68. Liddy, C., et al., *What are the cost savings associated with providing access to specialist care through the Champlain BASE eConsult service? A costing evaluation.* BMJ open, 2016. **6**(6): p. e010920. PMID: 27338880
69. Osman, M., et al., *SUN-234 Electronic consultations (eConsult) to enhance access to nephrologists care: what are the barriers and facilitators to implementation?* ISN World Congress of Nephrology (WCN) Abstracts, 2019. **4**(7 Supplement): p. S256-S257. doi:10.1016/j.ekir.2019.05.638

70. Bello, A., et al., *Protocol: Improving Access to Specialist Nephrology Care Among Rural/Remote Dwellers of Alberta: The Role of Electronic Consultation in Improving Care for Patients With Chronic Kidney Disease.* Canadian journal of kidney health and disease, 2019. **6**: p. 2054358119878715. PMID: 31631888
71. Osman, M.A., et al., *Barriers and facilitators for implementation of electronic consultations (eConsult) to enhance access to specialist care: a scoping review.* BMJ global health, 2019. **4**(5): p. e001629. PMID: 31565409
72. Rikin, S., E.J. Epstein, and I. Gendlina, *Rapid implementation of Inpatient eConsult Programme addresses new challenges for patient care during COVID-19 pandemic.* BMJ innovations, 2021. **7**(2). PMID: 34192016
73. Moroz, I., et al. *Key factors for national spread and scale-up of an eConsult innovation*. Health Research Policy and Systems, 2020. **18**, DOI: 10.1186/s12961-020-00574-0. PMID: 32493357
74. Breton, M., et al., *Dissemination, implementation, and impact: Strategies to Support the Provincial Scaling-up of Econsult in Canada.* Health Services Research, 2020. **55**(S1): p. 58-59. doi: 10.1111/1475-6773.13409
75. Breton, M., et al., *Scaling up eConsult for access to specialists in primary healthcare across four Canadian provinces: study protocol of a multiple case study.* Health Res Policy Syst, 2019. **17**(1): p. 83. PMID: 31511008
76. Breton, M., et al., *Scaling-Up eConsult: Promising Strategies to Address Enabling Factors in Four Jurisdictions in Canada.* International Journal of Health Policy and Management, 2023. **12**(1): p. 1-13. doi: 10.34172/IJHPM.2023.7203
77. Zheng, L., et al., *Perceptions of telehealth among inpatient consultative dermatology providers and practice patterns during COVID-19.* Arch Dermatol Res, 2023. **315**(8): p. 2449-2451. PMID: 37184600
78. Mohammed, R., et al., *Acceptance factors of telemedicine technology during Covid-19 pandemic among health professionals: A qualitative study.* Healthc Technol Lett, 2023. **10**(1-2): p. 23-33. PMID: 37077882
79. Zahid, N., et al., *Perception and Attitude of Pakistani Doctors Toward the Use of Telemedicine Technology.* Cureus, 2022. **14**(11): p. e31556. PMID: 36540489
80. El-Yafouri, R., L. Klieb, and V. Sabatier, *Psychological, social and technical factors influencing electronic medical records systems adoption by United States physicians: a systematic model.* Health Research Policy and Systems, 2022. **20**(1): p. 48. PMID: 35501897
81. Al-Otaibi, J., et al., *The Factors Contributing to Physicians' Current Use of and Satisfaction With Electronic Health Records in Kuwait's Public Health Care: Cross-sectional Questionnaire Study.* JMIR Med Inform, 2022. **10**(10): p. e36313. PMID: 36206039
82. Yousef, C.C., et al., *Health Care Providers' Acceptance of a Personal Health Record: Cross-sectional Study.* J Med Internet Res, 2021. **23**(10): p. e31582. PMID: 34569943
83. Kim, S., et al., *Analysis of the factors influencing healthcare professionals' adoption of mobile electronic medical record (EMR) using the unified theory of acceptance and use of technology (UTAUT) in a tertiary hospital.* BMC Med Inform Decis Mak, 2016. **16**: p. 12. PMID: 26831123
84. Zha, H., et al., *Acceptance of clinical decision support system to prevent venous thromboembolism among nurses: an extension of the UTAUT model.* BMC Med Inform Decis Mak, 2022. **22**(1): p. 221. PMID: 35986284
85. Jones, E.K., et al., *Barriers to and Facilitators for Acceptance of Comprehensive Clinical Decision Support System-Driven Care Maps for Patients With Thoracic Trauma: Interview Study Among Health Care Providers and Nurses.* JMIR Hum Factors, 2022. **9**(1): p.

