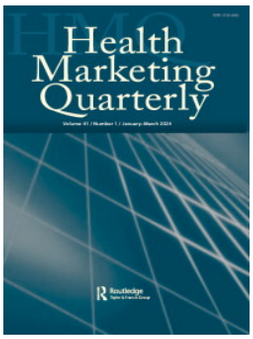

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Barriers to intention to adopt telemedicine: The interplay between exposure, trust, and convenience

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ABSTRACT

Telemedicine is an emerging option to improve patients' medical outcomes and overcome health disparities. The technology is a cost-effective alternative to in-person medical treatments and can supplement medical care to alleviate stress on the medical infrastructure in the upcoming decade. This study uses survey methods to investigate the patient population's intention to use telemedicine and assess the influence of different variables on telemedicine usage choices. Findings show that loss of income, trust in physicians, and time lost reduce intention to use telemedicine. The results carry implications for the healthcare industry, lawmakers, social workers, community activists, and family caregivers who bear the burden of helping loved ones with everyday tasks.

KEYWORDS

Telemedicine; health disparities; cost; convenience; trust in physicians

Introduction

COVID-19 resulted in increased demand for medical care throughout most of the world (Turner et al., 2021), which, in many cases, exceeded the capacity of medical infrastructure. This resulted in shortcomings in care provision, which motivated new ways of thinking about care provision. Similar Telemedicine emerged as one remedy to limited patient access to non-emergency care as medical facilities attempted to triage the most critical patients. As defined by the Health Resources and Services Administration (HRSA), an agency of the U.S. Department of Health and Human Services (HHS), "telehealth – sometimes called Telemedicine – is the use of electronic information and telecommunication technologies to provide care when you and the doctor are not in the same place at the same time. … you are able to: Talk to your doctor live over the phone or video chat, send and receive messages from your doctor using chat messaging, email, secure messaging, and secure file exchange, use remote patient monitoring

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so your doctor can check on you at home. For example, you might use a device to gather ECG or other vitals to help your doctor stay informed on your progress" (HSRA, 2024).

With an estimated 73 million Americans reaching the minimum Medicare age of 65 by 2030 (US Census Bureau, 2019), the healthcare system is likely to experience increased demand stress. According to Kriss (2018), the relatively rapid growth in the number of retirement-aged Americans is putting pressure on healthcare providers. Widespread adoption of telemedecine to replace some in-person visits could represent one mechanism to mitigate the expected challenges posed by the aging population. For example, Nwabueze et al. (2009) poists that the effective use of Telemedicine can improve the quality of healthcare delivery and strengthen the healthcare industry.

Increasing the accessibility and quality of healthcare while decreasing cost is a potential benefit of telemedicine (Wei et al., 2024). This study predicts that telemedicine services are more likely to be accepted by end-users when the service is familiar and has a financial benefit. With rising quality standards, a trend toward specialization, and the development of centers of excellence, telemedicine is becoming much more common for inpatients and outpatients (Ruckdäschel et al., 2006). It is predicted that users will assess the service's benefits and drawbacks, becoming more accustomed to telemedicine (Jansen-Kosterink et al., 2019). Studying the financial dynamics of telemedicine could improve the economic understanding of the initiative for patients and clinicians (Zhong et al., 2018). Indeed, telemedicine success is predicated on improving patient and medical professional financial outcomes as well as health outcomes.

The capabilities of telemedicine have grown with technological advancement; examples include reminder systems to improve compliance, virtual diagnosis and treatment recommendations, emergency call systems, or even the monitoring of vital signs in patients with chronic illnesses, assisting in precarious situations (Ruckdäschel et al., 2006). Technology-based services result from an innovation strategy, extensive research and development, and constantly changing initiatives that require an understanding customer readiness for technology-based systems (Hossain et al., 2017). When patients require an in-person visit with a physician, they must go through the process of scheduling an appointment, potentially taking time off from work, and enduring lengthy wait times. However, the availability of technology for remote communication with their physician offers a greater level of convenience for patients (Ivy, 2018), particularly those who are financially or time sensitive.

While the anticipated benefits of telemedicine are well understood, telemedicine adoption is still relatively low, and patient hesitancy to abandon

in-person visits with telemedicine persists. This study seeks to understand the barriers that affect patient adoption of telemedicine. In doing so, we analyze influences affecting the decision to use telemedicine as a way to interface with a healthcare provider, particularly familial experiences and economic factors that affect patient telemedicine usage choices. This study highlights considerations that insurance and medical practitioners can discuss with patients to support the use of telemedicine, and identifying where lawmakers and planners should direct federal, state, and local dollars to help improve community health outcomes.

Literature review and hypotheses

Understanding patients' attitudes and the variables that affect their decisions is crucial to the effective deployment of telemedicine. Studies have investigated patient use intentions in various contexts (Wei et al., 2024). Patient attitudes toward Telemedicine, satisfaction with existing treatment, and rapport with their doctor all influence use intention (Eikelboom & Atlas, 2005). However, the factors that influence telemedicine use intention are still understudied. This study proposes a model of telemedicine use intention, outlined in Figure 1, and seeks to further the researcher's understanding of this emerging area.

