

# Predictive Analysis of Patients' Telemedicine Adoption in the Nashville Metropolitan Area – An Application of UTAUT Model

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## Abstract

This quantitative predictive correlation study evaluated factors associated with the unified theory of acceptance and use of technology (UTAUT) that contribute to the patient's adoption of telemedicine. Specifically, the study determined whether the independent variables of performance expectancy, effort expectancy, social influence, and facilitating conditions significantly predicted healthcare patients' behavioral intent to adopt telemedicine in the Nashville Metropolitan Area. The Nashville Metropolitan Area is renowned for its healthcare technology industry and highly respected healthcare community, yet many regional hospitals in the area have closed, making healthcare access difficult for many residents. The COVID-19 pandemic exacerbated healthcare access challenges. Telemedicine offers a solution to limited healthcare access, but solutions are only viable if patients are willing to adopt new technology. The literature review supporting this study identified knowledge gaps regarding patients' perceptions and attitudes toward telemedicine adoption and use Nashville Metropolitan Area. The survey data were analyzed using multiple linear regression analysis, and the findings indicated that performance expectancy, social influence, and facilitating conditions explained 50.8% of the variance in participants' behavioral intentions to adopt telemedicine. Further research is needed to examine specific telemedicine applications and patient experiences in various contexts. However, healthcare leaders and organizational decision-makers can use the study's findings to decide when telemedicine is most appropriate, increase telemedicine implementation success, and improve patient care services.

**Keywords:** *COVID-19, Telemedicine adoption, Effort expectancy, Facilitating Conditions, Performance expectancy, Health expenditure, Nashville Metropolitan Area*

## 1. INTRODUCTION

This study focused on the adoption of telemedicine in the Nashville Metropolitan Area following the COVID-19 pandemic. Specifically, the research aimed to determine whether factors associated with the unified theory of the acceptance and use of technology (UTAUT) significantly predict Nashville residents' decisions to adopt telemedicine. The state of Tennessee has experienced unique challenges

associated with healthcare provision because of high rates of hospital closures and other factors limiting residents' access to healthcare (Letheren, 2021; Miller, 2023a, 2023b).

Telemedicine can potentially address challenges associated with limited healthcare access (DeGuzman et al., 2022; Hamnvik et al., 2022; Kahan et al., 2022; Rogers et al., 2022).

However, the effective use of telemedicine relies on patients' technology acceptance (Almathami et al., 2020; Harst et al., 2019; So et al., 2021). This study explored whether factors like performance expectancy, effort expectancy, social influence, and facilitating conditions predict patients' decision-making when adopting telemedicine.

Information technology (IT) is changing the face of modern medicine. Technologies like artificial intelligence, connected healthcare devices, cloud computing, and telemedicine improve healthcare services and outcomes by increasing efficiency and convenience (Garai et al., 2019; Kaplan, 2020; Tian et al., 2019). However, these technologies can only improve health outcomes if they are adopted by patients and healthcare professionals (Almathami et al., 2020). This study focused on the adoption of telemedicine among patients in the Nashville Metropolitan Area.

Telemedicine refers to the use of telecommunications and IT to provide healthcare services virtually over a distance with a patient in one location and a healthcare professional in another location (Bittmann et al., 2023; Kahan et al., 2022; Udsen et al., 2023). Telemedicine also encompasses virtual coordination between primary care physicians, hospital staff, and specialists (Seguí et al., 2020). Healthcare providers are using telemedicine to treat an increasing number of health problems, including diabetes, substance abuse, and epilepsy (Hazenberg et al., 2020; Ludvigsson, 2021; Shakir & Wakeman, 2021; von Wrede et al., 2020).

Despite the advantages of telemedicine, some barriers to implementation do exist. Patients and healthcare providers can resist telemedicine for various reasons (Amos et al., 2022; Beheshti et al., 2022). Patients can resist telemedicine because of concerns about technological literacy, data privacy, and quality of care (Fieux et al., 2020; Kruse et al., 2021; Nittari et al., 2020). Technologies cannot be effective or beneficial if users do not adopt them (Almathami et al., 2020; Harst et al., 2019; So et al., 2021). Thus, it is important to understand the factors influencing adoption and use when new technologies are implemented.

The general research problem this study focused on was the lack of research on the factors influencing telemedicine adoption in the United States in areas with limited healthcare access. Especially, Tennessee has experienced many recent hospital closures, and COVID-19

further limited in-person access to physicians and traditional healthcare. Nevertheless, the Nashville Metropolitan Area is renowned for its healthcare technology industry and a highly respected healthcare community (Frist, 2021). For these reasons, the Nashville Metropolitan Area provides a unique opportunity to study telemedicine adoption to determine the most important factors to patients.

Previous telemedicine studies have focused on research topics that are narrower or peripheral to the present topic. For example, some researchers focused on telemedicine adoption in other countries (Gu et al., 2021; Siripipatthanakul et al., 2023; von Wrede et al., 2020). Others only considered healthcare providers' acceptance and use of telemedicine (Garavand et al., 2022; Roudi et al., 2022; Shiferaw et al., 2021). However, a gap exists in the literature because no studies focus on general telemedicine adoption in the Nashville Metropolitan Area after the COVID-19 pandemic.