e29019. PMID: 35293873
86. Camacho, J., et al., *A Conceptual Framework to Study the Implementation of Clinical Decision Support Systems (BEAR): Literature Review and Concept Mapping.* J Med Internet Res, 2020. **22**(8): p. e18388. PMID: 32759098
87. Zhu, Y., et al., *Understanding Use Intention of mHealth Applications Based on the Unified Theory of Acceptance and Use of Technology 2 (UTAUT-2) Model in China.* Int J Environ Res Public Health, 2023. **20**(4). PMID: 36833830
88. Kerwagen, F., et al., *Usability of a mHealth Solution using Speech Recognition for Point-of-care Diagnostic Management.* J Med Syst, 2023. **47**(1): p. 18. PMID: 36729251
89. Schomakers, E.M., et al., *Applying an Extended UTAUT2 Model to Explain User Acceptance of Lifestyle and Therapy Mobile Health Apps: Survey Study.* JMIR Mhealth Uhealth, 2022. **10**(1): p. e27095. PMID: 35040801
90. Hajesmaeel-Gohari, S., et al., *The most used questionnaires for evaluating satisfaction, usability, acceptance, and quality outcomes of mobile health.* BMC Med Inform Decis Mak, 2022. **22**(1): p. 22. PMID: 35081953
91. Ahadzadeh, A.S., et al., *The Mediating Influence of the Unified Theory of Acceptance and Use of Technology on the Relationship Between Internal Health Locus of Control and Mobile Health Adoption: Cross-sectional Study.* J Med Internet Res, 2021. **23**(12): p. e28086. PMID: 34964718
92. Heinsch, M., et al., *Theories Informing eHealth Implementation: Systematic Review and Typology Classification.* J Med Internet Res, 2021. **23**(5): p. e18500. PMID: 34057427
93. Rouidi, M., et al., *TAM-UTAUT and the acceptance of remote healthcare technologies by healthcare professionals: A systematic review.* Informatics in Medicine Unlocked, 2022. **32**: p. 101008. doi: 10.1016/j.imu.2022.101008
94. Garavand, A., et al., *Factors influencing the adoption of health information technologies: a systematic review.* Electron Physician, 2016. **8**(8): p. 2713-2718. PMID: 27757179
95. Wixom, B.H. and P.A. Todd, *A Theoretical Integration of User Satisfaction and Technology Acceptance.* Information Systems Research, 2005. **16**(1): p. 85-102. doi:10.1287/isre.1050.0042
96. Davis, F.D., *Perceived usefulness, perceived ease of use, and user acceptance of information technology.* MIS Quarterly: Management Information Systems, 1989. **13**(3): p. 319-339. doi:10.2307/249008
97. Taylor, S. and P.A. Todd, *Understanding information technology usage: A test of competing models.* Information Systems Research, 1995. **6**(2): p. 144-176. doi:10.1287/isre.6.2.144
98. Venkatesh, V. and F.D. Davis, *A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies.* Management Science, 2000. **46**(2): p. 186-204. doi:10.1287/mnsc.46.2.186.11926
99. Moore, G.C. and I. Benbasat, *Development of an instrument to measure the perceptions of adopting an information technology innovation.* Information Systems Research, 1991. **2**(3): p. 192-222. doi: 10.1287/isre.2.3.192
100. Venkatesh, V., et al., *User Acceptance of Information Technology: Toward a Unified View.* MIS Quarterly, 2003. **27**(3): p. 425-478. doi: 10.2307/30036540
101. Venkatesh, V., J.Y.L. Thong, and X. Xu, *Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology.* MIS Quarterly: Management Information Systems, 2012. **36**(1): p. 157-178. doi: 10.2307/41410412
102. Jacob, C., A. Sanchez-Vazquez, and C. Ivory, *Understanding Clinicians' Adoption of Mobile Health Tools: A Qualitative Review of the Most Used Frameworks.* JMIR Mhealth Uhealth, 2020. **8**(7): p. e18072. PMID: 32442132

