Impact of Telemedicine Technology Tools and Perceived Barriers on Satisfaction and Continued Usage Intention of Office-based Physicians

Xiang Liu
The University of Queensland, Australia
xiang.liu1@uqconnect.edu.au

Avijit Sengupta
The University of Queensland, Australia
avijit.sengupta@uq.edu.au

Dongming Xu
The University of Queensland, Australia
d.xu@business.uq.edu.au

Abstract

Government-imposed lockdowns and shelter-in-place orders during COVID-19 have accelerated the adoption of telemedicine for remote patient monitoring, consultation, diagnosis, and care. However, healthcare providers' utilization of and satisfaction with telemedicine technologies could have a significant impact on the quality of care provided to patients during COVID-19. The objective of our study is to investigate the impacts of telemedicine technology tools and perceived barriers on physicians' overall satisfaction and continued usage intention of telemedicine in office-based ambulatory care settings. With the help of task-technology fit model we develop a set of hypotheses and then assess those hypotheses empirically with the help of National Electronic Health Records Survey (NEHRS) response data. While we find significant impacts of telemedicine technology tools on physicians' satisfaction and continued usage intention, perceived barriers only significantly impact physicians' satisfaction but not the continued usage intention. Our research has significant implications for both theory and practice.

Keywords: Telemedicine, Physician Satisfaction, Telemedicine Technology Tools, Perceived Barriers, Regression

1. Introduction

Telemedicine has become one of the most crucial aspects of healthcare provision during the COVID-19 pandemic (Malhotra et al., 2022). The Commonwealth Fund reported that the onset of the pandemic resulted in a preliminary surge in telemedicine visits within urgent care and ambulatory care settings (Mehrotra et al., 2020). This use continued at a much higher level throughout the pandemic than in the pre-pandemic period for both COVID-19 and non-COVID-19 suspected visits. In this regard, the utilization of and satisfaction with telemedicine technologies by healthcare providers could exert a substantial influence on the quality of care rendered to patients during the COVID-19 pandemic. However, there is a scarcity of research that addresses the effects of telemedicine technology tools and perceived barriers on physicians' satisfaction and their intention to continue with telemedicine technology.

Telemedicine is providing healthcare remotely using telecommunications technology (Wootton, 2001). By enabling remote medical consultations and monitoring, telemedicine can significantly improve healthcare access, enhance patient outcomes, and decrease healthcare costs (Kichloo et al., 2020). According to the telemedicine services global market report (2023), with a compound annual growth rate (CAGR) of 27.8%, the global market for telemedicine services will increase from $103.06 billion to $131.75 billion in the current year.

During social isolation and self-quarantine, telehealth enables healthcare delivery to patients' homes while maintaining the safety of other patients. Eligible people with a confirmed case of COVID-19 who are subject to self-isolation requirements should have a telephone or video consultation with their general physician (GP) to obtain a prescription for antivirals, as stated by the Australian Government Department of Health and Aged Care (2023). Zhang et al. (2020) found that more than 90% of patients consulted physicians via telemedicine technologies during the COVID-19 pandemic.

Telemedicine-related studies can broadly be divided into seven categories. These categories are a) adoption of telemedicine in different healthcare settings or specialties (Wilson & Maeder, 2015), b) barriers to telemedicine adoption in various healthcare facilities (Lin et al., 2018), c) facilitators of telemedicine adoption in various healthcare facilities (Almathami et al., 2020), d) telemedicine technology online-offline dynamics in the adoption context (Fan et al., 2023; Wang et al. (2020); e) patients experiences with telemedicine (Eze

URI: https://hdl.handle.net/10125/106809
978-0-9981331-7-1

et al., 2020; Aashima et al., 2021), f) comparison of service quality with traditional in-person care services (Isautier et al., 2020), g) the effects of telemedicine technology on geographical healthcare disparities (Hwang et al., 2022). Surprisingly, the technological components of telemedicine and their impacts on physicians' practices or work-related experiences remain unexplored. There is scant research on the impact of telemedicine technology tools on physicians' satisfaction and their intention to use them in the future. Our study addresses this gap in extant research.

We aim to address this gap by answering the following research questions. **RQ 1**: What is the effect of telemedicine technology tools on physicians' satisfaction with the use of telemedicine? **RQ 2**: What is the effect of telemedicine technology tools on physicians' intention to continue using telemedicine technology?