Findings from this study could benefit medical practices and ambulatory settings where telemedicine is used. Walk-in and outpatient clinics can use telemedicine as a triaging tool (Philips et al., 2019). Organizational leaders could use the findings to understand the role of patient acceptance when implementing telemedicine services. It is also possible that the findings could alleviate physicians' concerns that present barriers to telemedicine use.

In addition to healthcare professionals and organizations, the present study has the potential to benefit patients. Patients considering telemedicine could use the study's findings to increase their awareness and understanding of its benefits while examining their expectations about the effort it requires and how it could improve their health outcomes. The findings may be specifically helpful to Tennessee residents, specifically those in the Nashville Metropolitan Area and other regions in the United States where access to traditional healthcare services is becoming more limited.

## 2. THEORETICAL FRAMEWORK

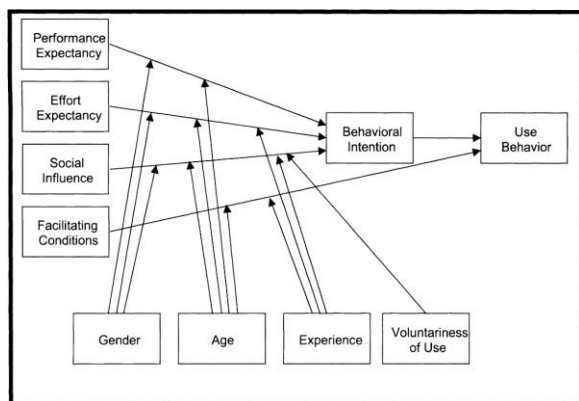
This study used Venkatesh et al.'s (2003) original UTAUT model as a theoretical framework to understand healthcare patients' perspectives and behaviors toward telemedicine adoption in the Nashville Metropolitan Area. The UTAUT is a modification of the technology acceptance model (TAM), enabling researchers to determine levels of users' acceptance and use of new technology. Using the UTAUT as a

framework allows researchers to study users' perceptions of a specific technology, and the value of the technology can be established based on the user's needs (Drehlich et al., 2020). Figure 1 presents the UTAUT model as designed by Venkatesh et al. (2003).

As indicated in Figure 1, the UTAUT's main independent variables are performance expectancy, effort expectancy, social influence, and facilitating conditions. Venkatesh et al. (2003) theorized that these variables significantly influenced behavioral intentions to use technology and actual use behavior. Additionally, gender, age, experience, and voluntariness of use are moderating variables affecting the main variable relationships in the UTAUT. Venkatesh et al. (2003) tested their model and found that the independent variables explained 70% of the variance in technology usage intentions.

**Figure 1 : The UTAUT Model**

Note. From "User Acceptance of Information Technology: Toward a Unified View," by V. Venkatesh et al., 2003, *MIS Quarterly*



The present study also modified the UTAUT model by focusing on direct relationships between the predictor variables (i.e., performance expectancy, effort expectancy, social influence, and facilitating conditions) and patients' use behavior, defined as telemedicine adoption. Additionally, the moderating variables of gender, age, experience, and voluntariness of use were excluded from the present analysis. The exclusion of the moderating variables was based on the study's aim to determine whether significant relationships existed between the independent variables and telemedicine use. Future research can examine moderating influences after significance is established in the primary relationships.

The four primary relationships that this research aimed to establish were the relationships between performance expectancy, effort expectancy, social influence, and facilitating conditions and the dependent variable of telemedicine adoption among patients in the Nashville Metropolitan Area. Performance expectancy refers to an individual's belief that using technology would improve performance outcomes (Venkatesh et al., 2003). It was expected that people would be more likely to use telemedicine if they believed it would improve health outcomes. Effort expectancy refers to how easy technology is to use (Venkatesh et al., 2003). It was expected that people would be more likely to use telemedicine if they felt it would be easy to use. Social influence refers to the belief that influential people (e.g., authority figures, colleagues, and family members) feel technology should be used. It was expected that patients whose doctors, friends, and family supported telemedicine would be more likely to use it. Facilitating conditions refers to the availability of technical infrastructure that supports the use of technology. It was expected that patients who believed they had the necessary infrastructure and support would be more likely to use telemedicine.

### 3. LITERATURE GAP AND THE PRESENT STUDY'S CONTRIBUTION

The literature review indicated that despite extensive research focused on telemedicine, more research is needed. Many studies were evaluated during the planning and completion of this study. The literature review served an important purpose in identifying research gaps. Telemedicine is an extremely popular research topic among healthcare and technology adoption researchers (Almathami et al., 2020; Garavand et al., 2022; Hazenberg et al., 2020). The vast number of systematic literature reviews on different aspects of telemedicine illustrated the great diversity and interest in this topic (Atmojo et al., 2020; Kavandi & Jaana, 2020; Kruse & Heinemann, 2022). Despite the thousands of studies on telemedicine, recent systemic reviews illustrate that gaps remain in scholars' understanding of many aspects of telemedicine application and use.