Exposure

Todaro et al. (2023) reported on a medical awareness campaign in rural areas. They concluded that awareness campaigns play a crucial role in promoting comprehensive epilepsy identification, particularly in settings marked by high levels of stigma. Merely being exposed to something fosters a sense of familiarity that makes a stimulus seem less dangerous and prompts approach behavior (Grimes & Kitchen, 2007). Positive emotions may naturally surface with repeated exposure to a stimulus. That is,

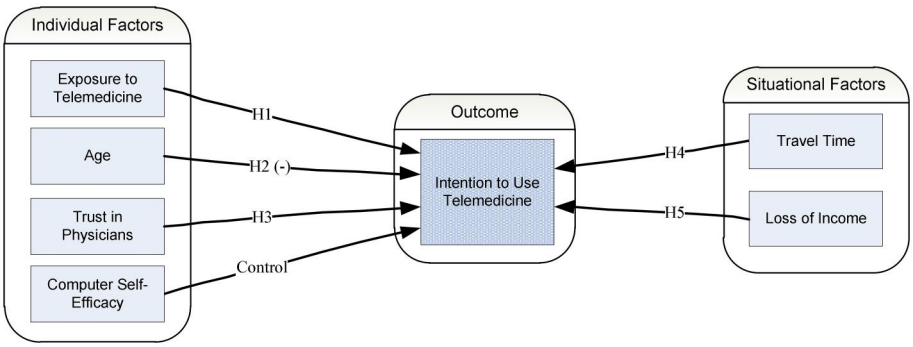

Figure 1. Research Model.

positive affect is more likely to be elicited by stimuli that are regular, salient, and easy to perceive (Chen et al., 2016).

Popularized by Robert Zajonc, the "mere exposure" effect is a phenomenon where repeated exposure to a stimulus increases the likelihood that the stimulus will be positively evaluated (Nanay, 2017). People's social and cultural cognition regarding a stimulus category is influenced by how frequently they are exposed to it. Individuals favor stimuli they have already experienced over stimuli they have never encountered. The simple exposure effect describes a general propensity to prefer familiar stimuli over unfamiliar ones (Abakoumkin, 2018). It has been suggested in the literature on marketing communication that the familiarity impact of exposure alone may reduce the perceived risk associated with a brand, resulting in preference development and brand choice (Grimes & Kitchen, 2007).

Telemedicine may change the relationship between hospitals and the community by enabling rural residents to receive more of their treatment locally and by improving locals' perceptions of the hospital (Potter et al., 2016). People may assume that something is well-known in their community if they are exposed to it frequently, even if they (a) have no prior knowledge of it, (b) are exposed to it incidentally, and (c) do not consciously process information about it. This idea is based on research on the psychological effects of mere exposure (Kwan et al., 2015). Following this principal, the following is proposed:

> H1: Patients with higher levels of exposure to telemedicine will report higher levels of intention to use telemedicine.

Age

Age has been shown to influence the adopton of a variety of computer related innovations. The most extensive examiniation of the eldery and telemedecine was conducted by Sheng et al. (2024). The authors explored both motivating (i.e., convience, ease of use, efficiency, and a forced option) and inhibint (i.e., telehealth limitation, privacy concerns, lack of trust, and lack of access and skills) factors in the use of telemedice amoung seniors (i.e., avareage of 74). Furthermore, they found that (older) females were more likely to use telemedicine than (older) males. Interestingly, Mikesell et al. (2023) examined adolesecents and thier use of telemedicine, finding that youths perceived telehealth to be more relaxed and less rushed, and also more focused on their chief complaint compared to face to face visits.

Older adults face complex care needs that challenges the current healthcare system (Bragg & Hansen, 2015). Although medical morbidity may contribute to this explanation, existing evidence indicates that age positively correlates with medical use (Fergus et al., 2017). Since older adults tend to have more complex health needs, it stands to reason that older adults may

percieve a need for face to face office visits, in order to better handle the complexity of their medical conditions. This would be consistent with media richness theory, which suggests that more complex messages require the use of more rich media (Trevino et al., 1987), with face to face being more rich than videoconferencing (Furner & George, 2012).

Age influences patient health care experience and how patients view communication in medical contexts (DeVoe et al., 2009). According to Fergus et al. (2017) 63 years of age is used to designate older adulthood in research looking at health anxiety, even if the exact age demarcating older adulthood has varied among extant studies in the health anxiety literature. Older patients require a different approach from physicians due to age-related attitudes, reduced time spent, and the importance of supportive interactions and effective communication (DeVoe et al., 2009). In general, it was discovered that age had a more significant impact on decision-making performance than decision-making experience (Taylor, 1975). Older patients tended to get more physician explanations, multilayered explanations, and non-discrepant replies, albeit only the first of these patterns approached statistical significance. The time physicians spent educating patients, which was longer for middle-aged patients than younger or older patients, was not strongly correlated with age (Waitzkin, 1985).

