The Perceived Usefulness of Telehealth in Outpatient Practice by Physical Therapists, Occupational Therapists, and Speech-Language Pathologists in Southwest Virginia

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A proposal for a capstone project submitted to the faculty of Radford University in partial fulfillment of the requirements for the degree of Doctor of Health Sciences.

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Abstract

Patient access to outpatient therapy services is limited in rural counties of southwest Virginia. There are five counties in southwest Virginia that have either no OTs and/or SLPs in the outpatient setting. Southwest Virginia counties compared to Virginia for PT/OT/SLP supply in the outpatient setting reveals a significant undersupply based upon population. Telehealth presents potential in addressing access to therapy clinics in rural communities. Telehealth provided by PTs/OTs/SLPs is a viable and sustainable alternative option for face-to-face visits in the outpatient clinic for patients in rural communities. To date there is very limited investigation into the perceptions and intention to use telehealth technology in the rural outpatient setting by PT/OT/SLPs. The survey results identified an association between perceived usefulness (PU) and effort expectancy (EE) and the dependent variable intention to use (ITU) telehealth. The use of the TAM and UTAUT as theoretical models allowed for the investigation of the perceptions of telehealth, as well as organizational support and attitude toward the modality in the clinical setting. Both the UTAUT and TAM2 are strong predictors of health care providers' adoption of technology. The subscales of PU and EE from the TAM2 and UTAUT models, for this research study, were associated with greater intention to use telehealth in the outpatient therapy clinics. The perceived usefulness of the equipment and the effort expectancy to utilize the technology are important indicators in the process of therapists adopting telehealth. Furthermore, ensuring therapists are aware of their attitudes toward telehealth may help improve the acceptance of the modality for improved patient access. The usefulness and expected effort in intention to use the equipment significantly correlated with adoption of telehealth technology.

Dedications

My mother was a registered nurse who raised 4 boys while working the late shift. She was always present for school activities, weddings, child births, and my academic achievements. She passed away December 2019 before I could finish this doctorate, but I know she is proud of what I have accomplished. Miss you mom.

Acknowledgements

I want to thank the faculty of the Radford University – Carilion program in Doctor of Health Sciences. The last couple years of my adult education have been very fulfilling, and to have been a student while managing in health care during the pandemic has allowed me to grow as a person. My committee chair and members have been a great support system during the capstone process – cheers to Dr. Everhart, Dr. Huth, Dr. Cassidy, and Dr. Dane.

To my wife, two daughters (who are also in college and graduate school), and my three dogs, your perseverance and tolerance during my work/school life has been commendable. Finally, to my fellow DHSc mates, hang in there as the goal is near at hand. The reason for our scholarly endeavor is to help solve health care problems for the future generations.

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LIST of ABBREVIATIONS

Definition of Terms and Constructs

Behavioral Intent (BI) – The degree to which a person has formulated conscious plans regarding whether to perform a specified future behavior (Venkatesh et al., 2003).

Effort Expectancy (EE) – The user expectations about the ease of use of technology (Venkatesh et al., 2003).

Facilitating Conditions (FC) – The expected level of organizational and technical infrastructure that can support the use of technology (Venkatesh et al., 2003).

Intent to use (ITU) – How the user accepts/adopts the technology (Davis, 1989).

Perceived ease of use (PEOU) – The degree to which a person believes that using a particular system would be free of effort (Davis, 1989).

Perceived usefulness (PU) – The degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989).

Performance Expectancy (PE) – The capability of the technology to providing benefits and enhancing the performance to the user according to his/her expectations (Venkatesh et al., 2003).

Social Influence (SI) – The expected influence of others on the user to start and continue using the technology (Venkatesh et al., 2003).

Attitude Towards Telehealth (ATT) – Health care users in a positive mood focus more on helpful and beneficial aspects of a new health care systems (Venkatesh et al., 2003).

CHAPTER ONE

INTRODUCTION

Telehealth has been an option of health care for many years; however, the COVID-19 pandemic in 2020 pushed telehealth adoption to the forefront (National Rural Health Association, 2020). In fact, about 1% of the total health care volume in the United States (U.S.) prior to the COVID-19 pandemic was accessed via telehealth, and a great number of physicians used telehealth for the first time in the pandemic's initial months in 2020 (Zarefky, 2022). The COVID-19 pandemic has necessitated new and/or expanded practice modalities across health care.

Prior to the COVID-19 pandemic, the adoption of telehealth was slowed by payment constraints, provider concerns, and organizational barriers. Among residents of rural communities, patients who utilized telehealth visits were more likely to be White and non-Hispanic, younger, have insurance, and live in a poorer community (Pierce, 2020).

In response to the pandemic many hospital corporations, medical universities, Veterans Administration, and medical clinics rapidly scaled the utilization of telehealth in response to COVID-19 (Lonergan et. al., 2020). A large study of patients across the United States identifed that only approximately 4% of participants had engaged in videoconferencing visits prior to 2020. In addition, the study found that those who were older, identified as Black individuals, or reported lower levels of education expressed less willingness to use videoconferencing (Fischer et al., 2020).

According to the Sage Growth Partners survey of U.S. health care consumers, just 36% of people making $25,000 or less state they have access to telehealth, but this

percentage increases as income rises. Furthermore, the pandemic has done more in a brief period of time to improve telehealth adoption than the 10 years preceding. Among telehealth users, the highest share of visits that utilized video services occurred among young adults ages 18 to 24 (72.5%), those earning at least $100,000 (68.8%), those with private insurance (65.9%), and White individuals (61.9%). Video telehealth rates were lowest among those without a high school diploma (38.1%), adults ages 65 and older (43.5%), and Latino (50.7%), Asian (51.3%), and Black individuals (53.6%) (Karimi, 2022).

The term telehealth is also known by several other names: telecare, telepractice, tele-education, e-health, telemedicine, and teleconsultation. The Health Resources and Services Administration (HRSA, 2020) identifies telehealth as "the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health, and health administration. Technologies include videoconferencing, the internet, store-and-forward imaging, streaming media, and terrestrial and wireless communications."

Historically, telehealth has been regarded as a tool for physicians practicing in rural communities; the intent of telehealth has been to improve access to communities that face health care provider shortages (Amoah et al., 2018; Cyr et al., 2019; Khairat et al., 2019 Kirby et al., 2021). In 2005, the American Speech and Hearing Association (ASHA) determined that telepractice is an appropriate model of service delivery for audiologists and speech-language pathologists (SLPs) (ASHA, n.d.). In 2006, the APTA issued a position paper that stated telehealth may be used to overcome barriers of access to services caused by distance, unavailability of specialists and/or subspecialists, and

impaired mobility. The American Physical Therapy Association (APTA) also provided that telehealth offers the potential to extend physical therapy services to remote, rural, underserved, and culturally and linguistically diverse populations (Lewis, 2021). A position paper by the American Occupational Therapy Association (AOTA) in 2013 noted high satisfaction among telehealth service recipients with no significant differences in clinical outcomes between occupational therapy services provided in-person and services provided through telehealth for care of patients recovering from stroke, breast cancer, traumatic brain injury, polytrauma, Parkinson's disease, neurological, and orthopedic impairments (Cason & Cohn, 2014).

The pandemic has necessitated other health care professionals explore ways to increase access to patients and clients through the use of these technological tools. In light of the pandemic, telehealth demand has grown to meet the public response for patient and provider comfort/safety, as well as patient convenience (NHRA, 2020). Among health care professionals that may benefit by increased productivity, patient satisfaction and quality/convenience factors via telehealth utilization are physical therapists (PT), occupational therapists (OT), and speech-language pathologists (SLP). These practitioners provide direct, hands-on patient care in a variety of settings. It should be noted that patients' potential benefits gained with telehealth are improved access to specialist, lower transportation cost, management of chronic disease, remote monitoring, cost reduction, and improved health care (Hong et al., 2020). Of interest to the researcher is the setting of outpatient therapy clinics in rural southwest Virginia, and the perceived usefulness of telehealth by these providers to improve access to rehabilitative services in these communities.

Despite overall improvements in the U.S. health care, older adults living in rural counties, such as southwest Virginia where the numbers of elderly are increasing at an increasing rate, continue to be underserved. Access to care in rural communities, compounded by the pandemic, pose both public and population health challenges. The rural community of southwest Virginia consists of 13 rural counties and three independent cities, Bristol, Norton, and Galax. In these rural community's care is further constrained by a lack of health providers, geography, poverty, and other social determinants of health (Virginia Rural Health Association, n.d.). Likewise, southwest Virginia residents identified quality of life and community via improved access to health care across the lifespan as important social determinants of health (Burnett et al., 2014; McManus et al., 2016).

The Health Human Resource Planning (HHRP) ratio of physical and occupational therapists and speech-language pathologists is one to three per 10,000 in southwest Virginia. According to Landry et al. (2009), the national HHRP ratio for physical therapists across the United States was 6.2 (for all practice settings). The HHRP ratio for physical therapists in the outpatient setting across the United States in 2018 was 6.7, occupational therapist 2.0, and speech language pathologist 1.8 (U.S Bureau of Labor Statistics, 2018). The HHRP ratio for physical therapists in the outpatient setting across Virginia in 2018 was 4.1, occupational therapist 1.3, and speech language pathologist 0.8 (Virginia Department of Health Professions, 2018). Table 4 reveals the disparity of therapist supply with the HHRP ratio for physical therapists in the outpatient setting across southwest Virginia in 2018 was 2.2, occupational therapist 0.5, and speech language pathologist 0.5 (Virginia Department of Health Professions, 2018). Addressing

the rehabilitation needs of people with disabilities who reside in underserved rural communities can be accomplished by improving supply or by alternative delivery models such as telehealth (Jesus et al., 2020; U.S. Bureau of Labor Statistics, 2020). Unfortunately, as or 2022, five counties in southwest Virginia do not have a speech-language pathologist and/or occupational therapist practicing in the outpatient setting (University of Virginia – Weldon Cooper Center for Public Service, n.d.). When barriers to access are combined with the deficiency in therapy providers, it challenges, if not limits, care quality and access (Burnett et al., 2014).

Since March 2020, the Centers for Medicare and Medicaid Services (CMS) have approved over 100 new telehealth service providers, along with almost 300 new billing codes to supplement the response to the public health emergency (PHE) in order to meet patient and provider demand (CMS, 2020). Telehealth is an alternative for in-person interactions, and for in-person care, offers a way to mitigate these access challenges in rural America, specifically southwest Virginia. Provider acceptance is a key factor in the utilization, expansion, and sustainability of telehealth services (Swales et al., 2019). The core of this research will therefore be to identify how the characteristics of outpatient therapy practices and the attitudes of PT/OT/SLPs affect the usage intention of telehealth technology. The pandemic as a confounder of telehealth use was researched in a large U.S. survey that found when presented with the choice between an in-person or a video visit for nonemergency care, most preferred in-person care (Predmore et al., 2021).