Systematic reviews by Almathami et al. (2020) and Kruse and Heinemann (2022) reviewed research on facilitators and barriers to telemedicine adoption. One of the biggest differences between the two reviews was that Kruse and Heinemann (2022) specifically looked at barriers and facilitators after the onset of the

COVID-19 pandemic. Other scholars like Garavand et al. (2022) and Kavandi and Jaana (2020) oriented their reviews toward specific stakeholder groups. Garavand et al. (2022) studied physicians' telemedicine acceptance, while Kavandi and Jaana (2020) narrowed the focus of their review to elderly patients. Other systematic reviews focused on using telemedicine to treat specific types of illnesses. Hazenberg et al. (2020) systematically reviewed using telemedicine to treat diabetic conditions, and Zangani et al. (2022) reviewed global mental health studies using telemedicine. Several systematic reviews even focused exclusively on articles using the TAM and UTAUT as telemedicine adoption frameworks (Kavandi & Jaana, 2020; Roudi et al., 2022).

Systematic reviews of existing studies are very valuable to researchers because they aggregate the findings from similar studies and enable convenient comparison of methods and findings. However, these reviews also have significant limitations. Systematic reviews rely on secondary data and findings reported in primary studies. Authors of systematic reviews do not independently verify findings in the studies they review. Despite this significant limitation, the systematic reviews on telemedicine research included in this review highlighted the lack of studies focused on patient adoption of telemedicine in the Nashville Metropolitan Area following the onset of the COVID-19 pandemic. The absence of similar studies focused on this population represents a gap in the body of knowledge addressed by examining whether performance expectancy, effort expectancy, social influence, and facilitating conditions could significantly predict the behavioral intention to adopt telemedicine in the study's target population.

The literature also included studies specific to the Nashville Metropolitan Area. Mercer and Newbrough's (1967) study illustrated how healthcare access in the city has been a decades-long concern, and Carr et al. (2004) studied healthcare entrepreneurship in Nashville's healthcare industry during the early 2000s. Haddadin et al. (2022) and Stubblefield et al. (2021) focused on specific healthcare outcomes following the COVID-19 pandemic. Nashville was even a focal point in Marks's (2020) article on telemedicine use in orthopedics. These studies illustrate Nashville's unique role in the healthcare industry as a hub for innovation and demonstrate that the city has been healthcare research setting for decades. However, none of these studies address this

study's aims or provide information on the factors influencing telemedicine adoption.

#### 4. RESEARCH METHODS AND FINDINGS

This study used the UTAUT framework to define the constructs and collected targeted population responses via a survey instrument and questionnaire based on Venkatesh et al.'s (2003) research. The survey was adapted with permission to capture users' behavior and experience towards telemedicine, and the responses were categorized using a Likert scale.

**Table A: Modified Questions aligning with Constructs and Survey Items from Venkatesh et al. (2003)**

Construct	Original Questions	Modified Questions
	1. I would find the system useful in my job. 2. Using the system enables me to accomplish tasks more quickly. 3. Using the system increases my productivity. 4. If I use the system, I will increase my chances of getting a raise.	1. I would find telemedicine useful in managing my healthcare outcomes. 2. Using telemedicine enables me to improve my healthcare outcomes. 3. Using telemedicine saves time when managing my healthcare. 4. If I use telemedicine, I will increase my chances of having positive health outcomes.
Effort Expectancy	1. My interaction with the system would be clear and understandable. 2. It would be easy for me to become skillful at using the system. 3. I would find the system easy to use.	1. The process of using telemedicine to manage my healthcare would be clear and understandable. 2. It would be easy for me to become skillful at using telemedicine. 3. I would find telemedicine

	4. Learning to operate the system is easy for me.	easy to use when managing my healthcare.  4. Using telemedicine is easy for me.
Social influence	1. People who influence my behavior think that I should use the system.  2. People who are important to me think that I should use the system.  3. The senior management of this business has been helpful in the use of the system.  4. In general, the organization has supported the use of the system.	1. People who influence my personal behavior think that I should use telemedicine.  2. People in my life who are important to me think that I should use telemedicine.  3. My healthcare providers have suggested using telemedicine to manage my healthcare.  4. In general, my friends and family have supported using telemedicine.
Facilitating conditions	1. I have the resources necessary to use the system.  2. I have the knowledge necessary to use the system.  3. The system is not compatible with other systems I use.  4. A specific person (or group) is available for assistance with system difficulties.	1. I have the resources necessary to use telemedicine.  2. I have the knowledge necessary to use telemedicine.  3. Telemedicine is compatible with other technologies I use.  4. I can get help from others when I have difficulties using telemedicine.
Behavioral intention	1. I intend to use the system in the next <n> months.  2. I predict I would use the system in the	1. I intend to use telemedicine in the future.  2. I predict I will use telemedicine in the future.

	next <n> months.  3. I plan to use the system in the next <n> months.	3. I plan to use telemedicine in the future.
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The questionnaire targeted Nashville adults who have used telemedicine services during the last 2 years. The aim was to understand consumer behaviors toward adoption and technology challenges. Table A below displays the survey questionnaire modified to align with original survey items from Venkatesh et al. (2003)

This study used a predictive correlational research design to study patients' telemedicine adoption in the Nashville Metropolitan Area. Predictive correlational designs enable researchers to forecast outcomes based on correlations between predictor (i.e., independent) and outcome (i.e., dependent) variables. The study's main predictor variables were performance expectancy, effort expectancy, social influence, and facilitating conditions.