We address our research questions with the help of the Task-Technology Fit (TTF) model. We first build a conceptual model and then develop a set of hypotheses based on this conceptual model while adopting concepts from the TTF model. We then empirically assess those hypotheses using the 2021 annual National Electronic Health Records Survey (NEHRS) data (NEHRS Questionnaires, 2022). We used ordinary least squares (OLS) and logistic regression models for our empirical analysis.

We find a significant positive effect of telemedicine technology tools on physicians' satisfaction with the use of telemedicine technology and physicians' intention to continue with telemedicine technology. Additionally, we find a significant negative effect of perceived barriers on physicians' satisfaction. However, we did not find any effect of perceived barriers to telemedicine on physicians' intention to continue with telemedicine technology. Finally, we find that physicians' satisfaction mediates the effect of telemedicine technology tools on their intention to continue with telemedicine technology.

This research contributes to theory and practice. First, this study uses the TTF model to explore how attributes of telemedicine technology fit physicians' needs by incorporating telemedicine technology tools and perceived barriers, physicians' satisfaction, and their continuous usage intention. Additionally, it provides empirical support for treating physicians' satisfaction as a mediator when considering whether the telemedicine technology meets user needs and influences continuous usage intention. The paper highlights the need for multiple telemedicine technology tools to satisfy physicians with their use, which is expected to lead to better diagnosis and improved care. This study is one of the earliest to examine the effects of telemedicine technology on physicians' satisfaction with telemedicine during the COVID-19 pandemic.

The remainder of the paper is organized as follows. Section 2 presents a review of the relevant literature. Section 3 describes the theoretical underpinnings of our conceptual model and the development of our hypotheses. Section 4 outlines the methodology of our research. Section 5 provides the results of our study, while Section 6 discusses the contributions and implications of these results. Section 7 discusses the limitations and future research directions of our study.

2. Literature review

The existing literature about telemedicine can be categorized into four distinct areas. The first category focuses on telemedicine's advancements and enhancements to current medical services. The second category centers on adoption and acceptance research, including facilitators of telemedicine technology adoption by physicians, the factors influencing physicians' and patients' adoption of telemedicine technology and the primary barriers hindering acceptance of telemedicine technology. The third category delves into understanding patients' experiences and levels of satisfaction when utilizing telemedicine technology. The fourth category focuses on telemedicine online-offline dynamics, affecting healthcare resources disparities.

Regarding the first category, the contribution of telemedicine to overall healthcare resources, Xu et al. (2022) stated that it could help address the dearth of healthcare facilities and practitioners in underserved communities, allowing timely and effective care delivery. Bashir and Bastola (2018) highlighted how telehealth procedures enable daily patient monitoring, providing rapid feedback and convenience for patients, family members, and caregivers. Mandal et al. (2022) found that telemedicine has become a mainstream and continuous supplement to outpatient care, meeting both urgent and non-urgent needs, particularly among younger patients.

Concerning category two, in current research into the realm of telemedicine technology, it is evident to find a dichotomy in physicians' perceptions about telemedicine technology adoption. Shaverdian et al. (2021) concluded that physicians generally have a positive attitude towards adopting telemedicine and believe that the quality of healthcare services supplied remotely is comparable to in-person healthcare. Conversely, Saiyed et al. (2021) revealed skepticism, with only 29% of physicians thinking that telemedicine technology could accurately diagnose patients. Furthermore, the efficiency of remote healthcare delivery may be inferior to in-person care and may increase physicians' workload after office hours (Lawrence et al., 2022). Delving into the determinants of telemedicine adoption, studies by Kissi et al. (2020) underscored the pivotal role of satisfaction for both providers and patients. Particularly, Nguyen et al. (2020) also emphasized the importance of satisfaction in accepting telemedicine technology. In their study, patient satisfaction with telemedicine technology was reported to be between 95% and 100% compared to in-person appointments. However, the transition to telemedicine technology has not been without challenges. Paul et al. (1999) investigated the inconsistency between sophisticated technology and end-user demands for healthcare activity, as well as concerns regarding patient confidentiality and privacy, which have been identified as barriers. The unsatisfactory sound quality of telemedicine equipment has also been recognized as a frequent and unexpected barrier to telemedicine utilization rates (Paul et al., 1999). As for the barriers to adopting and accepting telemedicine services during COVID-19 have significantly impacted patients and physicians. Issues such as limited internet access and slow internet speed for physicians and patients have raised concerns (Wang et al., 2023). In assessing these obstacles, Negrini et al. (2020) suggested that while telemedicine technology is sufficiently developed, the challenge lies in changing the habits of physicians and patients and implementing better regulations.