As such, age is expected to have an inverse relationship with the usage of telemedicine. Age typically influences the usage of medical care (Fergus et al., 2017). Younger, healthier people are less likely to use medical services, are more technically inclined, and are expected to be more likely to use telemedicine. Mikesell et al. (2023) indicates that younger patients appreciate having control over their health care and put a greater focus on the speed and aggressiveness of their treatment. Older patients valued continuity of treatment with a primary care physician who made the majority of their medical choices. They placed more importance on anticipatory treatment and care for the entire person than they did for each sickness or symptom (DeVoe et al., 2009). With increased visits for more complex age-related ailments, older patients build a repoire with their physician, and are more likely to prefer face-to-face interactions with their doctor, and are less likely to be aware of Telemedicine. For all of these reasons, the following is proposed:

H2: There is an inverse relationship between age and intention to use telemedicine.

Trust in physicians

Trust is pivotal in shaping interpersonal connections across all spheres of human relationships (Serino & Smatt 2005). Within the doctor-patient relationship, trust assumes the form of a pact, wherein the patient believes that

the doctor acts with their best interest in mind (Gopichandran & Chetlapalli, 2013). Interpersonal trust is frequently viewed as a learned personality attribute established through time and negotiation between individuals. It is simpler for the trustor to rely on the trustee and even predict their future behavior when the two parties have formed a working relationship (Katz, 2021).

In the healthcare system, trust is an essential and recognized cornerstone of delivering optimal healthcare and achieving favorable health outcomes. It represents an optimistic acceptance of one's inherent vulnerability and a steadfast belief that physicians (interpersonal trust) or healthcare institutions/systems (impersonal, institutional trust) will diligently safeguard one's interests. This trust forms the bedrock for cultivating meaningful and effective healthcare interactions, thus facilitating desirable health outcomes (Nikodem et al., 2022).

Physician trust reflects patients' acceptance of their vulnerable state, driven by the belief that the physician has their best interests in mind (Anderson & Dedrick, 1990). Anderson and Dedrick (1990) developed and validated an 11 item measure of trust in physicians, which has been widely adopted. The inherent vulnerability of patients is a crucial component of trust, as, without it, the need for trust in the physician would diminish. The greater the vulnerability a patient experiences, the higher the likelihood they will trust their physician (Ivy, 2018). A qualitative investigation indicated that the presence of a physician who is knowledgeable of the patient's background, social context, and family dynamics would substantially enhance comfort levels and foster trust (Gopichandran & Chetlapalli, 2013).

Trust in physicians refers to the level of confidence individuals have in healthcare institutions and the medical profession, as well as their willingness to rely on and engage with them, and as such has been studied extensively in a variety of contexts. Katz (2021) argued that physician trust is nurtured through positive encounters and personal experiences, grounded in one's faith in the organization or institution. This study proposes that patients who hold the belief that the healthcare system will safeguard their interests are predicted to be more likely to use Telemedicine. This relationship is expected since patients may be hesitant to use telemedicine if they believe that physicians may miss important cues in the absence of a face to face office visit, and if they do not trust physicians, patients believe that physicians are motivated to use telemedicine to quickly see as many patients as possible to maximize profit, and are thus more likely to overlook important information that would have presented itself in a traditional office visit. As such, the following is proposed:

H3: There is a positive relationship between trust in physicians and intention to use Telemedicine.

Travel time

Telemedicine can mitigate the challenges posed by geographical distance and time constraints, thereby enhancing accessibility for families, and improving their access to healthcare services (Kessler et al., 2016). Opportunity costs along with waiting times for receiving care reduce intention to seek care (Vanness et al., 2021). Telemedicine is a convenient alternative to in-person visits, eliminating the need for patients to travel to meet with specialists, and thus should reduce these opportunity costs. Notably, telemedicine has been shown to yield comparable patient outcomes and equal or higher levels of patient satisfaction when compared to traditional face-to-face appointments (Dullet et al., 2017).

Access to healthcare is hindered by the availability of healthcare providers in one's local area and transportation concerns (Kessler et al., 2016). Families who had in person appointments spent an average of 7 h away from work, whereas families who had appointments via videoconference spent an average of 4 h away from work (Smith et al., 2003). The demand for medical services is likely to exhibit greater sensitivity to variations in travel time compared to waiting time. Travel often incurs financial costs contingent on distance or duration, with distant facilities typically requiring higher (yet unobserved) financial expenditures (Acton, 1976). Emerging research indicates that older patients, individuals of the Black race, and those from lower income brackets face challenges accessing regionalized care or traveling to high-volume centers for surgical care (Ramirez et al., 2019).