This study used the UTAUT framework to define the constructs and collected targeted population responses via a survey instrument and questionnaire based on Venkatesh et al.'s (2003) research. The survey was adapted with permission to capture users' behavior and experience towards telemedicine, and the responses were categorized using a Likert scale. The questionnaire targeted Nashville adults who have used telemedicine services during the last 2 years. The aim was to understand consumer behaviors toward adoption and technology challenges.

This study used multiple linear regression modeling to analyze the survey data. The analysis determined the significance of correlations between the independent and dependent variables to identify factors contributing to patients' telemedicine adoption in the Nashville Metropolitan Area.

The following four research questions were answered by testing a corresponding set of null and alternative hypotheses- 1. To what extent does performance expectancy predict patients' behavioral intent to adopt telemedicine in the Nashville Metropolitan Area? 2. To what extent does effort expectancy predict patients' behavioral intent to adopt telemedicine in the Nashville Metropolitan Area? 3. To what extent does social influence predict patients' behavioral intent to adopt telemedicine in the Nashville

Metropolitan Area? 4. To what extent do facilitating conditions predict patients' behavioral intent to adopt telemedicine in the Nashville Metropolitan Area?

The study included N = 150 participants living in the Nashville Metropolitan Area. Pollfish, a third-party survey facilitator, provided a sample frame and selected participants randomly from database members who fit the study's inclusion and exclusion criteria. These criteria required participants to: (a) live in Nashville, Davidson, Murfreesboro, or Franklin, Tennessee; (b) have used telemedicine in the last 2 years since the onset of COVID-19; and (c) be 18 years of age or older. No additional gender, race, or economic factors were used to limit participation.

Participants shared demographic data used to describe the sample. This data included gender, age, experience level, and the voluntariness of their telemedicine use. The sample was split fairly evenly based on gender, with n = 65 female (43.3%) and n = 73 male participants (48.7%). Next, the survey administered by Pollfish asked participants to indicate their age by selecting an age range from 10 options: 18-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55, 56-60, 61-65, and Over 65. The largest age cohorts were participants ages 31-35 (19.3%), 36-40 (18%), and 41-50 (18%). The smallest age cohorts were participants ages 61-65 (2.7%) and 46-50 (4%).

**Table B: Sample Distribution Based on Experience**

Note. N = 150. The sample did not include missing responses.

Experience Using Telemedicine	N	%
Very inexperienced	11	7.3
Inexperienced	10	6.7
Somewhat inexperienced	15	10.0
Neither	16	10.7
Somewhat experienced	56	37.3
Experienced	31	20.7
Very Experienced	11	7.3

Total	150	100.0
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Another demographic data point collected from participants was their experience using telemedicine. All participants were required to have used telemedicine at least once in the 2 years since COVID-19. This requirement was to ensure that participants were minimally familiar with telemedicine technology in one form or another. Participants rated their experience level using telemedicine on a 7-point Likert scale ranging from 1 (*Very inexperienced*) to 7 (*Very experienced*). The sample was somewhat evenly distributed based on experience level. The same number of participants indicated they were either very inexperienced or very experienced (n = 11, 7.3%). The two largest experience cohorts within the sample were individuals identifying as somewhat experienced (n = 56, 37.3%) and individuals identifying as experienced (n = 31, 20.7%). Table B provides a full sample distribution based on experience level using telemedicine.

Additional characteristic evaluated as part of the sample description was the voluntariness of telemedicine use. COVID-19 resulted in the closure or restriction of many healthcare organizations and services, and these closures and restrictions forced some patients and healthcare providers to implement telemedicine options. This study did not focus directly on the issue of voluntary vs. forced telemedicine use. Instead, this question was included to combat the assumption that telemedicine use is always voluntary. Most participants (81.3%) indicated that their telemedicine use was voluntary. However, almost 1 in 5 participants (n = 28, 18.7%) indicated that their telemedicine use was involuntary. Table C presents the sample distribution based on voluntariness of use.

The full sample included N = 150 participants. The minimum number of participants required for the analysis, determined by an a priori G\*Power analysis, was N = 129. However, a minimal number of additional participants were sampled to ensure that the sample would be large enough if the elimination of outliers or incomplete responses were required.

**Table C: Sample Distribution Based on Voluntariness of Use**

Note. N = 150. The sample did not include missing responses.