STATEMENT of the PROBLEM

The literature suggests just residing in a rural area may be a barrier to PT/OT/SLP services (Freburger & Holmes, 2005). To improve patient access to outpatient therapy

services, the PT/OT/SLPs supply was positively associated with therapy use and with the amount of therapy received (Tohidast et al., 2020). Adding to the lack of available access and supply since 2020 is the COVID pandemic. In 2020, the pandemic led to personal restrictions and quarantine, resulting in potential deleterious effects from physical inactivity and shuttered access to exercise opportunities (Lippi et al., 2020). The pandemic isolation and social distancing mandates, availability of therapy clinics (supply), and even reliable transportation further hinder access to PT/OT/SLP evidence-based interventions in the outpatient setting.

Unfortunately, as of 2022, there are five counties in southwest Virginia that have either no OTs and/or SLPs in the outpatient setting. The comparison of southwest Virginia counties to Virginia for PT/OT/SLP supply in the outpatient setting reveals a significant undersupply based upon population. The APTA Physical Therapy Workforce Analysis (2020) noted a current ratio of 95 PTs per 100,000 people in the United States (APTA, 2021). However, the current ratio of patient to therapist in southwest Virginia is much lower with an undersupply for PTs of 46%; for OTs, 62%, and for SLPs, 38% (Table 4). These findings may support future research to develop adequate models of supply ratios for PT/OT/SLPs to identify underserved regions, practice settings, and populations (Lin et al., 2015).

The literature review revealed very limited investigation into the perceptions and intention to use telehealth technology in the rural outpatient setting by PT/OT/SLPs. Furthermore, research regarding effective telehealth training programs and pedagogy framework for therapy educational programs may benefit from this research project. The American Council of Academic Physical Therapy Education (CAPTE), Accreditation

Council for Occupational Therapy Education (ACOTE), and Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) accreditation bodies do not specifically detail a requirement for telehealth to be part of the curriculum, although the three associations encourage integration of telehealth in the education programs. For example, the CAA standards do not specifically identify "telehealth" or "telepractice." Many states adjusted their regulations to allow for telehealth practices over the last two years, including provisions for tele-supervision to support graduate students and the remote treatment of clients/patients (CAA, 2021). Indeed, the future may see a hybrid model of care where roughly one-third of each individual patient's episode of care would be through telehealth for PT/OT/SLP services (Grundstein et al., 2021).

SIGNIFICANCE of the PROBLEM

The limited availability of PT/OT/SLPs in outpatient therapy clinics in rural counties such as those found in southwest Virginia is reflected by the higher rates of hospital readmission for orthopedic and neurologic conditions, poor reduction in symptoms of many chronic diseases and conditions, and lower quality of life (Falvey et al., 2020; Mbada et al., 2019). Transportation barriers and distance to health care facilities are often cited by patients and their families as barriers to health care access (Syed et al., 2013). Indeed, patients report that transportation is the main cause for missed/rescheduled health care appointments; travel distance and time to health care providers also leads to greater health burden with associated poorer health outcomes in southwest Virginia and the rest of Appalachia (Arcury et al., 2005; Nemet & Bailey, 2000;).

Telehealth provided by PTs/OTs/SLPs is a viable and sustainable alternative option for face-to-face visits in the outpatient clinic for patients in rural communities (Keck & Doarn, 2014; Kollia & Tsiamtsiouris, 2021). The utilization of telehealth by PT/OT/SLPs in the outpatient setting has increased since the pandemic began, but the utilization appears to be diminishing. In an APTA report from May 2021, just over 10% of outpatient PTs provided care for an average of six patients per week via telehealth in 2021; however, double the number of OT/SLPs treated at least six patients per week in comparison during the same time period (Lewis, 2021; Virginia Telehealth Network, 2021). The service area/patient populations that represent the greatest utilization of telehealth by OT/SLPs are early intervention, school based, and pediatric private practice settings (AOTA, 2021; ASHA, 2021; HHS, 2021).

The aim of this research study is to provide insight as to PT/OT/SLP perceptions of and intention to use telehealth use during and after the pandemic. The results of this study may provide insight about the attitudes toward telehealth use into the future and assist with curriculum and training programs for telehealth. Rural communities' access to health care can be improved by telehealth services, and now is the time to determine barriers to utilization, if such barriers exist. Identification of telehealth utilization will allow therapy disciplines to respond to new technologies and client demands for access with alternative service delivery options.

PURPOSE and SIGNIFICANCE of the RESEARCH

The purpose of this quantitative correlational study will be to determine if the users' perceived ease of use (PEOU), perceived usefulness (PU), and organizational support (OS) for telehealth training is associated with the intention to use telehealth technology

by physical and occupational therapists and speech-language pathologists in outpatient therapy clinics in southwest Virginia. This research may contribute to the identification of barriers related to the adoption of telehealth and lead to the long-term use of telehealth as a means through which to improve access to physical, occupational, and speech therapy services in rural southwest Virginia.

Research Question(s) and Hypotheses

RQ1: Is there a statistically significant association between PEOU of telehealth technology, PU, and organizational support for telehealth training with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

$H1_0$: There is no statistically significant association between perceived ease of use of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in Southwest Virginia.

$H2_0$: There is no statistically significant association between perceived ease of use of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in Southwest Virginia.

$H3_0$: There is no statistically significant association between perceived ease of use of telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in Southwest Virginia.

$H4_0$: There is no statistically significant association between perceived usefulness of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in Southwest Virginia.

$H5_0$: There is no statistically significant association between perceived usefulness of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in Southwest Virginia.

$H6_0$: There is no statistically significant association between perceived usefulness of telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in Southwest Virginia.

$H7_0$: There is no statistically significant association between organizational support for telehealth training and the intention to use telehealth by physical therapists in outpatient therapy clinics located in Southwest Virginia.

$H8_0$: There is no statistically significant association between organizational support for telehealth training and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in Southwest Virginia.

$H9_0$: There is no statistically significant association between organizational support for telehealth training and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in Southwest Virginia.

RQ2: Is there a relationship between the practice geographic location (hospital-based outpatient clinic versus a private practice clinic) with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

$H10_0$: There will be no statistically significant correlation between the clinic location and utilization of telehealth.

RQ3: Does a relationship exist between the years of clinical experience with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

$H11_0$: There will be no statistically significant correlation between the years of clinical experience physical therapists, occupational therapists, and speech-language pathologists and the utilization of telehealth.

RQ4: Is there a relationship between patient demographic of age (adult or pediatric) with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

$H12_0$: There will be no statistically significant correlation between therapist utilization of telehealth and patient demographic of age.

RQ5: Is there a relationship between therapist sex with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

$H13_0$: There will be no statistically significant correlation between therapist gender and utilization of telehealth.

RQ6: Is there a statistically significant association between Attitude toward Telehealth Technology to include Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC) and Attitude towards Telehealth with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

$H14_0$: There is no statistically significant association between PE of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.

$H15_0$: There is no statistically significant association between PE of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.

$H16_0$: There is no statistically significant association between PE of telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in southwest Virginia.

$H17_0$: There is no statistically significant association between EE of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.

$H18_0$: There is no statistically significant association between EE of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.

$H19_0$: There is no statistically significant association between EE of telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in southwest Virginia.

$H20_0$: There is no statistically significant association between SI of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in Southwest Virginia.

$H21_0$: There is no statistically significant association between SI of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in Southwest Virginia.

$H22_0$: There is no statistically significant association between SI of telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in Southwest Virginia.

$H23_0$: There is no statistically significant association between FC of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.

$H24_0$: There is no statistically significant association between FC of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.

$H25_0$: There is no statistically significant association between FC of telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in southwest Virginia.

$H26_0$: There is no statistically significant association between Attitude towards Telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.

$H27_0$: There is no statistically significant association between Attitude towards Telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.

$H28_0$: There is no statistically significant association between Attitude towards Telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in southwest Virginia.

RQ7: Is there a relationship between therapist type and intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

$H29_0$: There is no statistically significant association between therapist type and the intention to use telehealth by physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia.

RQ8: Among the variables that are associated with the intent to use, which are the most important predictors for intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

$H30_0$: There is no statistically significant association with the variables associated with the intent to use and the prediction for intention to use telehealth by physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia.

The research questions will guide inquiry into the perceptions and intention to use telehealth technology by therapist in the outpatient setting. The use of TAM2 and UTAUT as the theoretical framework for this research project will allow the investigation of the factors that impact the intent to use telehealth technology among PT/OT/SLPs that work in rural southwest Virginia outpatient clinics. The TAM2 and UTAUT has been

identified as an acceptable model for use in predicting factors that influence the adoption of technology (Al-Rahmi et al., 2019; Teeroovengadum et al., 2017). The purpose of this quantitative correlational study is to determine if PEOU, PU, behavior (PE, EE, SI, FC, and ATT), and organizational support (OS) for telehealth training is associated with the intention to use telehealth technology by PT/OT/SLPs in outpatient therapy clinics in southwest Virginia.

If a lack of access to in-person care from PT, OT, and SLP practitioners is at the pinnacle during the pandemic, then the expectation might be to see significant utilization of telehealth during the period of March 2020 to May 2022 in Southwest Virginia outpatient therapy clinics. Investigation of the perceived usefulness of telehealth by PT/OT/SLPs in rural southwest Virginia might reveal if the technology is integrated into the outpatient practice.

CHAPTER TWO

REVIEW of the LITERATURE

GAPS in the LITERATURE

A literature search was performed on PubMed, Google Scholar, CDC, EBSCO, CMS, various state and federal government agencies for the years of 2000 – 2021 and the key words of telehealth, access, physical therapy, occupational therapy, speech-language pathology, intent to use technology, technology acceptance theory and supply of therapist. After removal for duplications, date of study, and to include English language, the 716 articles were reduced to 81 articles to begin the literature review. At the end of the literature review, the final number of articles increased to 298 to include data from governmental agencies and additional referenced journal articles that were deemed appropriate for the literature review.

This study aims to 1) determine PT/OT/SLP perceptions of telehealth use in outpatient clinics located in southwest Virginia to improve access to therapy; 2) predict PT/OT/SLP willingness to use telehealth; and 3) determine PT/OT/SLP perceived barriers related to use of telehealth in the outpatient therapy setting. User acceptance and adoption of technology behaviors have been examined in health care settings such as telemonitoring, telemedicine, e-records, and telerehabilitation (Bennani & Oumlil, 2014; Klaic & Galea, 2020; Schaper & Pervan, 2004; Strudwick, 2014). However, the literature review revealed a lack of research that investigated PT/OT/SLP intended use of telehealth in future professional practice in the outpatient setting. Based upon the review, it is unclear to what extent PT/OT/SLPs are willing to adopt and accept telehealth in the outpatient setting. Therefore, this study was designed to investigate barriers that could

affect telehealth implementation from the viewpoint of PT/OT/SLPs in southwest Virginia.