For patients who received treatment in specialist hospitals, there was an inverse relationship between distance and healthcare outcomes (Obrochta et al., 2022). Smith et al. (2003) found that the median time spent traveling for videoconferences was 30 min, with an interquartile range (IQR) of 20–60 minutes. The median travel time for face-to-face (FTF) appointments was 80 minutes, with an IQR of 50–153 min. Families who attended videoconferences spent half as long waiting for their appointment, with a median of 10 min, compared to families in the outpatient department, with a median waiting time of 20 min. Travel times tend to be longer for public transportation than for private vehicles. However, evidence suggests that treatment facilities are often located closer to neighborhoods where access to a private vehicle is limited, thus potentially favoring those with lower household access to private vehicles (Obrochta et al., 2022).

Acton (1976) proposed that the elasticity of demand for medical services in relation to time costs would surpass the elasticity in response to monetary costs when out-of-pocket costs decrease. Cost-effectiveness and cost-utility provide direct assessments of opportunity cost. The analysis involves evaluating the costs and outcomes of different healthcare interventions or programs to determine their relative value and efficiency. By comparing the costs and benefits of alternative interventions, researchers can quantify the opportunity cost of choosing one intervention over another. Cost-effectiveness assesses the costs and health outcomes in monetary terms, while cost-utility studies incorporate the concept of quality-adjusted life years (QALYs) to measure the overall health-related quality of life associated with different interventions.

Changes in travel and waiting time have had a substantial impact on the demand for healthcare, indicating that individuals are sensitive to variations in these time-related factors when seeking medical care (Acton, 1976). In summary, Telemedicine provides a more convenient and efficient alternative for patients, allowing them to minimize travel-related burdens and associated expenses while accessing necessary medical care (Dullet et al., 2017), and as such, this study predicts:

> H4: There is a positive relationship between travel time and intention to use telemedicine

Loss of income

Telemedicine may not only decrease or stabilize the cost of healthcare, but it will also reduce the financial burden of patients and family caregivers. AARP estimates that "Nationwide, 44 million Americans … provide care and support to someone because of a limitation in their physical, emotional, or cognitive functioning … worth $470 billion across the country" (Kriss, 2018, p. 2). A portion of this value is comprised of traveling to medical appointments. If telemedicine usage were to remain at a consistent level of 10% of all visits, numerous health systems would experience an increase of at least 1.000% over that period (Mehlman & Tamburri, 2020).

Telemedicine minimizes time requirements (Ellis et al., 2006), which reduces income loss from attending in-person doctor visits. This income loss affects patients and can potentially harm the financial status of caregivers (Starfield, 1982). Trends indicate that the caregiver-to-care-receiver ratio will decrease from 4.1 to 2.9 as the number of older adults requiring care increases through 2050 (Bragg & Hansen, 2015). The rising number of physicians who specialize has been blamed for increasing medical costs, as patients are forced to go to more costly specialists for general care (Allard, 1993). In addition, wait times for office visits have been steadily increasing

(Ansell et al., 2017), increasing the potential burden on patients and their caregivers.

Demand becomes comparatively more sensitive to changes in the opportunity cost of time when the out-of-pocket cost for a unit of medical services decreases, either due to improved insurance coverage or the availability of subsidized treatment (Acton, 1975). Even while the sick and aged frequently depend on professional care, they also get informal care from family members, including children. The demographic trend of a growing older population and rising life expectancy may significantly affect the younger generation's labor market participation since adult children frequently take on care obligations (Léger, 2000).

Bragg and Hansen (2015) found that older adults face complex care needs which challenge the current healthcare system. Family caregivers also incur financial losses as they endeavor to meet aging family members' needs. Earlier research indicates a conflict between caregiving and working hours, however it does not take into consideration the potential influence of elder care provision on the labor supply (Léger, 2000).

Diverse parental living arrangements may influence behaviors in adult children, therefore, the overall impact of parental sickness on the labor supply of adult children may not appear to be significant. Children may need to provide unofficial care for parents who live independently or share a home with a relative (Léger, 2000). In summary, it is predicted that when the use of telemedicine has a financial advantage over in-person office visits, for both patients and their caregivers, patients will be more inclined to use telemedicine.

H5: There is a positive relationship between the loss of earnings from time spent attending a medical appointment and intention to use Telemedicine.

Computer self-efficacy

Computer self-efficacy was included as a control. The reasoning is that demonstrating self-efficacy using digital systems can predict whether or not those technologies will be used effectively (Ulfert-Blank & Schmidt, 2022). Although similar, skills and competence beliefs should be distinguished since they affect motivation, performance, and learning. Computer knowledge and current computing experience measure how much one has learned and developed via their use of computers in the past and present. A person's self-perception of their level of familiarity with computers in various application fields is their level of computer expertise (He & Freeman, 2010).