The third category is patients' experience with telemedicine technology, and a few studies focus on this topic. Aashima et al. (2021), based on a survey of 48,144 patients, found that remote healthcare was satisfactory in addressing patient concerns while facilitating communication with healthcare providers. The most common benefits reported were time savings due to reduced travel and waiting times, improved accessibility, convenience, and cost-effectiveness. Similarly, Gondal et al. (2022) arrived at similar conclusions, with 81% of patients feeling that telemedicine technology meets their needs, 83% expressing satisfaction with the level of care received, and 88% reporting a positive overall experience.

Drawing from the fourth category, Hwang et al. (2022) analyzed a 10-year dataset from China, showing teleconsultations, through Exponential Random Graph Models (ERGMs), can address geographical offline healthcare resources disparities, but face cultural and financial challenges in rural areas. Although it is evident telemedicine technology can reduce this disparities, a few studies explored the influence of physicians' online and offline dynamics. Wang et al. (2020) addressed these concerns by developing a SVAR model that physicians' online activities increase offline service quantity, but increasing offline workload may reduce online engagement. However, more offline visits promote online knowledge-sharing. Fan et al. (2023) discovered that initiating online consultations positively influences offline appointments, with factors like recommendation popularity, hospital ranking, and per-capita GDP moderating this relationship.

Despite the well-documented surge in telemedicine technology utilization during the initial phases of the COVID-19 pandemic, there is a paucity of studies examining the evidence pertaining to telemedicine usage in the subsequent period.

Though several studies exist related to telemedicine technology and its impacts, few studies focus on the effects of telemedicine technology tools and perceived barriers on physicians' satisfaction and their intention to continue using such technologies. Our study addresses this gap in extant telemedicine literature.

3. Theoretical development and hypothesis building

We used the Task-Technology Fit model as the theoretical foundation of our study. Goodhue and Thompson created the Task-Technology Fit (TTF) model in 1995 to explain technology use by analyzing how well technology fits users' tasks and requirements. TTF argues that using the same technology can produce various results depending on its configuration and the task it uses (Goodhue & Thompson, 1995). This model demonstrates that new technology adoption depends on how well it fits users' needs. In contrast to previous research, which had mainly concentrated on the antecedents of usage and intention with the ability of technology to satisfy the needs and requirements of the users, TTF was the first theory that intended to study the post-adoption aspect of technology utilization. Due to the complexity and multi-dimensionality of TTF, this model has been used in different fields (Spies et al., 2020).

Telemedicine technology tools include telephone audio, videoconference software with audio, and telemedicine platforms used by office-based physicians in their medical practices. The attributes of these technologies can affect technology usage and physicians' intention to continue using a particular technology. The TTF theory considers the importance of fitting the functionality and attributes of telemedicine technology to the demands imposed by users' needs.

3.1. Physicians' adoption and use of telemedicine technology

Using the TTF model, Larsen et al. (2009) suggested that increased technology utilization occurs because users take advantage of specific technological functions, and this can increase users' satisfaction (DeLone and McLean, 2003; Gelderman, 1998). Thus, if technology tools fit the user's task requirements well, user satisfaction will be higher. In telemedicine, one of the essential tools is telephone audio, which enables physicians to communicate with their patients to conduct consultations, diagnosis, monitor, prescribe medication, provide medical advice, and manage prescription refills (Benjenk et al., 2021). Videoconference software with audio allows physicians to conduct virtual consultations and clinical examinations via video, review test results, and prescribe medication as needed to patients who cannot come to the clinic due to distance or mobility issues (McLean et al., 2011). Telemedicine platforms not integrated with electronic health records (EHRs) can help physicians conduct remote consultations and follow-up appointments with patients already seen in the clinic (Kane, 2020). Telemedicine platforms integrated with EHRs can streamline the documentation process, allowing physicians to update the patient's medical record in real-time during a telemedicine visit (Loeb et al., 2020). Other telemedicine technology tools can complete physicians' requirements in more aspects; for example, remote monitoring devices can help physicians provide more personalized care and monitor patients more closely, particularly those with chronic conditions (Haleem et al., 2021).