Additionally, this study utilizes the extended Technology Acceptance Model (TAM2) and the Unified Theory of Acceptance and Utilization of Technology (UTAUT) models as the framework for this research study. Research with the constructs from the TAM2 and UTAUT to investigate telehealth by PT/OT/SLPs in the outpatient setting is limited. Therefore, this project will contribute to the small amount of previous research in its use of the TAM2 and UTAUT approach to investigate PT/OT/SLP intention to use telehealth in practice. The use of both theories provides facilitators and barriers necessary for understanding the implementation of telehealth in provider practices.

It is crucial to investigate factors that will improve the quality of health for people and access for health care services in particular for underserved and vulnerable populations. The U.S. Department of Health and Human Services – Office of Disease Prevention and Health Promotion in the HealthyPeople 2030 has set access and quality as leading indicators toward improving health and well-being (Berchick & Jackson, 2021). A primary objective of Healthy People 2030 is to increase the use of health information technology to improve health quality, equity, and outcomes of care (HealthyPeople 2030). With the concern of adopting telehealth technology (IT) in the outpatient therapy practice, the intention of PT/OT/SLPs to utilize Information Technology (IT) in that setting becomes apparent. Understanding the intentions of PT/OT/SLPs to use telehealth is essential if the technology is to provide improved access to therapy services and support in communities with limited therapy supply, fill the identified literature gap, and meet the Healthy People 2030 objective. As a result, the findings from this research

project will address the literature gap by focusing on PT/OT/SLPs as the therapists of telehealth and analyzing their utilization from a socio-behavioral perspective of the therapist employing the TAM2 and UTAUT. This study is the first to use of the TAM2 and UTAUT investigate the perceptions and intention to use telehealth technology by PTs, OTs, and SLPs in the outpatient setting in southwest Virginia.

BACKGROUND

The COVID-19 pandemic introduced unprecedented orders from Virginia Governor Northam who, on March 30, 2020, issued Executive Order 55 (EO-55) entitled the "Temporary Stay at Home Order Due to Novel Coronavirus (COVID-19)." On June 2, 2020, the "Stay at Home" order was terminated with Executive Order 6 (Commonwealth of Virginia – Office of the Governor, 2020). From March 30, 2020, through June 2, 2020, physician offices and therapy outpatient clinics remained open as essential health care offices. Outpatient clinic volumes were significantly reduced as patients feared venturing into the public, even to receive essential medical and therapeutic interventions (CDC, 2020). Patients entered clinics to be screened for COVID by providers in N-95 masks, face shields, and plastic gowns. Patients also exercised while wearing masks, and the therapists distanced six feet from their patients. The therapy environment in the outpatient clinics, combined with stay-at-home orders and resurgent COVID infections, have challenged access to therapy services in and across the rural communities of southwest Virginia (Virginia Department of Health – State Office of Rural Health, 2020).

The pandemic opened new practice patterns as therapists struggled to safely provide services. According to Hoel et al. (2021), telehealth utilization during stay-at-home restrictions provided a continuation of health services while mitigating risk for patients

and therapist. Therefore, investigation into therapists' perceived usefulness, ease of use, and compatibility of telehealth to improve access to outpatient therapy services for clinics located in Southwest Virginia is merited. Although the literature to support telehealth utilization in PT, OT, and SLP practices is limited (Hall et al., 2021; Kolla & Tsiamtsiouris, 2021; Proffitt et al., 2021), this research does indicate that telehealth services alone were equivalent to outcomes for in-person services for certain diagnoses (Cottrell et al., 2017).

Telehealth is evidence-based and supported specifically for remote treatment of patients with stroke, orthopedic, and cardiac conditions (Agostini et al., 2015; Sarfo et al., 2015). Multiple studies detail the utilization of telehealth for the pediatric population by PTs, OTs, and SLPs (Hall et al., 2021; Kollia & Tsiamtsiouris, 2021; Tambyraja et al., 2021). In addition, Bettger et al. (2020) found that Virtual Exercise Rehabilitation In-home Therapy (VERITAS) revealed promising results with telehealth therapy interventions focused on total knee arthroplasty (TKA) patients. Telehealth and teletherapy has been determined to be a cost efficient and outcome effective alternative to in-person therapy visits in outpatient clinics for the age and diagnosis groups researched to date (Bettger et al., 2020).

Access to health care has been acknowledged in the literature as a health disparity and a social determinant of health, though limited research has been conducted on the intention to use telehealth by health care providers located in southwest Virginia (Healthy People, 2030; Holden & Karsh, 2010; Kissi et al., 2013; Yarborough & Smith, 2007). Telehealth is one option to improve overall health care access (Khairate et al., 2019); yet the prevalence of telehealth use remains unclear among PTs, OTs, and SLPs in rural

communities. To clarify "use" in terms of telehealth adoption, the International Organization for Standardization defines usability as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use" (Weichbroth, 2018).

The population to be investigated is discussed first. The following section will provide insight regarding the region of southwest Virginia, and the potential issue of access, in general, as a barrier by its population to the delivery of PT, OT, and SLP services. The next section will discuss telehealth, and the utilization of telehealth by all health care providers. The theoretical framework section describes the UTAUT and TAM2, and how these constructs shape this study.

PHYSICAL, OCCUPATIONAL and SPEECH LANGUAGE PATHOLOGY PRACTICE in the OUTPATIENT SETTING

What is physical therapy, occupational therapy, and speech-language pathology?

The APTA defines physical therapy as the treatment provided by a physical therapist (PT) that helps people improve movement and physical function, manage pain and other chronic conditions, and recover from and prevent injury and chronic disease (APTA, 2021). The U.S. trained physical therapist is typically a doctorate-trained and licensed to examine, diagnose, and treat movement related dysfunction. The PT utilizes exercise, modalities, assistive devices, patient education, and evidence-based research to treat patients.

The APTA provides the following description of the PT practice. PTs treat patients across the lifespan (birth to end of life), in practice settings that include hospitals, school systems, outpatient facilities, military installations, home health facilities, nursing

homes, assisted living facilities, sports complexes, and many more settings. The PT treats the whole person, with focus on impairments and dysfunctions of all body systems, not limited to cardiovascular, neurological, respiratory, integumentary, muscular/skeletal, reproductive, and lymphatic, to name a few. The services provided by a PT are typically in-person and hands-on in the clinical setting. After each session, the PT documents the treatment episode. This documentation is then submitted for reimbursement, and most insurance providers reimburse for in-person therapy treatment (APTA, 2021).

Prior to the pandemic, 2% of PTs reported providing telehealth services within the outpatient setting. By July 2020, the percentage of PTs providing telehealth services increased to 47% reflecting a need to reconsider traditional face-to-face service models and adapt to survive the financial impact, as well as provide continued outpatient therapy service to the community (Hall et al., 2021). The practice geographic location (urban versus rural), nor patient population was indicated in the reported use of telehealth services by Hall et al. (2021).

The practice of an occupational therapist (OT), as defined by the American Occupational Therapy Association (AOTA), is helping people across the lifespan to do the things they want and need to do through the therapeutic use of daily activities, or occupations (AOTA, n.d.). The OT utilizes evidence-based practice to focus on adapting the environment and/or task to fit the person. From pediatrics to geriatrics, the OT examines how the patient performs any kind of activity or task, then develops a plan to improve or make the activity easier or less painful.

The OT focuses on the patients' everyday tasks, such as activities of daily living (ADL) and instrumental activities of daily living (IADL). The ADL for the patient is the

task performed in self-care on a daily basis, while the IADL component includes the activities that allow the patient to live independently in a community. As with PT, the OT sessions are typically in-person and hands-on. The OT documentation and reimbursements are also similar to PT, and the therapists for both professions are required to do extensive documentation to meet the requirements set by the insurance provider for reimbursement.

In 2019, the American Occupational Therapy Foundation (AOTF) convened a planning grant committee with a focus on examining trends in and evidence for the use of telehealth in the OT practice (Proffitt et al., 2021). A survey of OTs in 2015 revealed telehealth use among OTs was less than 5% (Nissen, Hersch, Tietze & Chang, 2018). The pandemic effected OT telehealth use as the utilization increased to almost 40% (Geyer & Cooper, 2021).

The American Speech-Language-Hearing Association (ASHA) defines the work of a speech-language pathologist (SLP) as one who works to assess, diagnose, and treat speech, language, social and cognitive communication, and swallowing disorders in children and adults (ASHA, n.d.). The differentiation between speech and language in relation to communication is key. Speech disorders represent the difficulty in producing speech sounds fluently or difficulty with voice or resonance. Language disorders signify difficulty understanding or expressing feeling, ideas, and thoughts; these disorders may be spoken or written (ASHA, n.d.). Two other categories of communication disorders that are addressed by SLPs include those that address social and cognitive impairments. Social disorders are characterized by difficulty with the social use of verbal and nonverbal communication. Cognitive communication disorders represent issues with

organization of thoughts, attention span, memory, planning, and problem-solving techniques (ASHA, n.d.).

A survey of SLPs in a variety of employment settings from across the country identified changes in SLPs experiences with and perceptions of telehealth before, during, and predictions after the COVID-19 pandemic. The survey results revealed a dramatic increase in telehealth use from before March 2020 to October 2020. The reasons pediatric SLPs used telehealth during the pandemic were mostly a result of employer mandates or lowering infection risk for both client and clinician; however, over time, pediatric SLPs increased their telehealth proficiency and discovered the benefits of telehealth (Campbell & Goldstein, 2021). In addition, prior to March 2020, only 1.6% to 9% of global pediatric speech-language pathology services were provided via telehealth and using telecommunications technologies for synchronous videoconferencing (ASHA, 2020). Prior to the pandemic, fewer than 25% of graduate programs addressed telepractice, and state licensing boards prohibited synchronous videoconferencing across state lines (ASHA, 2016).

Challenges and Barriers Experienced by Patients and Clients in the Outpatient Setting

Outpatient clinics can be included within a larger health care system albeit for-profit or not-for profit, physician office, or privately owned. Experience has shown outpatient clinics provide one or more therapy services (PT, OT and/or SLP); often, the patient diagnosis may dictate that all three disciplines are engaged in the patient treatment plan (CMS, 2019). The identifying factors often associated with increased utilization of outpatient rehabilitation services by patients and clients include musculoskeletal and neurological conditions, multiple comorbidities, college education, and residential

location in an urban area (Carter & Rizzon, 2007). In addition, Holmes (2005) found that higher income, higher education levels, supplemental insurance, and availability of rehabilitation services were associated with increased utilization by the Medicare population.