Digital systems now allow people to accomplish increasingly sophisticated jobs or engage with highly individualized systems, even though

specific action stages (such as sorting information) are eliminated. People must be more technologically savvy and adaptive to fulfill expectations and take advantage of new opportunities (Ulfert-Blank & Schmidt, 2022). General computer self-efficacy (1) shapes attitudes and decisions regarding I.T. usage by influencing important beliefs like perceived ease of use. (2) As a core construct in the social cognitive theory, self-efficacy is recognized as a critical factor regulating one's computer behaviors (He & Freeman, 2010).

Computer self-efficacy (CSE), often explained as an individual's assessment of their computer-using skills, is a specific application of the broad construct of self-efficacy, a foundational idea of social cognition theory created in the study of learning and human behavior (He & Freeman, 2010). The distinction between general computer and task-specific self-efficacy is apparent when reviewing the conceptual and empirical work on self-efficacy. Task-specific computer self-efficacy is described as perceptions of the capacity to perform computer-related activities in general computing. In contrast, general computer self-efficacy is defined as an individual's efficacy evaluation across different computer application domains (Agarwal et al., 2000). As such, computer self-efficacy will be controlled for in this study.

Having reviewed relevant literature and developing a model of intention to use telemedicine based on individual characteristics and situational factors, the following section outlines the research methods, including experimental design, sampling procedures and statistical results.

Methods

An online survey was developed to test the model. Online surveys are currently the most common way to gather survey data globally\. Mechanical Turk (MTurk), a web-based data-collecting service operated by Amazon.com, was used to recruit participants. Several researchers have examined the demographics of MTurk participants, including gender, ethnicity, and educational attainment, and found that they were more representative of the U.S. population than those of conventional subject pools (e.g., Burnham et al., 2018). Rand (2012) discovered that MTurk users' demographic responses were reliable and consistent; for instance, I.P. address matching revealed that more than 95% of MTurk users accurately claimed their country of residence. It is understandable why many academics worry that MTurk respondents would all be unemployed or come mainly from a limited number of businesses. In general, the proportion of MTurk respondents who work in particular sectors is comparable to that of other research survey pools. For MTurk, the percentage of people who are employed as professionals varies between 12% and 16% (Huff & Tingley, 2015). The study protocol was approved by the

Institutional Research Board at Prairie View A&M University with the protocol number 2023-028.

The use of MTurk data has been shown to be both more reflective of the general population and often indistinguishable from many other sources of survey collection (Casler et al., 2013; Paolacci et al., 2010). It has also been shown to be more representative of the U. S. population than typical samples of convenience (Berinsky et al., 2012).

Measures

Age

Survey participants were asked to provide their ages in years, and parameters were established to limit the MTurk survey to participants 18 years old and older.

Trust

Trust in physicians was measured using a six item, 7- point Likert scale adapted from the Wake Forest Scales Measuring Trust developed by Hall et al (2001).

Time

Time was measured on a 7-point Likert scale by asking how much the subject agreed with the following statement "Travel time affects my decision to attend medical appointments."

Income loss

Income loss was measured on a 7-point Likert scale by asking how much the subject agreed with the following statement, "travel affects my decision to attend medical appointments."

Computer self-efficacy

Computer self-efficacy was measured on a 7-point likert scale by asking the level of agreement with the following statement, "I am comfortable with computer usage?"

Power analysis and sampling procedure

A power analysis was conducted to determine the minimum number of subjects necessary to achieve an a of 0.05, and a power of 95% with 6 predictors. Following the calculation outlined by Cohen (1977), the minimum number of observations necessary to achieve a power of 0.95 is 57. The

final sample of this study was 278, far exceeding the minimum number of observations indicated by the power analysis.

The sample for this study included United States residents over the age of 18. MTurks's online survey settings prevented individuals residing outside the U.S. from participating in this study. No attempt was made to target a specific demographic or socioeconomic group in the U.S. The researcher created a membership account with MTurk. The survey was created on Qualtrics and posted on the MTurk website, allowing the solicitation of random responses from the marketplace's registered workers. The members of MTurk who were based in the United States and agreed to the terms of the informed consent were allowed to proceed with the study. General demographic information about the participants, including age, marital status, gender, education, and income, was collected as part of the survey.

Results

A total of 278 usable responses were collected. Demographic information is outlined in Table 1. Trust in physicians had a Cronbach alpha of .91. Regression was used to analyze the data via SPSS 22. Table 2, shows the Means, Standard Deviations, and Correlations, while regression results are reported in Table 3.

Hypothesis 1 predicted that exposure to telemedicine will increase the intention to use telemedicine. This hypothesis was supported. Hypothesis 2 predicted an inverse relationship between age and intention to use telemedicine, this hypothesis was not supported. Hypothesis 3 predicted that as income loss from attending office visits increases, intention to use telemedicine would increase, this hypothesis was supported. Hypothesis 4 predicted that participants who report higher levels of trust in doctors will report higher intention to use telemedicine, this hypothesis was supported. Hypothesis 5 predicted that participants who needed to travel for longer periods of time to attend office visits will report higher intention to use telemedicine, this hypothesis was supported. These findings are illustrated in Figure 2, and are discussed, along with implications for researchers and practitioners, limitations and future research avenues in the next section.