103. Nadal, C., C. Sas, and G. Doherty, *Technology Acceptance in Mobile Health: Scoping Review of Definitions, Models, and Measurement.* J Med Internet Res, 2020. **22**(7): p. e17256. PMID: 32628122
104. Aggelidis, V.P. and P.D. Chatzoglou, *Using a modified technology acceptance model in hospitals.* Int J Med Inform, 2009. **78**(2): p. 115-26. PMID: 18675583
105. Kim, J. and H.-A. Park, *Development of a Health Information Technology Acceptance Model Using Consumers' Health Behavior Intention.* J Med Internet Res, 2012. **14**(5): p. e133. PMID: 23026508
106. Hung, M.-C. and W.-Y. Jen, *The Adoption of Mobile Health Management Services: An Empirical Study.* Journal of Medical Systems, 2012. **36**(3): p. 1381-1388. PMID: 20878452
107. Harst, L., H. Lantzsch, and M. Scheibe, *Theories Predicting End-User Acceptance of Telemedicine Use: Systematic Review.* J Med Internet Res, 2019. **21**(5): p. e13117. PMID: 31115340
108. An, M.H., et al., *Using an Extended Technology Acceptance Model to Understand the Factors Influencing Telehealth Utilization After Flattening the COVID-19 Curve in South Korea: Cross-sectional Survey Study.* JMIR Med Inform, 2021. **9**(1): p. e25435. PMID: 33395397
109. Torp, D.C., A. Sandbæk, and T. Prætorius, *The Technology Acceptance of Video Consultations for Type 2 Diabetes Care in General Practice: Cross-sectional Survey of Danish General Practitioners.* J Med Internet Res, 2022. **24**(8): p. e37223. PMID: 36040765
110. Lewis, W., R. Agarwal, and V. Sambamurthy, *Sources of Influence on Beliefs about Information Technology Use: An Empirical Study of Knowledge Workers.* MIS Quarterly, 2003. **27**(4): p. 657-678. doi: 10.2307/30036552
111. Wu, J. and A. Lederer, *A Meta-Analysis of the Role of Environment-Based Voluntariness in Information Technology Acceptance.* MIS Quarterly, 2009. **33**(2): p. 419-432. doi: 10.2307/20650298
112. Venkatesh, V., *Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model.* Information Systems Research, 2000. **11**(4): p. 342-365. doi: 10.2307/20650298
113. Bhattacherjee, A., *Understanding Information Systems Continuance: An Expectation-Confirmation Model.* MIS Quarterly, 2001. **25**(3): p. 351-370. doi: 10.2307/3250921
114. Chen, R., *Modeling of User Acceptance of Consumer E-Commerce Website*. International Conference on Web Information Systems Engineering - WISE, 2005: p. 454-462. doi: 10.1007/11581062_35
115. Venkatesh, V. and S. Goyal, *Expectation disconfirmation and technology adoption: Polynomial modeling and response surface analysis.* MIS Quarterly: Management Information Systems, 2010. **34**(SPEC. ISSUE 2): p. 281-303. doi: 10.2307/20721428
116. Pieters, J.J., A. Kokkinou, and T. van Kollenburg, *Understanding Blockchain Technology Adoption by Non-experts: an Application of the Unified Theory of Acceptance and Use of Technology (UTAUT)*. Operations Research Forum, 2021. **3**(1): p. 1. doi: 10.1007/s43069-021-00113-9
117. Chao, C.M., *Factors Determining the Behavioral Intention to Use Mobile Learning: An Application and Extension of the UTAUT Model.* Front Psychol, 2019. **10**: p. 1652. PMID: 31379679
118. Goodhue, D.L. and R.L. Thompson, *Task-Technology Fit and Individual Performance.* MIS Quarterly, 1995. **19**(2): p. 213-236. doi: 10.2307/249689
119. Wang, S.L. and H.I. Lin, *Integrating TTF and IDT to evaluate user intention of big data*

analytics in mobile cloud healthcare system. Behaviour & Information Technology, 2019. **38**(9): p. 974-985. doi:10.1080/0144929X.2019.1626486