With the implementation of the Affordable Care Act (ACA) in 2010, the percentage of Americans without health insurance decreased from 16% to 9% (CDC, 2015). With insurance coverage, Landry et al. (2016) estimated that the gap between demand and supply for therapists may double following the ACA implementation. This, in combination with baby boomers entering the Medicare population, will significantly increase demand for outpatient rehabilitation therapy services (Landry et al., 2016; Wong et al., 2014). With increased patient demand and limited therapist supply, the outpatient rehabilitation setting may require innovative delivery models to face the maturing population.

The utilization of outpatient rehabilitative services has many benefits. Outpatient therapy has been found to reduce the relative risk of hospitalization for Medicare beneficiaries for several studied conditions, such as low back pain and musculoskeletal conditions, amputation and neurological conditions, and paradoxical vocal fold motion disorder, among many other speech and language disorders (Carter & Rizzo 2007; de Heer & Warren, 2016; Dobson et al., 2019; Pasternak & Thibeault, 2019). Additionally, the medically underserved, along with the aging populations, benefit from improved access to outpatient therapy, as evidenced by enhanced health outcomes for chronic and acute disease (Moore et al., 2018). The most substantial benefit of improved access to therapy services and preventative care, and improvement in quality of life from outpatient

visits was in the child/adolescent, elderly, Black and Asian-American populations (Venkataramani et al., 2017). Those in households with annual incomes between 100% to 175% of federal poverty level also have seen increased utilization of outpatient therapy since the implementation of the ACA (Sandstrom, 2017).

The increasing utilization of outpatient rehabilitative services in the near-poor and low-income categories may be early positive signs of the potential benefits from the initiation of the ACA (Shartzer, Long & Anderson, 2016; Sommers et al., 2016). Quantitative data supports the demand for outpatient rehabilitative services, and access is improving across socioeconomic classes (Sandsrom, 2017). However, access to outpatient therapy in non-urban areas has not realized the same increased utilization as urban clinics, and this may be indicative of lower accessibility to PT/OT/SLP services by those living in rural areas (Cyr et al., 2019).

Even with the increase in utilizations of outpatient rehabilitative services since the ACA implementation, many patients continue to be unable to access outpatient therapy. The transition from inpatient to outpatient services, following hospitalization for orthopedic, neurologic, and oncology diagnoses, often results lack of outpatient therapy services by patients due to factors other than personal choice (Douthit et al., 2015). The continuity of care, whereby outpatient services are ordered and scheduled, is a “weak-link”; additionally, patient instructions, post-acute care, and program eligibility criteria have been cited as reasons patients do not progress through care in the outpatient setting (Janzen et al., 2019).

Individuals over the age of 80 years are less likely to receive outpatient therapy services for any condition, when compared to people 65 years of age and younger (Carter

& Rizzo, 2007). Underutilization of outpatient therapy is concerning in a population with decreasing function and greater risk for falls and aspiration. Carter and Rizzo (2007) indicated that intrinsic factors that influence the over 80 age group utilization of outpatient services include living alone and the belief that physical decline is part of the aging process. In the over 80 population, every second of every day, a person falls, leading to injury, loss of independence, and in some cases, death (CDC, 2021). The Stopping Elderly Accidents, Deaths, and Injuries (STEADI) initiative in the outpatient therapy clinics is utilized as routine fall prevention care for older adults; and access to outpatient therapy by the elderly is critical in fall prevention strategies (Ganz & Lantham, 2021).

The barriers of government and insurance policy and coverage, and access to outpatient therapy providers as identified for the elderly population are similar to those of the younger adult and child age populations (Venkataramani et al., 2017). From childhood obesity to autism, access to PT/OT/SLP outpatient services are critical interventions for the longterm health outcomes of the younger population (Harrison et al., 2019). Developmental delays in children have seen an increase from 3.57% to 4.55% from 2014 to 2017 (CDC, 2017). Unfortunately, many young children with developmental delays are not identified as early as recommended (CDC, 2018). Due to the national shortage of pediatric primary care providers, who are responsible for identification of developmental delays, the referral to outpatient PT/OT/SLP services has been impacted (Vitrikas et al., 2017).

Challenges and Barriers Experienced by PT/OT/SLP in the Outpatient Setting

Demand. Demand for PT, OT, and SLP services under most forecasting models are projected to outstrip supply (Landry et al., 2016). According to the U.S. Bureau of Labor Statistics (2021), employment of PTs is projected to grow 21% from 2020 to 2030; employment of OTs is projected to grow 17%; employment of SLPs is projected to grow 29%. These projections are all significantly faster than the average, of 8%, for all occupations.

The Projections Managing Partnerships (PMP) department of the U.S. Bureau of Labor Statistics forecasted strong employment growth for PT, OT, and SLP over the next 10 years as well (U.S. Bureau of Labor Statistics, 2021). For SLPs, the employment growth in Virginia within this decade (2020-2030) is expected to increase from 3,250 to 4,100, or an increase of 850 job openings. For PTs, the growth is an increase from 6,910 to 8,380, or 1,470 new jobs. OT job growth in Virginia for this decade from 3,160 to 3,690, or an increase of 530 positions (U.S. Bureau of Labor Statistics – PMP, 2021; Virginia Department of Health Professions, 2018).

The increase in demand for PT/OT/SLP will come in part from an aging baby boomer population, who are more active later in life as compared to their previous generational counterparts (HRSA, n.d.). The National Center for Health Workforce Analysis bases the forecasted demand on the older population's increased risk for heart attacks, strokes, and mobility-related injuries that require rehabilitative services for recovery. Chronic conditions, such as diabetes and obesity, will require PT/OT/SLPs to help manage mobility and self-care resulting from the effects of the chronic conditions. In addition, disabilities associated with Alzheimer's disease, cerebral palsy, autism, and

limb loss will require the skills of PT/OT/SLPs to help patients maintain independence in daily tasks, activity and communication and socialization (HRSA, n.d.). Southwest Virginia's median age is 40.3, which is higher than the 37.6 years estimated for Virginia. The region also has 12% more individuals over the age of 60 than the remainder of Virginia (University of Virginia – Weldon Cooper Center for Public Service, 2020).

Reimbursement and Documentation in the Outpatient Service Setting.

Documentation is a historical record of the patient condition, progress, treatment interventions, and goals for the therapy Plan of Care. The documentation for PT/OT/SLP differs in content but is similar in requirements needed for reimbursement by insurance providers in the outpatient setting. The single largest insurer in the U.S. is Medicare, and it is typically viewed as the "gold standard" for payment and coverage policies (AOTA, n.d.). The Medicare coverage policies and payment rules are also consistent across the country. However, the policies for Medicare Advantage, Medicaid, and private health insurance coverage plans can vary. Therefore, the practitioner needs to be familiar with the specific requirements for each insurance plan in relation to outpatient and telehealth services. For this literature review, Medicare payment and coverage policies will be the focus, although it should be noted that Medicaid (and a few other private insurances) at present also reimburses for telehealth services provided by PT/OT/SLP.

APTA, AOTA, and ASHA all identify the same documentation requirements for reimbursement by Medicare in the outpatient setting. The intent of the documentation is to justify the services billed, comply with applicable Medicare regulations, support the service being billed (CPT Code), and conform to state and local laws as well as professional guidelines for documentation (AOTA, APTA, ASHA, n.d.) The

documentation must be defensible in that it can support the clinical decision-making and ensures the PT/OT/SLP adheres to the standards of practice.

CMS provides telehealth documentation guidelines for practitioners that are similar to those for the outpatient setting with the main variation as identification of place of service [POS] (CMS, 2021). Prior to the pandemic, telehealth documentation and provision requirements were significantly more stringent (Fischer et al., 2020). PT/OT/SLP were not included as a provider type that could furnish telehealth as a covered service to Medicare beneficiaries (ASHA, n.d.-a). The PHE policies by CMS have temporarily eased regulations for how telehealth visits can be provided. The intent of the temporary relaxation is to make it easier for beneficiaries to get medical care and minimize exposure to COVID in health care settings such as outpatient therapy. Additionally, the waiver of restrictions on Medicare coverage for telehealth services by the Department of Health and Human Services (HHS) Secretary made services available to Medicare beneficiaries in any geographic area in the patient's home by PT/OT/SLP (APTA, 2020; Koma et al., 2021).

Beyond the PT/OT/SLP being licensed or registered in the state of practice, the therapist must also be aware of state guidelines or restrictions for the use of telehealth. The reimbursement for telehealth therapy services in the outpatient setting requires the use of modifier -95 to identify service as telehealth (ASHA, n.d.-b). The CMS comprehensive list of eligible telehealth services provided by PT/OT/SLP are quite different when compared to face-to-face outpatient visits, although the telehealth visits do have the consistent requirements of a physician referral and physician certification of the plan of care.

The federally declared PHE is renewable every 90 days but is expected to last through at least the end of 2021. HHS will determine when the PHE is no longer in effect. PT/OT/SLPs seek to encourage Congress to permanently authorize telehealth services by approving H.R. 2168, the Expanded Telehealth Access Act. Otherwise, once the federally declared PHE ends, Medicare will no longer reimburse PT/OT/SLPs directly for any telehealth services (Lewis, 2021).

Medicaid, which is designed to serve low-income Americans, has significant variability between states for outpatient rehabilitation, as it is an "optional benefit" (Virginia Department of Medical Assistance, n.d.-a). In Virginia, Medicaid allows for evaluation by PT/OT/SLP, and four treatment sessions (total of five therapy visits) annually before service authorization for additional visits with required demonstration of medical necessity (Administrative Code for Virginia – Virginia General Assembly, n.d.). Approval for additional PT/OT/SLP visits is reviewed on a case-by-case basis. Restrictions on visits have led to many practices closing their doors to Medicaid beneficiaries, due to the unaffordability of the high out of pocket fees for therapy services when their benefits are exhausted (Carvalho et al., 2017). In southwest Virginia, 14.8% are enrolled in Medicaid versus the state average of only 7.1%, and for Medicare, 22.7% of southwest Virginia residents are enrolled versus the state average of 12.1% (Virginia Healthcare Foundation, 2021).

Pediatric patients receiving PT/OT/SLP in the outpatient setting in Virginia have a different coverage policy that allows between 24 visits and 52 visits annually dependent upon the Medicaid plan (Virginia Department of Medical Assistance, n.d.-b). More than 1 million children in the United States receive school-based PT/OT/SLP services (ASHA,

2020). In Virginia, approximately 23,000 children covered by Medicaid receive therapy services within the school system (Virginia Health Care Foundation, 2021). During the pandemic, therapy services were disrupted due to school closures, which resulted in increased utilization by PT/OT/SLPs of telehealth to minimize the delay in therapy provision (Dahl-Popolizio et al., 2020; Hall et al., 2021; Tambyraja, Farquharson & Coleman, 2021).