These telemedicine technology tools can complement each other and provide different functions for physicians to finish their tasks better. The integration of these tools can increase physicians' work efficiency and effectiveness. Thus, various telemedicine technology tools can significantly benefit office-based physicians in meeting their working needs. Consequently, we propose the following hypothesis:

H1: The use of multiple telemedicine technology tools will have a significant positive effect on physicians' satisfaction with the use of telemedicine technology.

Previous research found that appropriate technology tools significantly increased user attitudes toward adopting technologies (Parkes, 2013) and their continued use. According to the TTF model, a better fit of technological tools enhances the intention to use technology post-adoption. Therefore, office-based physicians will continue to employ telemedicine technology tools depending on whether various tools keep fulfilling their requirements. Consequently, we hypothesize:

H2: The use of multiple telemedicine technology tools will have a significant positive effect on physicians' intention to continue using telemedicine technology for patients' care.

3.2. Barriers of telemedicine technology adoption

Innovation resistance can lead to a usage barrier if innovation changes the inherent status quo or users' values (Ram and Sheth, 1989). These barriers occur when technology is incompatible with current practices or habits (Kim et al., 2021). According to the research of Orlikowski (1996), incompatible technology can make users feel dissatisfied, and eventually, users can abandon the technology. In our research, office-based physicians may encounter several barriers when using telemedicine technology, which can affect the fitness level between the tools and their requirements, creating incompatibility and leading to dissatisfaction. Limited internet access or speed issues can lead to dropped calls or delayed communication (Almathami et al., 2020). A telemedicine platform that is not user-friendly or does not meet the needs of physicians or patients can create frustration and confusion, hindering effective communication (Agnisarman, 2017; Rodriguez, 2021). Telemedicine may also not be appropriate for some medical specialties, such as family medicine, internal medicine, behavioural health, dentistry, obstetrics, and gynecology, where in-person assessments are crucial for diagnosis (Nies et al., 2021). These barriers make telemedicine technology tools less compatible with physicians' tasks. Therefore, physicians may be unable to finish their tasks up to their level of satisfaction. According to Boudreau and Robey (2005), when users face barriers that force them to deviate from their routine or normal work process or protocols, they may feel dissatisfied, or their level of satisfaction decreases. Therefore, we propose that there is a negative relationship between perceived barriers to telemedicine and physicians' satisfaction. Thus, we hypothesize:

H3: Telemedicine technology usage barriers will have a significant negative effect on physicians' satisfaction with the use of telemedicine technology.

Scholars have discovered a negative association between perceived barriers and usage intention in numerous contexts (Moorthy et al., 2017). Perceived barriers may also increase physicians' doubts about telemedicine technology and its utility, believing it may not be beneficial or require extra resources to reap any real benefit. Therefore, we hypothesize :

H4: Telemedicine technology usage barriers will have a significant negative effect on physicians' intention to continue with the use of telemedicine technology for patients' care.

Extant research suggests that satisfaction is a vital predictor of an individual's decision to keep using any technology (Chang, 2010), and technology dissatisfaction can lead to rejection and discontinuance (Limayem, 2007; Bhattacherjee & Premkumar, 2004).

Therefore, it might be entirely possible that physicians' satisfaction may mediate the effects of telemedicine technology tools and perceived barriers on physicians' intention to continue using telemedicine technology. Based on the above arguments, we hypothesize:

H5: The impact of telemedicine technology tools and perceived barriers on physicians' intention to continue using telemedicine technology will mediate through physicians' satisfaction with telemedicine technology use.

Figure 1 presents the conceptual framework of our research.

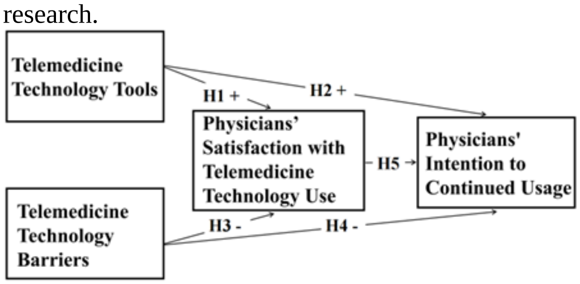

Figure 1. Conceptual model.