Voluntariness of Use	N	%
Yes	12	81.3
No	2	18.7
Total	15	100.0
	0	

Descriptive statistics were used to catalog and evaluate the dataset. Behavioral intention had the highest M (5.58) and SD (1.454) values for all the constructs. Social influence had the lowest M (4.51) score, and facilitating conditions had the lowest SD (1.083) of the constructs. Cronbach’s alpha coefficients determined that behavioral intention had the highest reliability coefficient ( $\alpha = 0.837$ ), and facilitating conditions had the lowest reliability coefficient ( $\alpha = 0.7$ ). Scores above 0.7 meet the standard of acceptability, so the instrument was suitable for examining telemedicine adoption among patients in the Nashville Metropolitan Area.

**Research Question One**

Research Question One asked, to what extent does performance expectancy predict patients’ telemedicine adoption in the Nashville Metropolitan Area? Testing a pair of corresponding hypotheses answered this question. The hypotheses were as follows:

H01. Performance expectancy does not significantly predict patients’ behavioral intent to adopt telemedicine in the Nashville Metropolitan Area.

Ha1. Performance expectancy significantly predicts patients’ behavioral intent to adopt telemedicine in the Nashville Metropolitan Area.

The multiple linear regression analysis used to test the hypotheses for Research Question One indicated that performance expectancy significantly predicts Nashville Metropolitan Area residents’ behavioral intentions to adopt telemedicine ( $\beta = 0.381$ ,  $t(145) = 4.760$ ,  $p < 0.001$ ). The relationship between the variables was positive, indicating that as performance expectancy increased, behavioral intentions to adopt telemedicine increased, and the relationship was significant. Based on these findings, the null hypothesis was rejected.

**Research Question Two**

Research Question Two asked, to what extent does effort expectancy predict patients’ behavioral intent to adopt telemedicine in the

Nashville Metropolitan Area? Testing a pair of corresponding hypotheses answered this question. The hypotheses were as follows:

H02. Effort expectancy does not significantly predict patients’ telemedicine adoption in the Nashville Metropolitan Area.

Ha2. Effort expectancy significantly predicts patients’ behavioral intent to adopt telemedicine in the Nashville Metropolitan Area.

The multiple linear regression analysis used to test the hypotheses for Research Question Two indicated that effort expectancy did not significantly predict Nashville Metropolitan Area residents’ behavioral intentions to adopt telemedicine ( $\beta = -0.018$ ,  $t(145) = -0.214$ ,  $p = 0.831$ ). The negative relationship between the variables indicated that behavioral intentions to adopt telemedicine decreased as effort expectancy increased. However, based on the p-value, the negative relationship was not significant, suggesting effort expectancy was not a driving factor in telemedicine adoption. As a result of these findings, the null hypothesis was not rejected.

**Research Question Three**

Research Question Three asked, to what extent does social influence predict patients’ behavioral intent to adopt telemedicine in the Nashville Metropolitan Area? Testing a pair of corresponding hypotheses answered this question. The hypotheses were as follows:

H03. Social influence does not significantly predict patients’ behavioral intent to adopt telemedicine in the Nashville Metropolitan Area.

Ha3. Social influence significantly predicts patients’ behavioral intent to adopt telemedicine in the Nashville Metropolitan Area.

The multiple linear regression analysis used to test the hypotheses for Research Question Three indicated that social influence significantly predicts Nashville Metropolitan Area residents’ behavioral intentions to adopt telemedicine ( $\beta = 0.252$ ,  $t(145) = 4.025$ ,  $p < 0.001$ ). The positive relationship between the variables indicated that behavioral intentions to adopt telemedicine increased as social influence increased. The p-value indicated that the relationship was significant, and the null hypothesis should be rejected.

### Research Question Four

Research Question Four asked, to what extent do facilitating conditions predict patients' behavioral intent to adopt telemedicine in the Nashville Metropolitan Area? Testing a pair of corresponding hypotheses answered this question. The hypotheses were as follows:

*H<sub>04</sub>*. Facilitating conditions do not significantly predict patients' behavioral intent to adopt telemedicine in the Nashville Metropolitan Area.

*H<sub>a4</sub>*. Facilitating conditions significantly predict patients' behavioral intent to adopt telemedicine in the Nashville Metropolitan Area.

The multiple linear regression analysis used to test the hypotheses for Research Question Four indicated that facilitating conditions significantly predict Nashville Metropolitan Area residents' behavioral intentions to adopt telemedicine ( $\beta = 0.299$ ,  $t(145) = 3.846$ ,  $p < 0.001$ ).

**Table C: Regression Model Coefficients**

Note. PE = performance expectancy, EE = effort expectancy, SI = social influence, FC = facilitating conditions, BI = behavioral intention

Unstandardized Coefficients		Standardized Coefficients		
B	SE	$\beta$	$t$	$p$
Constant	0.737	0.419		0.080
PE	0.395	0.083	0.381	0.000
EE	-0.020	0.092	-0.018	0.831
SI	0.239	0.059	0.252	0.000
FC	0.336	0.087	0.299	0.000

**Table D: Hypothesis results**

Note. A  $p < 0.05$  threshold was used to determine significance.