During the pandemic, the U.S. Department of Education Office of Special Education Programs stated that if a local education authority closes school for the general education population, they are *not required* to continue to provide services to students with disabilities during the same period. The Individuals with Disabilities Education Act (IDEA, 2020) requires local education agencies (LEAs) to provide students with disabilities a free and appropriate public education, including special education and related services according to each student's Individualized Education Program (IEP). Since March 2020, 74% of individuals with intellectual and developmental disabilities reported losing access to at least one PT/OT/SLP service due to school closure and lack of access (Jeste et al., 2020). The APTA, AOTA, and ASHA member surveys suggests that school-based PT/OT/SLPs quickly adopted telehealth to meet the needs of their school and outpatient populations to ensure that children with disabilities continued to receive the necessary educational and health care services (Dahl-Popolizio et al., 2021; Kollia & Tsiamtsiouris, 2021; Tambyraja et al., 2021).

Seventy-four percent of all insurance reimbursement in Virginia rural outpatient therapy clinics was collected from Medicare, Medicaid, and other governmental providers (VHHA, 2021). Medicare represents 58% and Medicaid 15% of the outpatient

payer mix (VHHA, 2021). The portion of Medicare reimbursement in the outpatient setting could negatively impact telehealth utilization if reimbursement is removed following the PHE. The benefits of improved access offered by telehealth, however, may possibly continue to be accessed in non-urban communities. One example is a not-for-profit health system in southwest Virginia that is investing capital to aid the Medicaid population, specifically addressing children's common health issues with the development of a Virtual Health initiative. Through the utilization of telehealth services by medical providers, as well as other allied health care providers (PT/OT/SLP, nurses, counselors, etc.), the health system seeks to help connect patients to providers no matter the time or location in order to improve community health (Ballad Health News, 2020).

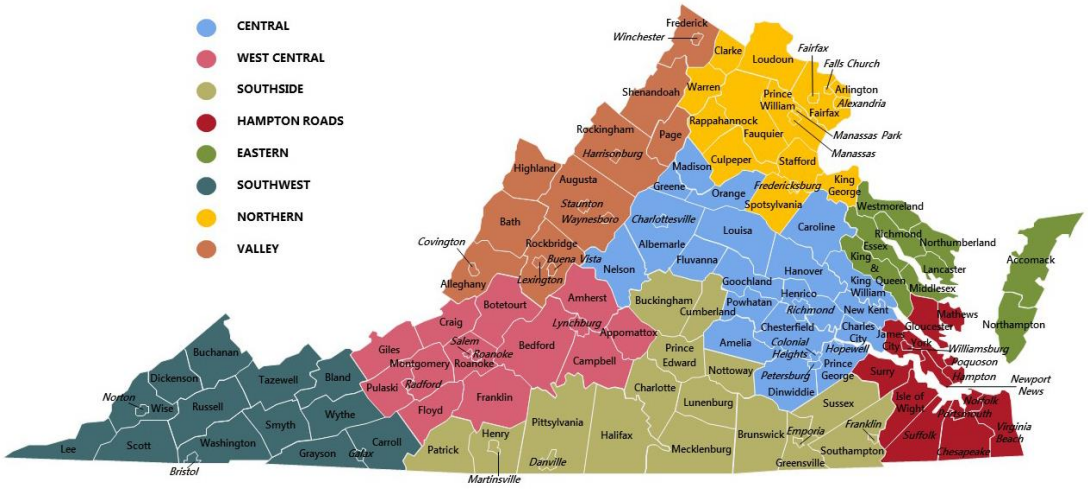
SOUTHWEST VIRGINIA

By definition, the Appalachian region is made up of 420 counties stretched across 13 states, from southern New York to northern Mississippi. Within Appalachia, there are five subregions: Northern, North Central, Central, South Central, and Southern. In 2019, there were 25.7 million people living in Appalachia; the population growth in the region is lower than the national average of 6% and has lost a significant number of its population in the preceding decade. Although Appalachia is rich in natural resources, the region has long struggled with poverty, with a 16.3% average poverty rate compared to the U.S. average of 14.6%. Counties in the Central and South-Central subregions of the Appalachian region present poverty levels as high as 41% (Appalachian Regional Commission, 2020). Southwest Virginia lies in the South-Central subregion of Appalachia.

Virginia has 25 counties within the Appalachian Region; 13 of those counties are in southwest Virginia. As shown in Figure 1, the 13 counties in southwest Virginia are Bland, Buchanan, Carroll, Dickenson, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wise, and Wythe. There are also three independent cities with southwest Virginia: The City of Bristol, of Galax, and of Norton. The population decline for each county in southwest Virginia is reflected in Table 1. Although Virginia realized a population growth of 4%, every county in southwest Virginia faced a decline from 0.4-11.3% in the last decade. The University of Virginia's Weldon Cooper Center projects that over the next 20 years, several counties in southwest Virginia will continue to see population declines up to 30% (University of Virginia Weldon Cooper Center, 2019).

Figure 1

Counties of Southwest Virginia



Note: (University of Virginia – Weldon Cooper Center for Public Service, n.d.). Retrieved from: https://demographics.coopercenter.org/virginia-regions. In the public domain.

Table 1

Population Changes 2010–2020 Counties in Southwest Virginia

Locality	April 1, 2010 Census	July 1, 2020 Estimate*	Change since 2010 Census	
			Numeric Change	*Percent Change*
Virginia	2,883,942	3,003,371	119,429	4.1%
Bland County	6,824	6,410	-414	-6.1%
Buchanan County	24,098	21,380	-2,718	-11.3%
Carroll County	30,042	29,367	-675	-2.2%
Dickenson County	15,903	14,331	-1,572	-9.9%
Grayson County	15,533	15,474	-59	-0.4%
Lee County	25,587	23,833	-1,754	-6.9%
Russell County	28,897	26,958	-1,939	-6.7%
Scott County	23,177	21,995	-1,182	-5.1%
Smyth County	32,208	30,068	-2,140	-6.6%
Tazewell County	45,078	41,431	-3,647	-8.1%
Washington County	54,876	53,559	-1,317	-2.4%
Wise County	41,452	37,862	-3,590	-8.7%
Wythe County	29,235	28,546	-689	-2.4%

Note: Published on January 29, 2021 by the Weldon Cooper Center for Public Service Demographics Research Group. Retrieved from: https://demographics.coopercenter.org. In the public domain.

According to the National Association of County and City Health Officials (NACCHO), the definition for "rural" is determined by the locale and the individual utilizing the term (NACCHO, 2013). In addition, the United States Census Bureau does not specifically define "urban" beyond locations outside of an urban area or center. But the United States Department of Health and Human Services does define "rural" as encompassing "all population, housing, and territory not included within an urban area. Whatever is not urban is considered rural" (United States Department of Health & Human Services - Health Resources and Services Administration, n.d.).

This research project will utilize the University of Virginia's Weldon Cooper Center for Public Service county map to define southwest Virginia. There are differing Virginia governmental maps that detail southwest Virginia to include the West Central

counties. However, the purpose of this research project is to link access in rural communities with telehealth utilization to PTs, OTs, and SLPs. The majority of counties included in West Central are predominately urban with significantly higher therapist to patient ratios, increased number of outpatient therapy clinics to improve access, and broadband and high-speed internet capabilities, which are not available in southwest Virginia to most residents. Hospital-based and private practice clinics located in southwest Virginia must meet the federal government requirement of at least 25 megabit/second (Mbps) internet connectivity (HealthIT.gov, 2021). Therefore, therapy clinics in southwest Virginia will have adequate internet speed, and this will not be a limitation for this research study.

Educational attainment is a long-term indicator of the investment that a state or region has made in both developing and attracting a productive population base. Virginia, as a whole, is doing well with 92% of the citizens holding at least a high school degree, which is on par with the national average. Virginia is also well-above the national average for a population with a bachelor's degree. Lower education levels are reflected in a substantial increase in wage inequality. Wage inequality and poverty both have disastrous effects on health status and should be a matter of urgent concern for policymakers and the general public (Coile & Duggan, 2019). The U.S. Census Bureau indicates that 12.1% of the population in southwest Virginia has less than a high school education level, compared to the Commonwealth of Virginia average of 8.4%. Furthermore, only 22.6% of the population had an earned bachelor's degree or higher, compared to the state average of 42.3% (U.S. Census Bureau, 2020).

The mean household income for the southwest Virginia population for 2019, according to the U.S. Bureau of Statistics, was $61,163, compared to the Virginia average of $106,007. In the Appalachian Region for the same period, the overall mean income per household was $70,362, which is only 79% of the U.S. average of $88,607 (Appalachian Regional Commission, 2021). The southwest Virginia mean household income is 14% below the average for all of Appalachia; this household income is well below the poverty line. The 27 rural counties in eastern Kentucky were the only areas with lower household income than central Appalachia and southwest Virginia. The number of persons in southwest Virginia living in poverty for 2015-2019 was reported as 132,540. It should be noted that this data is reflective prior to the onset of the coronavirus pandemic in 2020; the pandemic had a severe economic impact in the Appalachian Region.

Poverty and health status have a reciprocal relationship; their combination contributes to inequality by socioeconomic status (Jackson, 2017). The Center for Disease Control (CDC) defines disability as having difficulty in at least one of the following six areas: hearing, vision, cognition, walking or climbing, self-care, or attending to the functions of independent living. The portion of southwest Virginia residents reporting a disability in 2015-2019 was 19.2% for all age groups, versus the overall Virginia average of 11% (Appalachian Regional Commission, 2020). Southwest Virginia's relatively high disability rate corresponds to the population's older age structure, with 21.5% of residents aged 65 or older, which exceeds the national average (16.5% in mid-2019) (Appalachian Regional Commission, 2020). The 65 and older population also represents the largest increase of 4.7% in share of population by age

group when compared to the Virginia average of 3.6% (Appalachian Regional Commission, 2020).