Discussion

Given the potential of telemedicine to support patient outcomes while reducing demand on medical infrastructure, researchers now turn their attention to increasing telemedicine adoption. This study highlights several findings which may influence how telemedicine can be marketed to potential patients. This endeavor is consistent with Parkinson and Davey (2023,

Table 1. Demographics of respondents.

		Frequency	Percent	Cumulative
Gender	Male	115	41.4	41.4
	Female	156	56.1	97.5
	Non-binary / third gender	4	1.4	98.9
	Prefer not to say	3	1.1	100.0
Marital Status	Married	211	76.7	76.7
	Widowed	6	2.2	78.9
	Divorced	10	3.6	82.5
	Separated	3	1.1	83.6
	Never married	45	16.4	100.0
Race	White (Non-Hispanic)	210	75.5	75.5
	Black or African American	22	7.9	83.5
	American Indian or Alaska Native	8	2.9	86.3
	Asian	28	10.1	96.4
	Native Hawaiian or Pacific Islander	1	.4	96.8
	Hispanic	6	2.2	98.9
	Other	3	1.1	100.0
Education	Less than high school degree	3	1.1	1.1
	High school degree or equivalent (e.g., GED)	30	10.9	12.0
	Some college or AA degree	27	9.8	21.8
	College degree	113	41.1	62.9
	Graduate degree	102	37.1	100.0
Household Income	Under $20,000	20	7.2	7.2
	$20,000–$39,999	54	19.4	26.6
	$40,000–$59,999	56	20.1	46.8
	$60,000–$79,999	69	24.8	71.6
	$80,000–$99,999	45	16.2	87.8
	$100,000–$119,999	18	6.5	94.2
	$120,000–$139,999	3	1.1	95.3
	$140,000 or more	13	4.7	100.0
Pay Type	Salary	209	75.7	75.7
	Hourly	48	17.4	93.1
	Unemployed	19	6.9	100.0

Table 2. Means, Standard Deviations, and Correlations.

		M	SD	1	2	3	4	5	6
1	Exposure	10.12	1.17	1	−0.07	0.04	0.17**	0.06	0.23**
2	Age	39.85	15.94	−0.07	1	−0.06	−0.04	−0.09	−0.06
3	Income Loss	1.26	0.43	0.04	−0.06	1	0.29**	0.45**	−0.08
4	Trust	2.43	1.03	0.17**	−0.04	0.29**	1	0.29**	0.26
5	Travel time	29.45	1.36	0.06	−0.09	0.45**	0.28**	1	0.01
6	Computer self-efficacy	1.98	1.04	0.23**	−0.06	−0.08	0.26**	0.01	1

*= <.05, **= <.01.

Table 3. Regression results (Dependent Variable: Intention to use Telemedicine).

	Std. Error	Std Beta	t	Sig.
(Constant)	1.57		−4.62	0.00
Age	0.00	0.07	1.44	0.15
Trust	0.07	0.29	5.21	0.00
Time	0.05	0.24	4.22	0.00
Exposure	0.06	0.15	2.90	0.00
Computer self-efficacy	0.06	0.37	6.93	0.00
Loss of income	0.17	0.17	−3.04	0.00
R2 = 0.394				

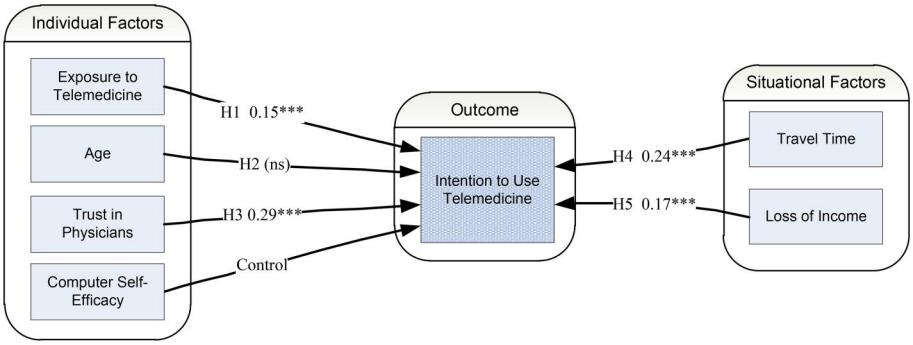

Figure 2. Evaluated Model. Standardized Beta Coefficients are shown. *** $p < .001$.

p. 349) call for research that supports digital health engagement, which they define as the use of "digital health tools … on behavioral change and health outcomes."

This study sought to understand the factors which influence patients' intention to use telemedicine. One experience factor, exposure to telemedicine; one demographic factor, respondent age; one attitudinal factor, trust in physicians; and two situational factors: travel time and loss of income associated with attending office visits, were evaluated. Findings supported a relationship between all of these factors except for one: Age did not have a significant impact on the intention to use telemedicine.