120. Ali, S.B., et al., *Focus Section Health IT Usability: Applying a Task-Technology Fit Model to Adapt an Electronic Patient Portal for Patient Work.* Appl Clin Inform, 2018. **9**(1): p. 174-184. PMID: 29539648
121. Chen, P.S., C.J. Yu, and G.Y. Chen, *Applying Task-Technology Fit Model to the Healthcare Sector: a Case Study of Hospitals' Computed Tomography Patient-Referral Mechanism.* J Med Syst, 2015. **39**(8): p. 80. PMID: 26126414
122. Chen, R.-F. and J.-L. Hsiao, *Health Professionals' Perspectives on Electronic Medical Record Infusion and Individual Performance: Model Development and Questionnaire Survey Study.* JMIR Med Inform, 2021. **9**(11): p. e32180. PMID: 34851297
123. Lee, H. and T. Ramayah, *An Examination of the Effects of Task Technology Fit and Hospital Information System Satisfaction in Public Hospital Malaysia: A Structural Model.* Advanced Science Letters, 2018. **24**: p. 1479-1483. doi:10.1166/asl.2018.10774
124. Spies, R., S. Grobbelaar, and A. Botha, *A Scoping Review of the Application of the Task-Technology Fit Theory.* Responsible Design, Implementation and Use of Information and Communication Technology, 2020. **12066**: p. 397-408. doi: 10.1007/978-3-030-44999-5_33
125. Strachna, O., O. Asan, and P.D. Stetson, *Managing Critical Patient-Reported Outcome Measures in Oncology Settings: System Development and Retrospective Study.* JMIR Med Inform, 2022. **10**(11): p. e38483. PMID: 36326801
126. Wanti, L.P., H.F.M. Insan, and N.W.A. Prasetya, *End User Satisfaction for Location Health Service Application with Analysis of Task Technology Fit.* Lontar Komputer : Jurnal Ilmiah Teknologi Informasi, 2020(2): p. 76-87%V 11. doi: 10.24843/LKJITI.2020.v11.i02.p02
127. Abdekhoda, M., A. Dehnad, and J. Zarei, *Factors influencing adoption of e-learning in healthcare: integration of UTAUT and TTF model.* BMC Medical Informatics and Decision Making, 2022. **22**(1): p. 327. PMID: 36494800
128. Bjerkan, J., et al., *Citizen-Patient Involvement in the Development of mHealth Technology: Protocol for a Systematic Scoping Review.* JMIR Res Protoc, 2020. **9**(8): p. e16781. PMID: 32857061
129. Chen, T.T., et al. *Using UTAUT, TTF, and PR integrating models to evaluate employees' acceptance and behavioral intention of PHM-based system in the military industry*. IEEE International Conference on Prognostics and Health Management (ICPHM), Detroit (Romulus), MI, USA, 2022, pp. 88-93, doi: 10.1109/ICPHM53196.2022.9815710.
130. Kang, H.J., J. Han, and G.H. Kwon, *The Acceptance Behavior of Smart Home Health Care Services in South Korea: An Integrated Model of UTAUT and TTF.* Int J Environ Res Public Health, 2022. **19**(20). PMID: 36293859
131. Siebert, J.N., et al., *Usability Testing and Technology Acceptance of an mHealth App at the Point of Care During Simulated Pediatric In- and Out-of-Hospital Cardiopulmonary Resuscitations: Study Nested Within 2 Multicenter Randomized Controlled Trials.* JMIR Hum Factors, 2022. **9**(1): p. e35399. PMID: 35230243
132. Wang, H., et al., *Understanding consumer acceptance of healthcare wearable devices: An integrated model of UTAUT and TTF.* Int J Med Inform, 2020. **139**: p. 104156. PMID: 32387819
133. Zaidi, S., et al., *Operability, Usefulness, and Task-Technology Fit of an mHealth App for Delivering Primary Health Care Services by Community Health Workers in Underserved Areas of Pakistan and Afghanistan: Qualitative Study.* J Med Internet Res, 2020. **22**(9): p. e18414. PMID: 32940612
134. Norzaidi, M. and I. Mohamed, *Evaluating technology resistance and technology*

satisfaction on students' performance. Campus-Wide Information Systems, 2009. **26**: p. 298-312. doi:10.1108/10650740910984637