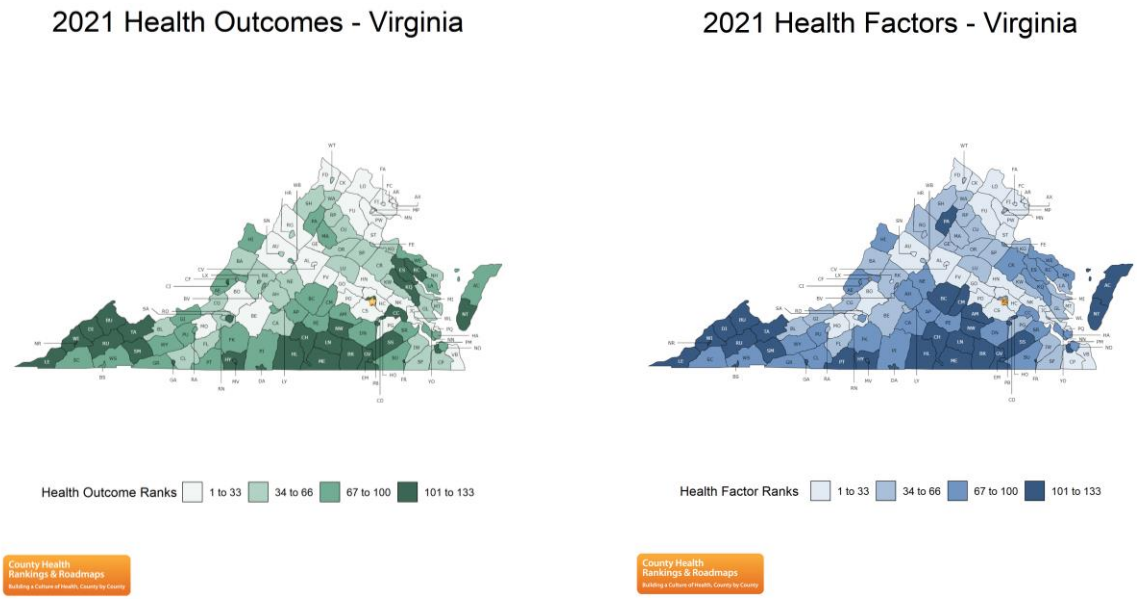
The U.S. Census Bureau has recently updated the census form, so the data presented for population, race, age, and so on, significantly distorts the ability to view rural communities. As a result of the injected "noise" and how responses are processed, the 2020 Census data is not comparable with previous censuses. For the 2020 census, American Indian/Alaska Native (AIAN), alone or in combination with other races or ethnicities, in southwest Virginia was presented as representing 1.8% of the population. Those who identified as Asian, alone or in combination with other races or ethnicities, presented as 0.7% of the population. Those who identified as Black, alone or in combination with other races or ethnicities, presented as 3.9%. Those who identified as Pacific Islander, alone or in combination with other races or ethnicities, included 0.1%. The Latino or Hispanic ethnicity presented as 2.6% of the population of southwest Virginia. Those who identified as "some other race," alone or in combination with other races or ethnicities, presented as representative of 2.3% of the population. The remainder identified as White, presented as 88.6% (UVA Weldon Cooper Center, 2020).

The 2020 Virginia County Health Rankings Dataset provides information on health *outcomes* and health *factors*. Health *outcomes* represent how healthy counties are within the state. These rankings are based on two types of measures: how long people live and how healthy people feel while alive. The other health ranking is health *factors*, which represent influences on the health of a county. These represent an estimate of the future health of counties as compared to other counties within a state. These ranks are based on four types of measures: health behaviors, clinical care, social and economic

factors, and physical environment factors. A strong majority of the counties in southwest Virginia rank in the bottom 25% for both data sets. In addition, the counties of Buchanan, Dickenson, and Lee were ranked last in the state for health outcomes and factors (Figure 2).

Figure 2

County Health Rankings and Roadmaps for Virginia



Note. University of Wisconsin Population Health Institute – County Health Rankings and Roadmaps, 2021. Retrieved from: https://www.countyhealthrankings.org/app/virginia/2021/overview. In the public domain.

Additional information from the Virginia County Health Rankings Dataset revealed that in southwest Virginia counties, premature death (as defined by years of potential life lost before age 75) per 100,000 persons is 11,500: almost twice that of Virginia at 6,400. The leading causes of premature death are malignant neoplasms, diseases of the heart, chronic lower respiratory disease, accidents, and diabetes mellitus. The rankings for quality of life, health behaviors, clinical care, social and economic factors (education, employment, and poverty), health outcomes, and physical

environment also place the 13 counties and three independent cities located in southwest Virginia in the bottom 25%, with multiple counties as the lowest ranked when compared to other regions in Virginia (University of Wisconsin Population Health Institute – County Health Rankings and Roadmaps, 2021).

Southwest Virginia can be characterized by poverty, limited industry, and employment options, and higher than average unemployment; one lesser-known hurdle for the region is transportation. In regard to access to employment, 6.8% of residents must drive more than an hour to work one-way, and 25.4% reported driving between 30-59 minutes one-way (Virginia Employment Commission, 2020). The number of households in southwest Virginia without at least one vehicle was 6.8% compared to the Virginia average of 6%. Ironically, the data revealed that households in southwest Virginia beat the state average for households with two or more vehicles. It should be noted that the running condition of the vehicle was not stated (Appalachian Regional Commission, 2021). Healthy People 2020 states that factors such as travel distance and the supply of providers can also limit people's ability to access adequate health care (Douthit et al., 2015; Healthy People 2020). Rural residents may need to travel long distances to get to health care providers and thus may be less likely to seek preventive care and treatment for chronic conditions (Douthit et al., 2015). Residents of rural regions are also more likely to have chronic disease and poor overall health status. Limited transportation opportunities and health services in rural areas provide strong rationale to create and implement telehealth services as an option to the populations living in southwest Virginia (Douthit et al., 2015; Nelson et al., 2007).

The IT infrastructure in southwest Virginia has greatly improved over the last decade with the help of government agencies, such as the Mid-Atlantic Telehealth Resource Center and Appalachian Regional Commission, to increase broadband access to rural communities. The number of homes in southwest Virginia with at least one computer device is 82.2% compared to the state average of 92.1%. Unfortunately, 17.8% of homes do not have any computer device; this ranks as second lowest to only 19.7 of eastern Kentucky homes without such a computer device. Computer devices had become commonly used for such activities as telehealth home visits, schoolwork, entertainment, online banking, health care access, and socializing; the pandemic's effects have magnified the importance of such devices. The data also portrays a "digital divide," particularly between urban and rural areas in Appalachia, that will likely be highlighted more keenly in the coming years (Appalachian Regional Commission, 2021).

The households of southwest Virginia with an internet subscription were 72.8% compared to of the entire commonwealth of Virginia at 85.5%. The broadband (high speed) access in southwest Virginia households was 72.1%; access across the state of Virginia was 85.2% with the national average at 83% (Appalachian Regional Commission, 2021). Broadband internet enhances people's ability to pay bills, pursue learning, access telework and telehealth, and connect with friends and family. Indeed, it has become a tool for promoting economic development and improving health. The Appalachian Regional Commission needs to focus on providing access to broadband internet across southwest Virginia as the region appears to be at risk of being left behind; only eastern Kentucky (at 71.4%) and Mississippi (at 69.2%) were below southwest

Virginia in regard to percentage of the population with broadband access (Appalachian Regional Commission, 2021).

Pandemic Isolation Impact on Southwest Virginia

In 2020, the pandemic led to personal restrictions and quarantine, resulting in potential deleterious effects from physical inactivity and shuttered access to exercise opportunities (Lippi et al., 2020). The World Health Organization (WHO) defined guidelines regarding the minimal amount of physical activity necessary to maintain adequate health and fitness. For adults aged 18 to 64 years, the recommendation is to engage in weekly training of at least 150 minutes of physical activity of moderate-intensity, 75 minutes of physical activity of vigorous-intensity, or a corresponding combination of activity of moderate- and vigorous-intensity (WHO, 2021). Limited physical exercise may be associated with an increased risk of a kaleidoscope of disabling disorders, such as diabetes, cancer, osteoporosis, cardiovascular disease, and mental health problems (Lippi et al., 2020). Southwest Virginia ranks in the bottom 10% of counties in Virginia for physical inactivity and access to exercise opportunities (University of Wisconsin Population Health Institute – County Health Rankings and Roadmaps, 2021).

Isolation associated with quarantine and physical distancing also manifest in social and cognitive issues. Communities also faced limited access to everyday needs, and this leads to social, emotional, and communication disorders that can be effectively treated with access to SLP and OT services in the outpatient setting (Sheehy, 2020). A survey of 1,342 Parkinson patients revealed half of participants reported a negative change in PD symptoms, with 45–66% reporting mood disturbances (Feeney et al.,

2021). In addition, telehealth use increased from 9.7% prior to the pandemic to 63.5% during the pandemic, but this increase was in the higher income and higher education bracket. Feeney et al. (2021) also identified that services were more often used for doctor's appointment than physical, occupational, speech, or mental health therapies. Almost half (46%) of Parkinson patients preferred to continue using telehealth always or sometimes after the coronavirus outbreak had ended (Feeney et al., 2021). Finally, the Covid isolation impact due to school and outpatient clinic closures has a significant impact on child speech and language development that necessitates the intervention by SLPs. As such, the active SLPs of the field must dedicate efforts to the proper provision of telepractice services to prevent the persistence of speech and language problems in children and as a result decrease their quality of life in the future due to isolation and social distancing (Tohidast et al., 2020).

ACCESS to OUTPATIENT PT/OT/ST CLINICS in SOUTHWEST VIRGINIA

The pandemic isolation and social distancing mandates, availability of therapy clinics (supply), and even reliable transportation can hinder access to PT/OT/SLP evidence-based interventions in the outpatient setting. The literature suggests just residing in a rural area may be a barrier to PT/OT/SLP services (Freburger & Holmes, 2005). But in rural communities, if the supply is sufficient, the greater local availability of therapists can lead to shorter wait time and greater flexibility in scheduling and improve access (Freburger & Holmes, 2005). To improve patient access to outpatient therapy services, the PT/OT/SLPs supply was positively associated with therapy use and with the amount of therapy received. The supply of PT/OT/SLPs determines utilization

and demand; supply was positively associated with the likelihood of physicians making therapy referrals for adults with neurological and musculoskeletal disorders (Hunter, 2004). Therefore, if there is adequate PT/OT/SLP supply then access to outpatient services in rural communities is improved.

Accessibility

The barriers to PT/OT/SLP access include rurality and provider shortages. The definition of "rural" from the United States Census Bureau (Census) codes can be complex. The Census does not actually define rural, but instead considers "rural" to include all people, housing, and territory not located within an urban area. Any area that is not urban is then considered rural. Urban areas consist of populations of 50,000 or more people and urban clusters of 2,500-49,999 people. In the 2010 Census, 19.3% of the population and 97% of the land area in the United States was classified as rural (United States Census Bureau, n.d.).

As seen in Figure 3, adding to the definition complexity, the Office of Management and Budget (OMB) decides which counties are metropolitan (metro), micropolitan (micro), or neither from a different formula. Based upon the OMB definition of rural, per the 2010 Census statistics for the United States, 15% of the population and 72% of the land area was classified as rural. As can be seen, the Census overcounts population in rural areas, while the OMB undercounts the rural population. Additionally, the Census definition of rural does not follow city/county boundaries, thereby making it difficult to determine if an area or county is rural or urban. Likewise, the OMB includes some rural areas that are in metropolitan counties, such as the Grand

Canyon is in a metro county; the OMB undermeasures the land of rural areas, as compared to the Census.