H#	Predictor-outcome variable relationship	$p$ -value	Result
1	Performance expectancy -> Behavioral intention	< 0.001	Reject the Null
2	Effort expectancy -> Behavioral intention	0.831	Retain the Null
3	Social influence -> Behavioral intention	< 0.001	Reject the Null
4	Facilitating conditions -> Behavioral intention	< 0.001	Reject the Null

1	Performance expectancy -> Behavioral intention	< 0.001	Reject the Null
2	Effort expectancy -> Behavioral intention	0.831	Retain the Null
3	Social influence -> Behavioral intention	< 0.001	Reject the Null
4	Facilitating conditions -> Behavioral intention	< 0.001	Reject the Null

The positive relationship between the variables indicated that behavioral intentions to adopt telemedicine increased as positive perceptions of facilitating conditions increased. The  $p$ -value indicated that the relationship was significant, and the null hypothesis should be rejected.

Table C presents the regression model coefficients used to determine the extent and significance of the relationship between effort expectancy and behavioral intention, including the  $\beta$  and  $p$ -values. Table D summarizes the hypothesis results used to answer the study's research questions.

## 5. DISCUSSION AND IMPLICATIONS

This study evaluated telemedicine adoption in the Nashville Metropolitan Area using the unified theory of acceptance and use of technology (UTAUT) as a theoretical lens. Telemedicine offers many benefits to patients living in areas with limited healthcare access (DeGuzman et al., 2022; Hamnvik et al., 2022; Kahan et al., 2022). High rates of hospital closures in Tennessee and ongoing physician shortages suggest that telemedicine could be a useful strategy for healthcare provision in the area (Hooker et al., 2022; Letheren, 2021; Miller, 2023a, 2023b). However, the effective use of telemedicine relies on patients' acceptance of technology (Almathami et al., 2020; Harst et al., 2019; So et al., 2021). This study explored whether factors like performance expectancy, effort expectancy, social influence, and facilitating conditions predict patients' decision-making when adopting telemedicine

Findings from Research Question One indicated that performance expectancy significantly predicted behavioral intentions to use



telemedicine. Thus, the null hypothesis was rejected. The positive significant relationship between performance expectancy and behavioral intention meant that participants who believed using telemedicine would improve their health outcomes were more likely to intend to use telemedicine.

This study was a predictive correlation, meaning that the changes in performance expectancy can be used to predict changes in behavioral intentions. However, causality cannot be inferred, and it is improper to conclude that participants' belief that telemedicine would improve health outcomes caused the increased behavioral intention to adopt the technology. The findings aligned with the UTAUT model, which anticipates a positive predictive relationship between performance expectancy and behavioral intention (Chao, 2019).

The findings also echoed with similar technology adoption research showing significant positive relationships between performance expectancy and behavioral intention (Alabdullah et al., 2020; Rouidi et al., 2022). The findings indicate that a telemedicine application has a greater chance of being adopted and used if it helps patients manage their healthcare treatments, improves their health outcomes, saves time, or improves their health. Healthcare professionals should consider these factors when providing telemedicine options to patients. Telehealth developers can benefit from the study's findings by understanding that performance is a key requirement for adoption. Finally, organizational leaders and decision-makers should consider whether telemedicine improves healthcare outcomes before implementing new technologies. If stakeholders perceive telemedicine as useful, the technology will be more likely to be adopted by patients, and the implementations will be more successful.

Findings from Research Question Two indicated that effort expectancy did not significantly predict behavioral intentions to use telemedicine. The relationship between effort expectancy and behavioral intention was negative, indicating that participants who believed telemedicine was difficult to use were less likely to intend to use telemedicine. However, the relationship was not statistically significant, and the null hypothesis was retained. The lack of significance meant that effort expectancy could not be used to predict changes in behavioral intentions toward telemedicine adoption.

Effort expectancy refers to whether a technology can be mastered quickly and easily (Rouidi et al., 2022). A positive relationship means that users who believe technology will be easy to use are more likely to use it than users who feel telemedicine will be difficult to use (Beh et al., 2021). Stakeholders must recognize that the effort associated with using technology is not automatically a critical element in the successful use of telemedicine.

Healthcare professionals do not need to recommend the most basic or easy-to-use applications. Instead, they can promote applications with the greatest utility and chance to improve healthcare outcomes. Patients may not be as concerned about how easy a system is to use because technology makes most actions easier. Therefore, telehealth developers can focus on utility over complexity. Furthermore, when faced with a choice, organizational decision-makers can choose a more complex telemedicine application with greater performance metrics over a simpler app with fewer healthcare benefits.

Findings from Research Question Three indicated that social influence significantly predicted behavioral intentions to use telemedicine. The null hypothesis was rejected as a result. The positive significant relationship between social influence and behavioral intention meant that participants who believed others felt technology was important were more likely to intend to use telemedicine.