135. Mahdavian, M., et al. *Identifying main resistance factors in ERP implementation: A case study*. in *2012 9th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology*. 2012. doi:10.1109/ECTICon.2012.6254311
136. Ngafeeson, M. and V. Midha, *An Exploratory Study of User Resistance in Healthcare IT.* International Journal of Electronic Finance, 2014. **8**: p. 74-94. doi:10.1504/IJEF.2014.064003
137. Goodhue, D.L. and R.L. Thompson, *Task-technology fit and individual performance.* MIS Q., 1995. **19**(2): p. 213–236. doi: 10.2307/249689
138. Hsiao, J.-L. and R.-F. Chen, *Understanding Determinants of Health Care Professionals' Perspectives on Mobile Health Continuance and Performance.* JMIR Med Inform, 2019. **7**(1): p. e12350. PMID: 30882353
139. Alhendawi, K.M., *Task-technology fit model: Modelling and assessing the nurses' satisfaction with health information system using AI prediction models.* International Journal of Healthcare Management, 2022: p. 1-13. doi: 10.1097/CIN.0000000000000142
140. Liddy, C., et al., *Ten steps to establishing an e-consultation service to improve access to specialist care.* Telemed J E Health, 2013. **19**(12): p. 982-90. PMID: 24073898
141. Liddy, C., et al., *Impact of the Connected Medicine collaborative in improving access to specialist care: a cross-sectional analysis.* CMAJ Open, 2021. **9**(4): p. E1187-e1194. PMID: 34906995
142. Kumar, R., *Research methodology : a step-by-step guide for beginners*. 4th edition, SAGE Publications Ltd., London. 2014, ISBN: 9781446269978
143. Goodhue, D.L., W. Lewis, and R. Thompson, *Does PLS Have Advantages for Small Sample Size or Non-Normal Data?* MIS Quarterly, 2012. **36**(3): p. 981-1001. doi: 10.2307/41703490
144. Hair, J.F., et al., *The use of partial least squares structural equation modeling in strategic management research: a review of past practices and recommendations for future applications.* Long range planning, 2012. **45**(5-6): p. 320-340. doi:10.1016/j.lrp.2012.09.008
145. Hair Jr, J.F., et al., *Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research.* European business review, 2014. **26**(2): p. 106-121. doi:10.1108/EBR-10-2013-0128
146. Henseler, J., G. Hubona, and P.A. Ray, *Using PLS path modeling in new technology research: updated guidelines.* Industrial management & data systems, 2016. **116**(1): p. 2-20. doi:10.1108/IMDS-09-2015-0382
147. Hair, J.F., et al., *When to use and how to report the results of PLS-SEM.* European business review, 2019. **31**(1): p. 2-24. doi:10.1108/EBR-11-2018-0203
148. Benitez, J., et al., *How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory IS research.* Information & management, 2020. **57**(2): p. 103168. doi: 10.1016/j.im.2019.05.003
149. Chin, W., et al., *Demystifying the role of causal-predictive modeling using partial least squares structural equation modeling in information systems research.* Industrial Management & Data Systems, 2020. **120**(12): p. 2161-2209. doi: 10.1108/IMDS-10-2019-0529
150. Hair Jr, J.F., et al., *PLS-SEM or CB-SEM: updated guidelines on which method to use.* International Journal of Multivariate Data Analysis, 2017. **1**(2): p. 107-123. doi:10.1504/

IJMDA.2017.087624
151. Williams, M.D., N.P. Rana, and Y.K. Dwivedi, *The unified theory of acceptance and use of technology (UTAUT): a literature review.* Journal of enterprise information management, 2015. **28**(3): p. 443-488. doi:10.1108/JEIM-09-2014-0088
152. So, S., M.R. Ismail, and S. Jaafar, *Exploring Acceptance of Artificial Intelligence amongst Healthcare Personnel: A Case in a Private Medical Centre*, International Journal of Advances in Engineering and Management (IJAEM), 2021. **3**(9): p. 56-65. doi: 10.35629/5252-03095665
153. Bagozzi, R.P. and L.W. Phillips, *Representing and testing organizational theories: A holistic construal.* Administrative science quarterly, 1982: p. 459-489. doi:10.2307/2392322
154. Venkatraman, N. and J.H. Grant, *Construct measurement in organizational strategy research: A critique and proposal.* Academy of management review, 1986. **11**(1): p. 71-87. doi: 10.5465/amr.1986.4282628
155. Peter, J.P., *Reliability: A review of psychometric basics and recent marketing practices.* Journal of marketing research, 1979. **16**(1): p. 6-17. doi: 10.1177/002224377901600102
156. Hair, J.F., W.C. Black, and B.J. Babin, *Multivariate Data Analysis: A Global Perspective*. 7th edition. Pearson Education; 2010. ISBN: 0135153093
157. Robinson, J.P., P.R. Shaver, and L.S. Wrightsman, *Measures of personality and social psychological attitudes: Measures of social psychological attitudes*. Vol. 1. Gulf Professional Publishing; 1991. ISBN: 0125902441
158. Fornell, C. and D.F. Larcker, *Evaluating structural equation models with unobservable variables and measurement error.* Journal of marketing research, 1981. **18**(1): p. 39-50. doi: 10.1177/002224378101800104
159. Anderson, J.C. and D.W. Gerbing, *Structural equation modeling in practice: A review and recommended two-step approach.* Psychological bulletin, 1988. **103**(3): p. 411. doi: 10.1037/0033-2909.103.3.411
160. Hair Jr, J.F., C.M. Ringle, and M. Sarstedt, *Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance.* Long Range Planning: International Journal of Strategic Management, 2013. **46**(1-2): p. 1-12. doi: 10.1016/j.lrp.2013.01.001
161. Chin, W.W., *The partial least squares approach for structural equation modeling*, in *Modern methods for business research.* 1st edition, Psychology Press; 1998, p. 295-336. doi: 10.4324/9781410604385
162. Falk, R.F. and N.B. Miller, *A primer for soft modeling*. First edition. University of Akron Press; 1992. ISBN: 0962262846
163. Ho, K.F., C.H. Ho, and M.H. Chung, *Theoretical integration of user satisfaction and technology acceptance of the nursing process information system.* PLoS One, 2019. **14**(6): p. e0217622. doi: 10.1371/journal.pone.0217622
164. Paré, G., et al., *Toward a multidimensional assessment of picture archiving and communication system success.* Int J Technol Assess Health Care, 2005. **21**(4): p. 471-9. PMID: 16262970
165. William, H.D. and R.M. Ephraim, *The DeLone and McLean Model of Information Systems Success: A Ten-Year Update.* Journal of Management Information Systems, 2003. **19**(4): p. 9-30. doi: 10.1080/07421222.2003.11045748
166. Kabra, G., et al., *Understanding behavioural intention to use information technology: Insights from humanitarian practitioners.* Telematics and Informatics, 2017. **34**(7): p. 1250-1261. doi:10.1016/j.tele.2017.05.010
167. DeLone, W.H. and E.R. McLean, *Information Systems Success Measurement.* Foundations