4. Method

4.1. Data Source

We used the annual National Electronic Health Records Survey (NEHRS) response data from 2021 to test our hypotheses empirically. The National Electronic Health Records Survey (NEHRS) is a nationally representative survey employing a probability sample of office-based ambulatory care physicians (NEHRS Questionnaires, 2022). The Centres for Disease Control claim that this data broadly represents physicians working in ambulatory settings in the United States, including uses such as producing state and national estimates of EHR adoption and utilization, practice-related information, prescribing practices for controlled substances, engagement with health information exchanges, utilization of telemedicine technology, and documentation associated with medical record systems and physician burden associated with the implementation and utilization of them among office-based physicians in the United States (NEHRS Questionnaires, 2022). There were thirty-two primary questions included in the survey questionnaire. Physicians that participated in the 2021 NEHRS submitted a total of 1,875 questionnaires that were fully completed.

4.2. Independent and dependent variables

The key independent variables are telemedicine technology tools and perceived barriers to telemedicine. In terms of telemedicine technology tools, the survey includes five categories: telephone audio; videoconference software with audio (e.g., Zoom, Webex, FaceTime); telemedicine platforms not integrated with EHR (e.g., Doxy. me); telemedicine platforms integrated with EHR (e.g., updating clinical documentation during a telemedicine visit); and other tool (s).

Additionally, perceived barriers to telemedicine include five categories: 1) limited internet access and speed issues; 2) telemedicine platform that is not easy to use or does not meet physicians' needs; 3) telemedicine is not appropriate for specialty or type of patients; 4) limitations in patients' access to technology (e.g., smartphone, computer, tablet, Internet); 5) patients' difficulty using the telemedicine platform.

The key dependent variable is office-based physicians' satisfaction with telemedicine technology.

Another critical dependent variable in our research is office-based physicians' intention to continue using telemedicine technology.

Besides the dependent and independent variables, we considered a set of relevant control variables, including telemedicine technology facilitators (Facilitator) indicating improved reimbursement and relaxation of rules related to use of telemedicine visits, physicians' gender (Physex), physicians' age group (Phyage50), specialty (Speccat), number of physicians working in the facility (Numofphy), and nature of the practice (Setting). The details of control variables are discussed in the empirical strategy section.

4.3. Empirical Strategy

While the dependent variable, Telemedsat, physicians' satisfaction with telemedicine technology use, follows a normal distribution, physicians' intention to continue using telemedicine technology is a binary variable.

Therefore, we used an ordinary least squares (OLS) regression model to estimate all coefficients for physicians' satisfaction (see equation 1). We used a logistic regression model to estimate all the coefficients for physicians' intention to continue using telemedicine technology (see equation 2 and equation 3).

$$y_i = \beta_0 + \beta_1 Telemedtools_i + \beta_2 Telemedbarriers_i + \gamma_1 Facilitator_i + \gamma_2 Physex_i + \gamma_3 Phyage50_i + \gamma_4 Speccat_i + \gamma_5 Numofphy_i + \gamma_6 Setting_i + \varepsilon_i \quad (1)$$

For equations 1, y represents physicians' satisfaction with telemedicine technology, and equations 2 and 3 represent the binary dependent variable physicians' intention to continue using telemedicine technology.

To check the mediation effect of physicians' satisfaction (see H5), we used physicians' satisfaction as an independent variable in Model 2 to develop Model 3.

$$y_i = \beta_0 + \beta_1 Telemedtools_i + \beta_2 Telemedbarriers_i + \gamma_1 Facilitator_i + \gamma_2 Physex_i + \gamma_3 Phyage50_i + \gamma_4 Speccat_i + \gamma_5 Numofphy_i + \gamma_6 Setting_i + \varepsilon_i \quad (1)$$

$$y_i = \beta_0 + \beta_1 Telemedsat_i + \beta_2 Telemedtools_i + \beta_3 Telemedbarriers_i + \gamma_1 Facilitator_i + \gamma_2 Physex_i + \gamma_3 Phyage50_i + \gamma_4 Speccat_i + \gamma_5 Numofphy_i + \gamma_6 Setting_i + \varepsilon_i \quad (3)$$

5. Results

Table 1 shows the descriptive statistics of independent, dependent and control variables.