As expected the inconvenience associated with attending office visits (i.e., both travel time and loss of income) drove participants to consider virtual encounters with their care providers. This does not suggest that these participants believe that the quality of care that they receive in virtual visit is comparable to what they might receive at an office visit, rather it indicates that for many individuals, virtual visits are acceptable substitutes for office visits in some circumstances and when office visits are inconvenient.

Parkinson and Davey (2023, p. 347) point out that " … issues of trust, ethics, vulnerability, and agency are inextricably linked with health marketing and consumer decision making for good health." This study found that higher levels of trust in physicians led to higher levels of intention to use telemedicine. Since the consequences of an ineffective medical visit can be catastrophic (i.e., a missed diagnosis of a serious disease could lead to a substantial loss of quality of life), patients may be uncomfortable forgoing the richness of a close, hands-on examination, in which samples can be taken immediately and often analyzed in minutes. Further, if a patient does not trust doctors and views them as perhaps lazy or money driven and thus trying to see as many patients as possible, they may be concerned that during telemedicine encounters they will not have enough of the physician's attention to achieve the goal of the encounter.

There are multiple explanations for why a relationship between age and intention to adopt telemedicine was not supported. First, older individuals may be more likely to have mobility challenges which make visiting the physician in person more challenging, leading some of them to prefer the convenience of a virtual encounter. Also, older individuals are more likely to have multiple and complex medical needs, which may require more frequent medical visits than younger patients. It is possible that individuals who have frequent medical visits, and thus more experience interacting with their physician are more capable of effectively communicating with their physician using leaner media. This explanation is consistent with channel expansion theory (Carlson & Zmud, 1999), which suggests that as communication participants become more familiar with each other, with the topic of the communication and with the media, they can effectively convey more rich understanding using leaner media. Finally, the assumption that older participants are less technologically competent may simply not be true in 2023, when the data were collected. With this in mind, computer self-efficacy may be a better indicator of adoption than age. Computer self-efficacy was included as a control and found to have a significant impact on intention to adopt telemedicine and was not significantly correlated with age (the correlation was −0.06). Indeed, COVID has resulted in improved computer abilities across multiple populations (König & Seifert, 2022).

Implications and future research

Advocates for Telemedicine seek to increase adoption with the goal of reducing the burden of the healthcare system while encouraging better health outcomes by removing barriers seeing a physician. Telemedicine has the potential to enhance healthcare accessibility and quality while also reducing costs. Haimi and Sergienko (2024), surveyed 618,850 US patients, and found that before the pandemic, 23.1% had used telemedicine, during the pandemic that number grew to 59.2%, and after the pandemic, this number dropped to 39.5%. Given the expected benefits of telemedicine and the remaining room for growth in telemedicine adoption, health marketers, including care providers and advocacy groups seek to convince patients to consider telemedicine. The findings of this study could be helpful in focusing those efforts on patients who are most likely to benefit from and consider telemedicine.

Currently telemedicine adoption by patients is low, however it is growing, indicating that there is potential to increase use steadily going forward, resulting in the desirable outcomes identified above. The finding that exposure to telemedicine does increase intention to adopt telemedicine indicates that information campaigns, success stories, and word of mouth

may be effective channels for advocates of telemedicine to increase exposure to virtual visits, normalize them socially, and ultimately achieve the espoused benefits of telemedicine. Researchers might consider employing marketing theories, particularly related to branding, word of mouth and even campaigning from the political science literature to explore effective ways of increasing exposure to telemedicine.

While this study did not support a relationship between age and intention to use telemedicine, a relationship between computer self-efficacy and intention to use telemedicine was identified. Further, computer self-efficacy and age were not significantly correlated. While there are multiple explanations for this, and each explanation carries its own implication for advocates of Telemedicine, the finding itself implies two things. First, advocates for Telemedicine should not simply target older patients, since age does not necessarily serve as a proxy for technical adeptness.

Second, since computer self-efficacy is a determinant of intention to use Telemedicine, digital channels such as e-mail, social media and influencers may not be effective at reaching those most resistant to the adoption of telemedicine. Instead, traditional media such as television commercials, newsprint, billboard advertising and flyers may be more effective at reaching the less technologically inclined. It appears that the relationship between age and attitudes toward telemedicine are more nuanced than simply comfort and capability with technology.

Indeed, market segmentation researchers have advocated for the clustering of individuals into like groups, and developing products to satisfy the unmet needs of each segment as well as marketing strategies to appeal to each segment (Tynan & Drayton, 1987). While demographics including age have been widely used for segmentation, this finding (the lack of support for a relationship between age and intention to use telemedicine) is consistent the growing body of literature suggesting that behavioral, psychographic and lifestyle factors as segmentation drivers may be more effective at supporting product development and marketing initiatives (e.g., Lee & Kim, 2023; Wells et al., 2014).