and Trends® in Information Systems, 2016. **2**(1): p. 1-116. doi: 10.1561/2900000005
168. Kissi, J., et al., *Predictive factors of physicians' satisfaction with telemedicine services acceptance.* Health Informatics Journal, 2019. **26**(3): p. 1866-1880. PMID: 31854222
169. Maillet, É., L. Mathieu, and C. Sicotte, *Modeling factors explaining the acceptance, actual use and satisfaction of nurses using an Electronic Patient Record in acute care settings: An extension of the UTAUT.* International Journal of Medical Informatics, 2015. **84**(1): p. 36-47. PMID: 25288192
170. Hsiao, J.L. and R.F. Chen, *An investigation on task-technology fit of mobile nursing information systems for nursing performance.* Comput Inform Nurs, 2012. **30**(5): p. 265-73. PMID: 22156768
171. Kowitlawakul, Y., *The technology acceptance model: predicting nurses' intention to use telemedicine technology (eICU).* Comput Inform Nurs, 2011. **29**(7): p. 411-8. PMID: 20975536
172. Hsiao, J.L., H.C. Chang, and R.F. Chen, *A study of factors affecting acceptance of hospital information systems: a nursing perspective.* J Nurs Res, 2011. **19**(2): p. 150-60. PMID: 21586992
173. Melas, C.D., et al., *Modeling the acceptance of clinical information systems among hospital medical staff: an extended TAM model.* J Biomed Inform, 2011. **44**(4): p. 553-64. PMID: 21292029
174. Pai, F.-Y. and K.-I. Huang, *Applying the technology acceptance model to the introduction of healthcare information systems.* Technological forecasting and social change, 2011. **78**(4): p. 650-660. doi: 10.1504/IJBHR.2013.057363
175. Wu, J.H., et al., *Testing the technology acceptance model for evaluating healthcare professionals' intention to use an adverse event reporting system.* Int J Qual Health Care, 2008. **20**(2): p. 123-9. PMID: 18222963
176. Yu, P., H. Li, and M.P. Gagnon, *Health IT acceptance factors in long-term care facilities: a cross-sectional survey.* Int J Med Inform, 2009. **78**(4): p. 219-29. PMID: 18768345
177. Lin, C., I.C. Lin, and J. Roan, *Barriers to Physicians' Adoption of Healthcare Information Technology: An Empirical Study on Multiple Hospitals.* Journal of medical systems, 2011. **36**: p. 1965-77. PMID: 21336605
178. Becker, D., *Acceptance of mobile mental health treatment applications.* Procedia Computer Science, 2016. **98**: p. 220-227. doi: 10.1016/j.procs.2016.09.036
179. Chang, I.-C., et al., *Physicians' acceptance of pharmacokinetics-based clinical decision support systems.* Expert systems with applications, 2007. **33**(2): p. 296-303. doi: 10.1016/j.eswa.2006.05.001
180. Aggelidis, V.P. and P.D. Chatzoglou, *Hospital information systems: measuring end user computing satisfaction (EUCS).* J Biomed Inform, 2012. **45**(3): p. 566-79. PMID: 22426283
181. Pynoo, B., et al., *Do hospital physicians' attitudes change during PACS implementation? A cross-sectional acceptance study.* Int J Med Inform, 2012. **81**(2): p.88-97. PMID: 22071012
182. Kijsanayotin, B., S. Pannarunothai, and S.M. Speedie, *Factors influencing health information technology adoption in Thailand's community health centers: applying the UTAUT model.* Int J Med Inform, 2009. **78**(6): p. 404-16. PMID: 19196548
183. Saigí-Rubió, F., et al., *Determinants of Catalan public primary care professionals' intention to use digital clinical consultations (eConsulta) in the post-COVID-19 context: optical illusion or permanent transformation?* J Med Internet Res, 2021. **23**(6). PMID: 34097638
184. Holden, R.J. and B.T. Karsh, *The technology acceptance model: its past and its future in health care.* J Biomed Inform, 2010. **43**(1): p. 159-72. PMID: 19615467