Figure 3

OMB Rural Definition

Area or County	Rural or Not Rural
Metro area (urban core of 50,000 or more people)	Not rural
Micro area (urban core of 10,000-49,9999 people)	Rural
Counties outside of Metro or Micro Areas	Rural

Note. Metro areas that are part of a county contribute to the difficulty in defining rurality for counties in Virginia. Retrieved from: https://www.hrsa.gov/rural-health/about-us/definition/index.html. In the public domain.

The Human Resources and Service Administration (HRSA) utilizes the definitions of rural as provided by the Census and the OMB, and also utilize the Rural-Urban Commuting Area (RUCA) codes to refine their description of rural. This research project will employ the RUCA codes in conjunction with the maps from the University of Virginia's Weldon Cooper Center for Public Service to define "rural." The U.S. Department of Agriculture's (USDA) Economic Research Service (ERS) utilizes the Census data to create the RUCA codes that the HRSA utilizes in the determination of rural status (HRSA, n.d.). The RUCA codes classify U.S. census tracts using measures of population density, urbanization, and daily commuting. A second dataset applies 2010 RUCA classifications to ZIP code areas by transferring RUCA values from the census tracts that comprise them (USDA, 2019).

Utilizing the ERS - RUCA codes and the Weldon Cooper Center for Public Service's map for rural southwest Virginia, this research project will then overlay data from the Virginia Department of Health to compare the supply of PT/OT/SLP therapists to rural communities. This process will help reduce the confounding of researchers and policy makers employment of a dizzying array of definitions for rural. The ERS states that Nonmetropolitan is considered to be an acceptable proxy for rural when classifying counties; the ERS definition for rural is all Nonmetropolitan counties and all Metropolitan Census tracts with RUCA codes of 4-10 (Cyr et al., 2019; Douthit et al., 2015; USDA, 2019). The ERS – RUCA (codes 4-10) listed in Table 2, further reflect the designation for all counties and cities defined by the Weldon Cooper Center for Public Service's map for rural Southwest Virginia.

Table 2

RUCA Primary Codes Classification System

General Classification	Core Area Codes	High Commuting Primary Flow (at least 30% to Urbanized Area) Codes	Low Commuting Primary Flow (between 10-30% to Urbanized Area) Codes
Metropolitan (Urban) (>50,000 pop.)	1	2	3
Micropolitan (Large Town) (10,000 - 49,999 population)	4	5	6
Small Town (2,500 – 9,999 population)	7	8	9
Rural (Isolated Rural) (<2,500 pop.	10	-	-

Note. (US Health Resources and Services Administration - Federal Office of Rural Health Policy /US Department of Agriculture Economic Research Service (FORHP). Retrieved from: https://www.doh.wa.gov/Portals/1/Documents/1500/RUCAGuide.pdf. In the public domain.

In Virginia, there are 135 local jurisdictions (counties and cities), and 59 of that number are Nonmetropolitan, or rural, as defined by RUCA coding. For health care

research of rural communities, counties are the standard building block for collecting economic data and for conducting research to track and explain regional population and economic trends. Nonmetropolitan, or rural, counties include some combination of open countryside, rural towns (places with fewer than 2,500 people), and urban areas with populations ranging from 2,500 to 49,999 that are not part of larger labor market areas (Metropolitan areas).

With the definition of rural determined, the distribution of PT/OT/SLPs in rural versus urban counties is vital. This information is obtained by the Virginia Department of Health from surveys of therapists renewing their licenses in odd-numbered years. The Healthcare Workforce Data Center (HWDC) administers voluntary surveys to PT/OT/SLP practitioners regulated by the Virginia Department of Health Professions (DHP). The HWDC surveys are not traditional, scientifically validated snapshot surveys. The practitioners provide information about their employment over the last 24 months. The HWDC's voluntary surveys consistently achieve high response rates, usually above 75% but often around 90%. The HWDC survey is utilized to create two Virginia reports: the CareForce Snapshot and the Workforce report. The Workforce report provides specific detail for the PT/OT/SLP therapists within Virginia.

The Virginia Department of Health Professions HWDC Workforce 2020 report provided data for the number of licensees of actual therapists employed in Virginia, and this data represents all licensees with a primary or secondary work site in Virginia at any time in the past year, or who indicated intent to return to Virginia's workforce at any point in the future. For this research project, the Virginia Workforce 2020 data will be

utilized in order to represent the actual PT/OT/SLPs working in Virginia at the present time of this study.

According to the Virginia DHP Workforce 2020 data, there were 3,996 SLPs practicing in Virginia. From the DHP Workforce report, it is notable that only 334 SLPs practice in rural counties. Additionally, the DHP survey indicated that three out of every four SLPs work in either Northern Virginia, Central Virginia, or Hampton Roads. Similarly, of the 7,903 PTs, only 614 in the Workforce 2020 report indicated "rural" as the practice location. The trend continues for PTs as three-quarters of all PTs in Virginia work in either Northern Virginia, Central Virginia, or Hampton Roads. The DHP survey report indicates that in 2020 there were 4,317 OTs licensed in Virginia, but only 308 were practicing in rural counties (Healthcare Workforce Data Center, 2021).

Number of PT/OT/SLP per County in Southwest Virginia, also Across Virginia

In Virginia, there are 135 local jurisdictions (counties and cities), of which 59 are rural. The 13 counties in Southwest Virginia are Bland, Buchanan, Dickenson, Carroll, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wise, and Wythe. The three independent cities within southwest Virginia are the Cities of Bristol, Galax, and Norton. The number of residents per county is based upon the 2020 U.S. Census Bureau published by the Weldon Cooper Center for Public Service Demographics Research Group. The Bureau of Economic Analysis combines the city of Galax with neighboring Carroll County, Bristol City with Washington County, and Norton City with Wise County for statistical purposes.

A commonly adopted approach to benchmarking projection of the populations future demand, and in turn the future required number and type of providers, is the Health

Human Resource Planning (HHRP) provider-to-population ratio (Landry et al., 2009). A PT/OT/SLP-to-population ratio estimates the current workforce density, or supply, to the size of the population. This ratio can then be compared against an identified threshold density that is assumed to correspond with a health system's ability to deliver essential therapy services. Advantages for using this ratio is that the approach is quick and simple to apply, may be utilized for comparative analyses over time and geography, and is easy to understand compared to more advanced statistical modeling techniques. In using the ratio, the assumption is that the relative proportion of the PT/OT/SLPs in a given area at any given moment is the most important determinant for the ability to deliver therapy services. A disadvantage of the ratio is that the approach does not consider any other variables, aside from population size, which are known to play a role in determining the impact of therapy performance on patient health outcomes in a given context. Other variables that also can impact outcomes include population structure; epidemiology and burden of disease; service utilization; therapist efficiency; health regulations and policies; technological capacity; distribution of therapist by occupation, place of work, and socio-demographic characteristics; public demand for services; and patient ability to pay for services (WHO, 2008).

In this study, HHRP ratios for PT/OT/SLPs practicing in outpatient clinics across southwest Virginia were estimated in order to conduct a comparative analysis of ratios across Virginia's urban and rural counties. However, a comparison of the PT/OT/SLPs in Virginia against the United States is hindered by the U.S. data reflecting ALL therapists practicing in ALL settings. Therefore, the practice setting of outpatient therapy could not be extrapolated for the U.S. comparison. According to Landry et al. (2009), the national

HHRP ratio for physical therapists across the United States was 6.2 for all practice settings, (i.e., the national averages for physical therapists per 10,000 people across the United States was 6.2.); the HHRP ratio for physical therapists in all practice settings in Virginia in 2005 was 7.19; the HHRP ratio for physical therapists in Canada in 2005 was 4.8. This data is reflective of all practice settings (Landry et al., 2009). The Landry method for ratio calculation utilized both active and inactive therapists, which would appear to deflate the ratio.

Using the Landry method to calculate the HHRP ratio, the number of active licensed PT/OT/SLPs, as reported by the DHP, for the state and each county was multiplied by 10,000; the result was divided by each county's population. Unlike the Landry method, only licensed therapists as identified by the DHP were utilized for the HHRP ratio. This equation yielded the density of PT/OT/SLPs per 10,000 people in Virginia and each county in southwest Virginia for 2018 for the outpatient setting. Unfortunately, the use of inactive therapists by Landry et al. (2009) does not allow for comparison, but can perhaps provide a means to determine a comparison of county-to-state HHRP ratio (Landry et al., 2009). Researchers can reference the PT/OT/SLP HHRP ratios to provide insight as to whether provider supply densities are optimal for patient access.

The HHRP ratio for physical therapists in the outpatient setting across the United States in 2018 was 6.7, occupational therapist 4.0, and speech language pathologist 4.8 (U.S Bureau of Labor Statistics, 2018). The HHRP ratio for physical therapists in the outpatient setting across Virginia in 2018 was 4.1, occupational therapist 1.3, and speech language pathologist 0.8 (Virginia Department of Health Professions, 2018). Table 4

reveals the disparity of therapist supply with the HHRP ratio for physical therapists in the outpatient setting across southwest Virginia in 2018 was 2.2, occupational therapist 0.5, and speech language pathologist 0.5 (Virginia Department of Health Professions, 2018). Addressing the rehabilitation needs of people with disabilities who reside in underserved rural communities can be accomplished by improving supply or by alternative delivery models such as telehealth (Jesus et al., 2020; U.S Bureau of Labor Statistics, 2020).

Literature suggests that very limited research has been conducted on workforce supply and therapy need in urban and rural communities. It also revealed one other study that examined SLP supply to population. In the provinces and territories of Canada in 2017, there were 3.7 SLPs per 10,000 population (Lagacé et al., 2018). A workforce supply study across 35 high-income countries identified an average supply of PT and OTs per 10,000 population was 15.7. The U.S. average PT and OT supply (all practice settings) for the same study period in 2017 from the Jesus et al. study was 10.8. The Jesus et al. (2020) study also indicated the need assessment for PT and OT services based upon disability-focused data (i.e., years lived with disability from the Global Burden of Disease 2017), alongside other relevant health and socioeconomic indicators. The average need in the United States for PT and OT services was 6.6. Ultimately, PT and OT supply was positively predicted by a lower population size (Jesus et al., 2020).

The limitation of the PT/OT/SLP supply to population density ratio is the inability to compare rural to urban counties due to the different population health requirements and therapy availability (Sykes et al., 2014). Ideally, for improved accuracy regarding population health requirements, it is important to establish the amount of unmet demand for PT/OT/SLP services that exists, such as lack of PT/OT/SLPs, and financial or

geographical barriers, inhibiting the patient from receiving therapy in the outpatient setting (Carvalho et al., 2017). Future investigations with the concept of a benchmarking projection of the population's future therapy demand (e.g., whether and how much rehabilitation services are actually sought and utilized by the population, regardless of underlying need) in rural communities are critical for a greater understanding of the government policy and the socio-economic, environmental and health drivers (Lagacé et al., 2018).