Also, considering channel expansion theory, researchers may examine whether repeated and frequent medical visits lead to a better ability to communicate rich messages using lean media. Finally, do the complex and evolving medical issues associated with older patients make telemedicine less effective at providing care? If so, it might be that older patients prefer telemedicine because it is convenient and they are confident that they can communicate effectively, however the odds of a missed diagnosis may be higher.

Support was found for inconvenience factors (time to travel and loss of income) influencing intention to use telemedicine. Visiting physicians in

person is inconvenient for multiple reasons, scheduling can be a challenge, wait times can be unexpected and substantial, and clinic hours are often limited to regular business hours just to name a few. While this finding does imply that if office visits become more inconvenient, telemedicine adoption will likely increase.

Further, advocates for telemedicine can highlight the relative benefits of telemedicine to office visits in terms of convenience in their messaging, in order to effectively appeal to patients who find office visits to be inconvenient. In addition, this suggests that focusing marketing efforts on those patients who live far from healthcare facilities, and those who have indicated that they incur lost wages to attend medical appointments may lead to increased adoption of telemedicine.

Combined with the lack of a finding related to age, the finding related to convenience factors raises a question that could benefit from further investigation: Could the inconvenience of very frequent medical visits drive older individuals to prefer virtual visits to office visits? Indeed the effect of office visit frequency on attitudes regarding telemedicine has yet to be explored.

The finding that patients who trust doctors more will report higher levels of intention to use telemedicine indicates that efforts to encourage telemedicine adoption should focus not only on building awareness of the capabilities of telemedicine and the convenience of virtual encounters, but also on building trust in physicians in general, and physicians who offer telemedicine in particular. Doing so may alleviate some of the concerns of those who are reluctant to replace an office visit with a virtual visit because they fear that the physician may be trying to see as many patients as possible, so they won't have their full attention and an important medical observation may be missed. Indeed, telemedicine is limited in many ways, as it is not possible to take blood samples, throat swabs, skin biopsies or x-rays during a virtual visit. If the discussion and visual inspection via a videoconference indicates that further testing is necessary, the patient will need to make an appointment at a lab, likely at an additional cost. This shortcoming is likely to be a challenge to the adoption of telemedicine for some time.

This finding also carries implications for researchers, as it stresses the importance of understanding the drivers of patient trust in physicians, including different types of trust, and particularly empathy or identification-based trust, which likely influences the extent to which patients believe that physicians are deeply concerned about their well-being, rather than treating them like a customer.

Although not directly tested, this finding also suggests that efforts to advertise telemedicine to patients who are distrustful of physicians may

lead to entrenchment and further distrust. Future research could test the converse nature of this relationship. However, by asking physicians to identify those patients whom they feel seem to trust them, and marketing to those with higher levels of trust, telemedicine adoption may increase. This would also provide health care providers with the ability to identify those who may not trust their physicians, and indicate that the health care provider should engage in activities that develop trust among those patients.

Limitations

The findings should be interpreted within the context of the sampling population. The generalizability of these findings may be affected by self-selection bias and the fact that online survey participants are likely to be more comfortable with technology, and thus more likely to use telemedicine, while not all patients who could benefit from Telemedicine are necessarily technology savvy. Further, decisions regarding medical care are vast in scope, dependent on an enormous number of interrelated factors, some personality level characteristics of the patient, some related to the medical condition, some situational and some related to the medical provider. Designing experiments to understand and ultimately influence patient decisions is substantially complex, and it is unrealistic to expect any experiment to fully examine the factors that influence such decisions. This study attempted to incorporate one experience factor, one demographic factor, 2 situational (convenience) factors, and one attitudinal factor. This study did not incorporate any factors related to the medical history or potential medical outcomes of the patient, which is likely to drive the decision making. Future studies should develop scenario-based experiments that manipulate medical factors which may influence patient choice.

Conclusion

Telemedicine represents an option to enhance medical outcomes and address health disparities among patients. It offers the potential to expand and improve access to appropriate care and specialty services, benefiting the broader patient population. Moreover, telemedicine is a cost-effective alternative to in-person medical treatments and should be utilized as a supplemental healthcare approach to alleviate the strain on the medical infrastructure. Caring for sick senior parents has a stronger impact on the labor supply of women than on men (Léger, 2000). The core purpose of telemedicine is to enhance individual and community health through disease prevention, treatment provision, and healthcare provider education (Johnson, 2023). The acceptance of health information technology relies

heavily on its utilization and acceptance by medical professionals (Holden & Karsh, 2010).

Telemedicine can alleviate the stress on families and the medical system in the upcoming decade. Lawmakers have expanded access to telemedicine services, with 57.4% of Medicare Advantage plans now offering telemedicine benefits (Park et al., 2021). The increased acceptance of telemedicine by the Centers for Medicare and Medicaid Services (CMS) will likely influence other public health insurers to provide telemedicine coverage.

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