185. Morton, M.E. and S. Wiedenbeck, *A framework for predicting EHR adoption attitudes: a physician survey.* Perspect Health Inf Manag, 2009. **6**(Fall): p. 1a. PMID: 20169013
186. Yamin, M.A.Y. and B.A. Alyoubi, *Adoption of telemedicine applications among Saudi citizens during COVID-19 pandemic: An alternative health delivery system.* Journal of Infection and Public Health, 2020. **13**(12): p. 1845-1855. PMID: 33172819
187. Wan, L., S. Xie, and A. Shu, *Toward an Understanding of University Students' Continued Intention to Use MOOCs: When UTAUT Model Meets TTF Model.* SAGE Open, 2020. **10**(3). doi: 10.1177/2158244020941858
188. Schaper, L.K. and G.P. Pervan. *An investigation of factors affecting technology acceptance and use decisions by Australian allied health therapists*. in *2007 40th Annual Hawaii International Conference on System Sciences (HICSS'07)*. 2007. doi:10.1109/HICSS.2007.69
189. Tung, F.-C. and S.-C. Chang, *A new hybrid model for exploring the adoption of online nursing courses.* Nurse Education Today, 2008. **28**(3): p. 293-300. PMID: 17706842
190. Raymond, L., et al., *Improving performance in medical practices through the extended use of electronic medical record systems: a survey of Canadian family physicians.* BMC Med Inform Decis Mak, 2015. **15**: p. 27. PMID: 25888991
191. Lin, T.C., *Mobile nursing information system utilization: the task-technology fit perspective.* Comput Inform Nurs, 2014. **32**(3): p. 129-37. PMID: 24419090

Supplementary Files

URL: http://asset.jmir.pub/assets/748e7f2fb9e88e7cd5e25e346613b2b8.docx

Figures

The proposed research model based on UTAUT and TTF, and user satisfaction.

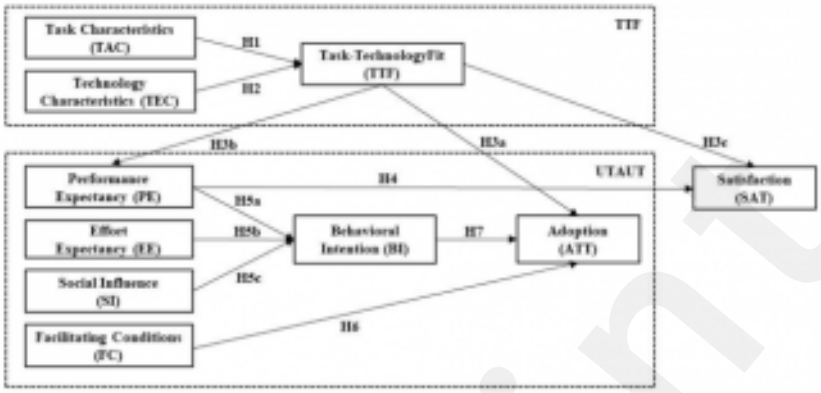

Figure 1. The proposed research model based on UTAUT and TTF, and user satisfaction.

Creation of a new eConsult and submission of a clinical question to the specialist.