Table 1. shows descriptive statistics of independent, dependent and control variables.

	Variables	Average/ Category (Percentage)
Dependent variable	Physicians' satisfaction	Average = 3.479
	Physicians' continuous usage intention	Yes = 82.84% No = 17.16%
Independent variables	Telemedicine technology tools	Average = 1.99
	Telemedicine barriers	Average = 2.39
Control variables	Facilitators	No improvement = 46.5% Improvement = 40.3%
	Gender	Female = 32.693% Male = 67.307%
	Age group	≤ 50 = 34.88% > 50 = 65.12%
	Specialty	Primary care specialty = 48.693% Surgical specialty = 21.973% Medical specialty = 29.333%
	Office-based settings	Solo or group practice = 70.347% Other setting = 29.653%
	Number of physicians practices in the facility	1 physician = 23.093% 2-3 physicians = 19.627% 4-10 physicians = 28.76% 11-50 physicians = 15.573% More than 50 physicians = 11.947%

5.1. Inferential Statistics

Table 2 shows the correlation coefficients among our independent variables, telemedicine technology tools and perceived barriers to telemedicine, and one dependent variable, physicians' satisfaction with telemedicine technology.

Table 2: The correlation matrix with Pearson correlation.

	Telemedicine technology tools	Telemedicine technology barriers	Physicians' usage satisfaction
Telemedicine technology tools	1.00		
Telemedicine technology barriers	0.247	1.00	
Physicians' usage satisfaction	0.151	-0.123	1.00

In the dataset, there is a mild positive correlation of 0.247 between the utilization of telemedicine technology tools and perceived barriers to telemedicine. Meanwhile, the usage of telemedicine technology tools exhibits a mild positive correlation of 0.151 with physicians' satisfaction levels. Contrarily, perceived barriers to telemedicine show a mildly negative correlation with physicians' satisfaction, evidenced by a coefficient of -0.123. These correlations are not strong, thereby, the data does not present any significant multicollinearity concerns.

Table 3 shows the estimated coefficients along with standard errors for Model 1.

Table 3. Estimated coefficients with standard errors for physician satisfaction.

Variables	Physician satisfaction
	Model 1
	Coefficient (Std. Errors.)
Telemedicine technology tools	0.228 (0.034)***
Telemedicine barriers	-0.238 (0.028)***
Facilitators	0.499 (0.060)***
Physicians' gender Female Male	 baseline -0.184 (0.063)**
Physicians' age group Below 50 years Above 50 years	 baseline -0.117 (0.061)
Physicians' specialty Primary care specialty Surgical specialty Medical specialty	 baseline -0.205 (0.081)* 0.182 (0.065)**
Number of physicians 1 physician 2-3 physicians 4-10 physicians 11-50 physicians Above 50 physicians	 baseline -0.345 (0.094)*** -0.264 (0.085)** -0.333 (0.099)*** -0.292 (0.108)**
Setting of physicians Private solo or group practice Other setting	 baseline 0.127 (0.065)
Constant	3.674 (0.124)***
Number of observations = 1,465 Adjust $R^2 = 0.140$ Sig ≤ 0.001 ***, Sig ≤ 0.01 **, Sig ≤ 0.05 *	

According to Table 3, while telemedicine technology tools have a significant positive effect on physicians' satisfaction, telemedicine barriers significantly negatively affect physicians' satisfaction. Therefore, we found empirical support for our H1 and H3.

According to the results in Table 3, for every one-unit increase in telemedicine technology tools, physicians' satisfaction levels are expected to increase by 0.228 units. However, physicians' satisfaction levels are expected to reduce by 0.238 units for every unit of increased perceived telemedicine barriers.

Table 4 shows the odd ratios and standard errors for Model 2 to test our H2 and H4. Furthermore, we added physicians' satisfaction as a mediator variable in Model 3 to test our H5.

Table 4. Estimated odds ratio with standard errors for binary logistic regression models.