Social influence refers to whether a user feels other influential people in their lives feel using a technology is important (Venkatesh et al., 2003, 2012). In the UTAUT, social influence reflects whether influential and important people like friends and family believe technology should be used (Joa & Magsamen-Conrad, 2021).

The present study's findings highlight the importance of support from friends and family and expert opinions from healthcare professionals. The results align with the UTAUT and research conducted by Liu et al. (2019), Petersen et al. (2020), and Zhou et al. (2019). In each study, social influence was a strong factor in technology adoption. Liu et al. (2019) focused on physical activity. Petersen et al. (2020) examined mobile health application adoption by diabetes patients, and Zhou et al. (2019) studied nurses' adoption of electronic information management systems. These studies illustrate that social influence is a factor in various contexts, even among differing stakeholder groups.

For healthcare professionals, the present study's findings highlight the power of their social influence when recommending a telemedicine application. Most patients rely on and respect healthcare professionals as authority figures, and their recommendations can be influential. Healthcare providers should use their authority and social influence in ways that avoid damaging the provider-patient relationship.

Developers must recognize the importance of all stakeholders when designing applications, and organizations seeking to implement telemedicine options into their care services should evaluate attitudes toward technology among physicians and patients during the planning stages

Findings from Research Question Four indicated that facilitating conditions significantly predicted participants' behavioral intentions to use telemedicine. The positive significant relationship between facilitating conditions and behavioral intention meant that participants who had access to supportive infrastructure and systems were more likely to intend to use telemedicine.

Facilitating conditions refer to the infrastructure and support systems available to technology users (Shiferaw et al., 2021). Napitupulu et al. (2021) noted that facilitating conditions in healthcare contexts like telemedicine can refer to Internet access and smartphone or computer use. Rouidi et al. (2022) systematically reviewed 12 studies that included facilitating conditions as a variable. They reported that 11 of the 12 articles found support for facilitating conditions as a strong predictor of technology adoption.

Healthcare professionals should ensure patients can access the resources necessary to use telemedicine before recommending these care alternatives. Telemedicine developers should consider designing applications compatible with devices using diverse operating systems to broaden their accessibility and attract users of Apple and Android devices. Organizational leaders should consider hiring dedicated staff to support patient and physician technical needs during telemedicine implementation. These suggestions could potentially improve patients' telemedicine experiences and promote adoption.

## 6. LIMITATIONS OF THE STUDY

This study had several limitations related to sampling methods and aspects of the research

design. The study's focus on the Nashville Metropolitan Area was the first limitation associated with sampling. The area was chosen because even though the Nashville Metropolitan Area is renowned for its influence in the healthcare industry, Tennessee faces serious healthcare access challenges due to hospital closures and physician shortages (Frist, 2021; Letheren, 2021; Miller, 2023a, 2023b). The unique characteristics of the research setting mean that the findings may not be easily generalized to other areas in the United States

Another limitation associated with sampling was the choice of simple random sampling instead of stratified random sampling. Research has shown that older adults adopt technology at lower rates than younger adults (Mitzner et al., 2019). However, without a stratified sample, it was impossible to determine whether age significantly moderated the relationships between performance expectancy, social influence, facilitating conditions, and behavioral intentions to adopt telemedicine.

Another limitation was using a third-party survey company to gather data for this quantitative analysis. Pollfish conducted the survey, which limited the participants to individuals who make up Pollfish's panel of voluntary survey takers. The most technology-resistant individuals are probably not members of an online survey panel. For this reason, some level of selection bias should be expected (Nayak & Narayan, 2019).

The cross-sectional, non-experimental research design was also a limitation as they meant that the findings did not show any change in participants' behavioral intentions to adopt telemedicine over time. A final limitation involved the UTAUT as a theoretical framework. Using the UTAUT meant that only four independent variables were examined as predictors of telemedicine adoption. Other factors like privacy, fear, or cybersecurity may have influenced participants' telemedicine adoption (Chu et al., 2021; Fieux et al., 2020; Lateef, 2020).

## 7. IMPLICATIONS FOR FUTURE STUDY

An analysis of the study's limitations highlights the study's many implications for future research. Future research can extend the application of this study's findings by changing the target population and sampling procedures. Fahs (2020) noted that healthcare access varies drastically based on geographic location, and Rhyan et al. (2020) found that patients in rural

areas used telemedicine at higher rates than their urban counterparts. A quantitative, comparative study focused on regional or population-density differences within the United States would illustrate how telemedicine adoption varies and identify potential factors influencing that variance.

Employing a longitudinal research design would allow researchers to develop a more detailed understanding of the telemedicine adoption process. This study only looked at participants' experiences, beliefs, and attitudes after they had used telemedicine. Using a cross-sectional approach meant this study could not infer causal relationships between the variables (Spector, 2019). A mixed-methods approach that collected data at several points in the adoption process (e.g., before, during, and after use) would enable researchers to document participants' experiences in detail, identify adoption barriers and incentives, and explain changes in participants' attitudes and intentions toward telemedicine adoption.