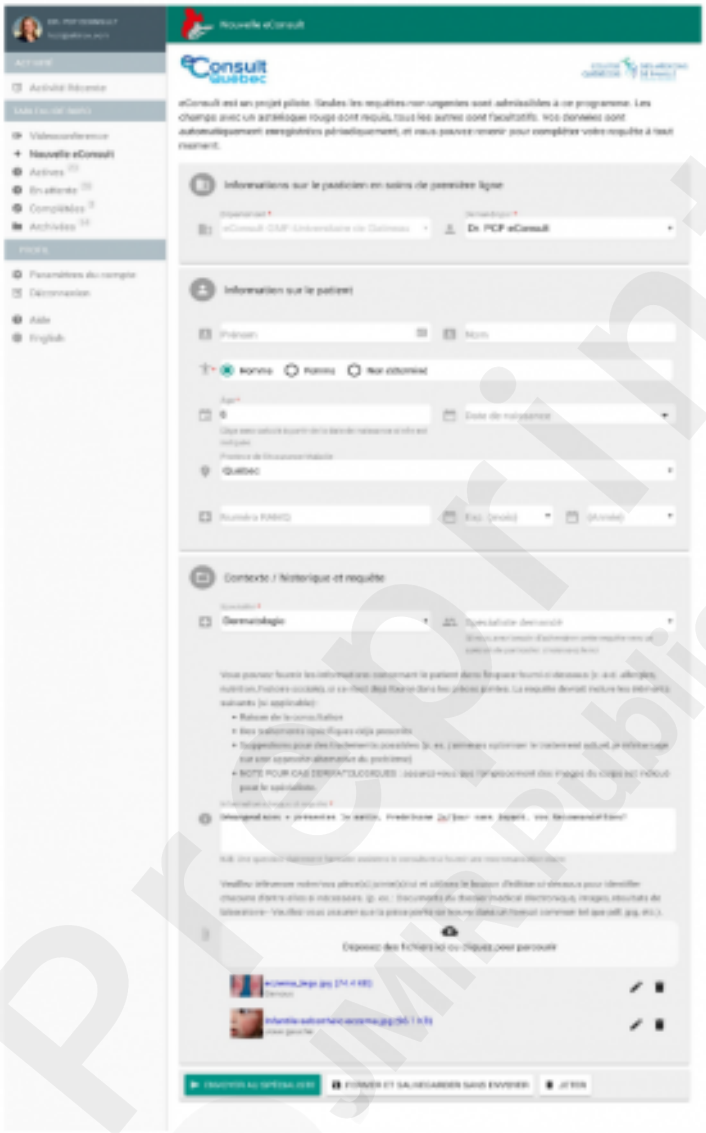

Figure 2. Creation of a new eConsult and submission of a clinical question to the specialist

The interface of the PCPs dashboard.

Figure 3. The interface of the PCPs dashboard

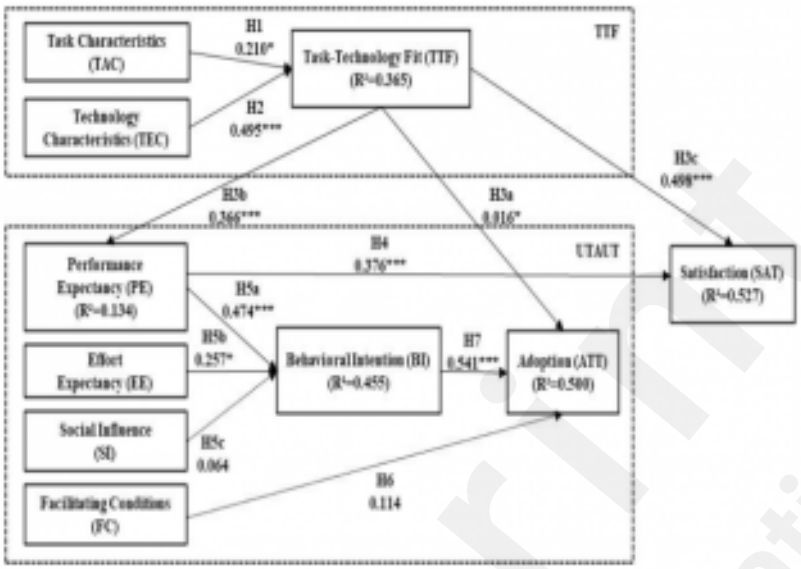

Figure 2. Partial least squares results and R^2 values (N=136), ***P<.001, **P<.01, *P<.05.