Variables	Physician's future usage intention	
	Model 2	Model 3
	Odds ratio (Std. Errors)	Odds ratio (Std. Errors)
Telemedicine technology tools	1.596 (0.167)***	1.256 (0.161)
Telemedicine barriers	0.816 (0.063)*	1.140 (0.108)
Telemedicine satisfaction	-	4.279 (0.444)***
Facilitator	4.336 (0.845)***	2.956 (0.677)***
Physicians' gender		
Female	baseline	baseline
Male	0.862 (0.166)	1.088 (0.250)
Physicians' age group		
Below 50 years	baseline	baseline
Above 50 years	0.698 (0.127)*	0.718 (0.159)
Physicians' specialty		
Primary care specialty	baseline	baseline
Surgical specialty	0.452 (0.096)***	0.494 (0.127)
Medical specialty	0.607 (0.117)*	0.409 (0.097)
Number of physicians		
1 physician	baseline	baseline
2-3 physicians	0.569 (0.149)*	0.718 (0.227)
4-10 physicians	0.758 (0.181)	1.042 (0.302)
11-50 physicians	0.867 (0.246)	1.501 (0.511)
Above 50 physicians	0.735 (0.229)	1.394 (0.540)
Setting of physicians		
Private solo or group practice	baseline	baseline
Other setting	1.621 (0.319)*	1.522 (0.371)
Constant	4.165 (1.514)***	0.032 (0.017)***
Number of observations = 1,237; 1,234 Sig ≤ 0.001 ***, Sig ≤ 0.01 **, Sig ≤ 0.05 *		

According to the outcomes of Table 4, our Model 2 shows that telemedicine technology tools have a statistically significant positive effect on physicians' intention to continue using telemedicine technology. Perceived barriers have a statistically significant negative effect on physicians' intention to continue using telemedicine technology. Therefore, though we found empirical support for H2 and H4. Therefore, holding the effects of other variables constant, for every unit increase in telemedicine technology tools, we can expect a 1.596-point increase in the log of odds of physicians' intention to continue using telemedicine technology. In addition, holding the effects of other variables constant, for every unit increase in perceived barriers to telemedicine we can also estimate a 0.816-point decrease in the log of odds of physicians' intention to continue using telemedicine technology.

According to the results reported in Model 3, physicians' satisfaction significantly impacts physicians' intention to continue using telemedicine technology. Therefore, holding the effects of other variables constant, we can estimate a unit increase in physicians' satisfaction leading to a 4.279-point increase in the log of odds of physicians' intention to continue using telemedicine technology. Nevertheless, telemedicine technology tools, barriers, and interaction factors do not significantly affect physicians' intention to continue using telemedicine technology. Since our H5 is empirically supported.

6. Discussion

The study commenced by posing two research questions: RQ 1: What is the effect of telemedicine technology tools on physicians' satisfaction with the use of telemedicine? RQ 2: What is the effect of telemedicine technology tools on physicians' intention to continue using telemedicine technology?

Our findings revealed a statistically significant positive effect of telemedicine technology tools on physicians' satisfaction and intention to continue using telemedicine technology, thereby offering empirical support for H1 and H2. Drawing upon the existing literature, especially the insights from Xu et al. (2022) and Bashir and Bastola (2018) among others, while telemedicine brings about positive outcomes in various healthcare fields, its efficiency and effectiveness often hinge on how seamlessly it integrates with the daily healthcare tasks. This finding points to the TTF model, indicating that when office-based physicians' use of multiple telemedicine technology tools meets their work requirements and aligns with their healthcare tasks, it elevates their satisfaction levels. The efficiency and convenience offered by telemedicine technology tools which facilitate appointments without physical visits or extensive administrative tasks, can indeed contribute to higher satisfaction. Telemedicine technology tools that align with physicians' workflow and specific tasks can enhance efficiency and productivity. When the tools seamlessly integrate into their existing work processes and protocols, it reduces disruptions and streamlines their practice. When physicians experience increased efficiency and productivity through these tools, it positively influences their future intention to use them.