Finally, future research should consider telemedicine adoption through additional theoretical lenses. This study used the UTAUT as a framework for evaluating telemedicine adoption. However, the variables of performance expectancy, social influence, and facilitating conditions only explained 50% of the variance in participants' behavioral intentions to use telemedicine. Other factors like trust, safety, and digital literacy could affect patients' willingness to adopt healthcare-related technologies (Fieux et al., 2020; Luciano et al., 2020; Nittari et al., 2020). Researchers could use the protection motivation theory or the technology threat avoidance theory to explore the impact of additional variables. Alternatively, researchers could modify the UTAUT model by adding constructs like trust, security awareness, and digital literacy. Such an approach would provide a more thorough understanding of the antecedents of telemedicine adoption among patients.

## 8. SUMMARY

Many studies were evaluated during the planning and completion of this study. The literature review served an important purpose in identifying research gaps. Telemedicine is an extremely popular research topic among healthcare and technology adoption researchers (Almathami et al., 2020; Garavand et al., 2022; Hazenberg et al., 2020). The vast number of systematic literature reviews on different aspects of telemedicine illustrated the great

diversity and interest in this topic (Atmojo et al., 2020; Kavandi & Jaana, 2020; Kruse & Heinemann, 2022). Despite the thousands of studies on telemedicine, recent systemic reviews illustrate that gaps remain in scholars' understanding of many aspects of telemedicine application and use.

Systematic reviews by Almathami et al. (2020) and Kruse and Heinemann (2022) reviewed research on facilitators and barriers to telemedicine adoption. One of the biggest differences between the two reviews was that Kruse and Heinemann (2022) specifically looked at barriers and facilitators after the onset of the COVID-19 pandemic. Other scholars like Garavand et al. (2022) and Kavandi and Jaana (2020) oriented their reviews toward specific stakeholder groups. Garavand et al. (2022) studied physicians' telemedicine acceptance, while Kavandi and Jaana (2020) narrowed the focus of their review to elderly patients. Other systematic reviews focused on using telemedicine to treat specific types of illnesses. Hazenberg et al. (2020) systematically reviewed using telemedicine to treat diabetic conditions, and Zangani et al. (2022) reviewed global mental health studies using telemedicine. Several systematic reviews even focused exclusively on articles using the TAM and UTAUT as telemedicine adoption frameworks (Kavandi & Jaana, 2020; Roudi et al., 2022).

Systematic reviews of existing studies are very valuable to researchers because they aggregate the findings from similar studies and enable convenient comparison of methods and findings. However, these reviews also have significant limitations. Systematic reviews rely on secondary data and findings reported in primary studies. Authors of systematic reviews do not independently verify findings in the studies they review. Despite this significant limitation, the systematic reviews on telemedicine research included in this review highlighted the lack of studies focused on patient adoption of telemedicine in the Nashville Metropolitan Area following the onset of the COVID-19 pandemic. The absence of similar studies focused on this population represents a gap in the body of knowledge addressed by examining whether performance expectancy, effort expectancy, social influence, and facilitating conditions could significantly predict the behavioral intention to adopt telemedicine in the study's target population.

The literature also included studies specific to the Nashville Metropolitan Area. Mercer and Newbrough's (1967) study illustrated how

healthcare access in the city has been a decades-long concern, and Carr et al. (2004) studied healthcare entrepreneur Nashville's healthcare industry during the early 2000s. Haddadin et al. (2022) and Stubblefield et al. (2021) focused on specific healthcare outcomes following the COVID-19 pandemic. Nashville was even a focal point in Marks's (2020) article on telemedicine use in orthopedics. These studies illustrate Nashville's unique role in the healthcare industry as a hub for innovation and demonstrate that the city has been healthcare research setting for decades. However, none of these studies address this study's aims or provide information on the factors influencing telemedicine adoption

Patients constitute important stakeholders in the adoption and implementation of telemedicine (Atmojo et al., 2020; Darrat et al., 2021; Ikram et al., 2020). Telemedicine technologies cannot be effective or beneficial if users refuse to adopt them (Almathami et al., 2020; Harst et al., 2019; So et al., 2021). Therefore, understanding the factors that predict patients' behavioral intentions to adopt telemedicine is critical to successful implementations. This study utilized the UTAUT as a theoretical framework to examine patients' intent to use telemedicine in the Nashville Metropolitan Area.

This study addressed gaps in the literature by analyzing data from N =150 residents in the Nashville Metropolitan Area using multiple linear regression. The analysis determined that performance expectancy, social influence, and facilitating conditions significantly predicted 50.8% of the variance in patients' intention to adopt telemedicine. The findings suggest that healthcare decision-makers and organizational leaders can improve telemedicine adoption by emphasizing how telemedicine can improve healthcare outcomes, promoting positive social attitudes toward telemedicine applications, and providing infrastructure and resources that support telemedicine adoption. While more research is needed to explore telemedicine adoption in specific settings, this study's findings indicate that most telemedicine use is voluntary and supported by positive performance, social, and technological factors

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