Additionally, our findings revealed a statistically significant negative effect of perceived barriers on physicians' satisfaction with the use of telemedicine technology. Thus, we receive empirical support for our H3 that suggests the barriers perceived by office-based physicians diminish the alignment with their healthcare task-related work requirements, resulting in decreased satisfaction with the use of telemedicine technology. Drawing upon the empirical findings for H4, we found that perceived barriers negatively influence physicians' intention to continue using telemedicine technology. The perceived barriers seemingly weaken the congruence between the telemedicine technology and the healthcare tasks physicians undertake. Consequently, as illuminated in H3, there is not just a diminution in satisfaction but also a reluctance to persistently employ telemedicine technology in future endeavors. This observation is consistent with the Task-Technology Fit (TTF) model. When physicians perceive a misalignment between the telemedicine technology and their clinical tasks, owing to perceived barriers, it renders even a technologically advanced system less utilization. This reluctance can stem from the anticipated additional exertion to overcome these barriers or from the physicians' evaluation that the technology does not substantively facilitate their clinical tasks. In essence, this perceived task-technology misalignment decreases their motivation for sustained technology engagement.

Finally, as per the results described in Table 4, physicians' satisfaction mediates the effects of telemedicine technology tools and perceived barriers on physicians' intention to continue using telemedicine technology. When satisfied, physicians are more inclined to exhibit a stronger intention to continue using the technology. Conversely, when satisfaction diminishes due to perceived barriers, it can consequently diminish the intention of physicians to persist with the technology. Thus, physicians' satisfaction emerges as a key mediator, capturing the subtle interplay between the telemedicine technology tools' features, the barriers it presents, and the subsequent impact on continued physicians' usage intentions. Therefore, we find empirical support for our H5.

Healthcare practitioners are cognizant of the potential advantages offered by telemedicine. This recognition is not contingent upon internet speed but is predicated on understanding and trusting telemedicine's utility. Telemedicine has emerged as a salient trend within the current and forthcoming medical market (Waseh & Dicker, 2019). Patients' demand for more convenient and efficient medical services steadily escalates (Mosadeghrad, 2014). Consequently, doctors face the compulsion to adapt and adopt telemedicine technology to meet their needs and make efforts to provide the best services (Ranganathan & Balaji, 2020), even in scenarios characterized by sluggish internet connectivity. Although patient engagement remains pivotal for the successful implementation of telemedicine, physicians' decisions, and intention to employ telemedicine primarily rely on their recognition, awareness, and comprehension of telemedicine, along with their understanding of its potential benefits.

6.1. Implications to theory

Extant research has explored the acceptance of telemedicine use employing various models and theories. However, the perspective of the Task-Technology Fit (TTF) model needs to be specifically investigated (Harst et al., 2019). The current study uses TTF to determine physicians' satisfaction and physicians' intention to continue using telemedicine technology. It addresses the research gap in understanding how telemedicine technology tools and perceived barriers of telemedicine technology enhance and hinder physicians continued use intention through the TTF mechanism.

6.2. Implications to practice

The findings of this study shed light on office-based physicians' attitudes toward adopting telemedicine technology. Firstly, healthcare organizations should optimize remote medical tools' design, functionality, and usability to align with physicians' specific tasks and workflows, ensuring a solid match between the technology and their needs.

Finally, a clear understanding of the perceived barriers of telemedicine technology and their effects on physicians' satisfaction and continuous usage intention can help government agencies allocate resources and funding to support research and development initiatives focused on improving Task-Technology Fit in telemedicine and developing more appropriate telemedicine technology tools. Governments can also encourage collaboration between healthcare organizations, technology developers, and researchers to strengthen the Task-Technology Fit model through research partnerships and grants.

7. Limitations and future directions

The main research limitations of this study include the disadvantage of generalization due to the single source of data collection and the need for comparison of data collection over a long period. Future research can conduct cross-country analyses to replicate this research model, promote the research model's results, obtain a more comprehensive perspective, and make the research more universal. Second, compared to this cross-sectional study, assessing this research model in a longitudinal context with and without COVID-19 may reveal new findings. Third, future studies should extract the data of IVs and DVs from different sources to avoid the possibility of common method bias. Additionally, we should also conduct in-depth interviews to probe physicians' experiences and perceived benefits of using multiple telemedicine technology tools, or to address any concerns they might have had. The limitations also extend to the Task-Technology Fit (TTF) model's applicability in the rapidly evolving context of telemedicine. The demand for tasks and services is not static, driven by patient needs and the technological advancements witnessed during and post the COVID-19. Thereby, fitness can shift based on these dynamic factors. Future research should delve deeper into understanding how the changing nature of telemedicine tasks affects task-technology alignment.

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