The population size was a factor directly associated with the PT/OT/SLP workforce supply. This may create a double disparity, or ecological risk, for people living in rural counties by facing needs-based shortages of therapists, if explicit governmental policies are not in place (Jesus et al., 2020). Research suggests that population need was not independently associated with the PT/OT/SLP supply; population size was associated with supply. Access to needed rehabilitation can be problematic for many reasons. First, PT/OT/SLPs are unavailable or in very small numbers in the outpatient setting. Second, existing therapy services and PT/OT/SLPs concentrate in urban locations and are not accessible to numerous people with disabilities who are living in rural settings. Third, many people have no access to needed rehabilitation due to health insurance coverage or limited covered visits under the insurance plan. Finally, people with disabilities typically have lower employment rates, higher health expenditures, and lower mobility. Therefore, the costs of services, lack of transportation or lack of physically accessible sites are also access barriers (Dew et al., 2013; Jesus et al., 2017; MacKenzie et al., 2019).

In 2006, the United Nations Convention on the Rights of Persons with Disabilities (CRPD) provided guidance to meet the challenges the disabled face in accessing basic

rehabilitation health care. The guidance provided by the CRPD is often challenged by the undersupply and inequitable distribution of PT/OT/SLPs. The scarcity of workforce studies on PT/OT/SLPs and the lack of policy-makers' action on therapist supply have not benefitted the plight for access faced by the disabled. Jesus et al. (2017) suggest the "Six Rehab-Workforce Challenges": 1) monitor supply accounting for needs and demand, 2) structural improvement to supply data sources, 3) study all therapy disciplines, 4) staffing underserved communities (to include telehealth use), 5) adapt policy options to context of rural versus urban, and 6) develop international solutions to the workforce supply. To develop a HHRP for PT/OT/SLPs, future research in determining PT/OT/SLPs supply requirements should consider more than just population size, including other need indicators (such as population ageing and epidemiological variables), and demand indicators (such as rehabilitation services use and data on unfilled vacancies) (Sykes et al., 2014; World Federation of Occupational Therapists, 2016). The literature does not provide specific research on workforce supply in rural communities for therapists in outpatient settings and based upon this, the use of population size will be utilized to determine PT/OT/SLP supply compared to Virginia's HHRP ratio (for outpatient setting) and the United States' supply HHRP ratio (for all practice settings).

Unfortunately, as of 2022, there are five counties in southwest Virginia that have either no OTs and/or SLPs in the outpatient setting (Table 3). Although the DHP data represents all active licensed therapists in Virginia, the focus for this research project is on the outpatient setting. Of the 7,903 physical therapists with active licenses in Virginia, only 3,510 listed "outpatient" as the practice setting. Of the 4,317 occupational therapists, 1,079 listed "outpatient" as the practice setting. Of the 3,996 speech-language

pathologists, 684 listed “outpatient” as the practice setting (Virginia Healthcare Workforce Data Center, 2020). Therapists that listed “school” as the practice location were not included as outpatient therapists for the purposes of this research study. The comparison of southwest counties to Virginia for PT/OT/SLP supply in the outpatient setting reveals a significant undersupply based upon population. For physical therapists, there is an undersupply of 46%; for occupational therapists: 62%, and for speech-language pathologists: 38% (Table 4). These findings may support future research to develop adequate models of supply ratios for PT/OT/SLPs to identify underserved regions, practice settings, and populations (Lin et al., 2015).

Table 3

PT/OT/SLPs in Clinics Across Southwest Virginia

County	**Number of residents per Census July 1, 2020**	**Number of Physical Therapists in Outpatient Setting**	**Number of Occupational Therapists in Outpatient Setting**	**Number of Speech-Language Pathologists in Outpatient Setting**
Bland	6,410	1	1	0
Buchanan	21,380	2	1	1
Carroll (to include Galax City)*	35,963	3	1	1
Dickenson	14,331	3	0	0
Grayson	15,474	6	1	1
Lee	23,833	3	0	0
Russell	26,958	3	0	0
Scott	21,995	3	0	0

Smyth	30,068	12	2	3
Tazewell	41,431	8	3	3
Washington (to include Bristol City)*	70,724	19	6	5
Wise (to include Norton City)*	41,763	8	3	3
Wythe	28,546	10	3	2

Note. *The Bureau of Economic Analysis combines the city of Galax with neighboring Carroll County, Bristol City with Washington County and Norton City with Wise County for statistical purposes. Published on January 29, 2021 by the Weldon Cooper Center for Public Service Demographics Research Group. Retrieved from: https://demographics.coopercenter.org. In the public domain.

Table 4

HHRP Therapist Ratio in Outpatient Setting

County	**Number of residents per Census July 1, 2020**	**No. Of PTs**	**HHRP PT Ratio**	**No. Of OTs**	**HHRP OT Ratio**	**No. Of SLPs**	**HHRP SLP Ratio**
Bland	6,410	1	1.6	1	1.6	0	0.0
Buchanan	21,380	2	0.9	1	0.5	1	0.5
Carroll (to include Galax City)*	35,963	3	0.8	1	0.3	1	0.3
Dickenson	14,331	3	2.1	0	0.0	0	0.0
Grayson	15,474	6	3.9	1	0.7	1	0.7
Lee	23,833	3	1.3	0	0.0	0	0.0
Russell	26,958	3	1.1	0	0.0	0	0.0
Scott	21,995	3	1.4	0	0.0	0	0.0
Smyth	30,068	12	4.0	2	0.7	3	1.0

Tazewell	41,431	8	1.9	3	0.7	3	0.7
Washington (to include Bristol City)*	70,724	16	2.3	3	0.4	5	0.7
Wise (to include Norton City)*	41,763	8	2.0	3	0.7	3	0.7
Wythe	28,546	9	3.2	3	1.1	2	0.7
Southwest Virginia	364,545	80	2.2	19	0.5	17	0.5
Virginia	8,631,393	3,510	4.1	1,079	1.3	684	0.8
United States*	331,449,281	220,870	6.7	131,600	4.0	158,100	4.8

Note. Virginia Department of Health Professions (DHP) data for **active** PT/OT/SLPs were utilized for the ratio calculation which diverges from the Landry study of 2009 which included **inactive** therapist also for the ratio calculation. Retrieved from:
https://www.bls.gov/oes/current/oes291123.htm
https://www.bls.gov/ooh/healthcare/occupational-therapists.htm
https://www.bls.gov/ooh/healthcare/speech-language-pathologists.htm
https://nchealthworkforce.unc.edu/interactive/supply/
*The data represented for the United States reflects therapist practicing in ALL locations – not specific to outpatient only. In the public domain.

Access to an Outpatient Therapy Clinic in Rural Communities

There are high public expectations for access to quantity and quality of rehabilitation services for individuals with chronic disabilities in order to improve and maintain their function (Laliberté et al., 2017). The distributive justice principle states that "fair to access" requires that people have equal opportunities to PT/OT/SLP; in rural communities, fair to access is limited (Laliberté et al., 2017; Lewins, 1996). Access for individuals with chronic disabilities is also important for those seeking nonpharmacological management of pain. Unfortunately, due to access issues,

Appalachia continues to witness an increase in the proportion of use of all prescription medications for rural residents when compared to urban residents; this epidemic of opioid misuse and opioid use disorder underscores the necessity for outpatient therapy access as an alternative treatment for acute and chronic disease (Goode et al., 2013).

Parkinson's Disease is a progressive disorder of the central nervous system that affects movement and often leads to slow movement, stiffness, loss of balance, and communication disorders (Mayo Clinic, n.d.). The loss of mobility often makes attending outpatient therapy a stressful task or could prevent access altogether. In addition, a recent study found that PT/OT/SLPs experience challenges with resources that significantly impact the provision of therapy services for Parkinson's patients due to large caseloads, outpatient clinic locations and staff support (Swales et al., 2019). According to Marta Gwinn, MD of the CDC, the prevalence of Parkinson's disease is estimated to double by 2030 (Hamza et al., 2011). The increase in patients with Parkinson's disease, combined with limited PT/OT/SLP staffing levels in rural communities, will unfortunately place patients at risk of not receiving evidence-based treatment (Swales et al., 2019).

In addition, for parents of children with developmental disabilities living in rural communities, access to PT/OT/SLP is significantly decreased compared to urban access; these children disproportionately experience access barriers to PT/OT/SLP services (McManus et al., 2016). Urban children with developmental needs receive, on average, 50 hours of therapy annually, whereas rural children only receive 4.5 hours of therapy annually (Bailey et al., 2003). Access to therapy for children is essential, and research suggests children with greater condition severity and who live in rural areas are significantly more likely to report an unmet need for therapy (McManus et al., 2016).

Access to therapy services is essential for children as to limit the negative effects of the developmental disorder that will lead to physical, psychological, social, and economic longterm deficits (Tohidast et al., 2020).

Rural residents with lower income, less educated, and without supplemental private insurance were less likely to use PT/OT/SLP services; these rural community residents also tend to be in poorer health (CDC, n.d.-d; Douthit et al., 2015; Virginia Department of Health, n.d.-c; Virginia Rural Health Association, n.d.-b). In-person SLP services (as well as PT/OT) is not possible for many individuals for different reasons, including geographical and economic issues, especially for low-income communities; however, a solution is telehealth services and provision of PT/OT/SLP services from a distance (Tohidast et al., 2020). The Virginia Rural Health Association and the Organization for Health in the Appalachian Region state that community characteristics indicate that rural residents use less health care, and this is typically considered to be indicative of problems with access (i.e., not receiving the necessary care due to travel distance, clinic availability, or financial concerns) (Appalachian Regional Commission, 2021). The PT/OT/SLP supply, which in turn impacts access to therapy, is positively predicted by a lower population size; demographic and economic indicators also validate that access impacts rural communities' health status (Jesus et al., 2020). Children and adults experience barriers to essential health, including transportation issues, provider shortages, and difficulty obtaining specialist care (Douthit et al., 2015; McNamus, 2016; Venkataramani et al., 2017). Residents living in rural counties are at risk for poorer health outcomes due to several indicators, including that of low provider supply or a total lack of provider (Zolotor & Yorkery, 2018).

The availability and accommodation of therapeutic outpatient services relates to the timely attainment, geographic location, hours of operation, and capacity of services offered. Additionally, traveling for care is also a central theme for access of outpatient therapy services in rural communities (Cyr et al., 2019; Douthit et al., 2015). In rural communities where outpatient therapy clinics are a significant distance from the patient home, governmental assistance to offset the costs and imposition of travel to facilitate their access may be necessary (Dew et al., 2012; Dew et al., 2013). Recent research has found that adequate access promotes management of dire health problems, and there is a positive relationship between increased distance from a health care facility and decreased health status (Amoah et al., 2020; Quattrochi et al., 2020).

Transportation barriers and distance to health care facilities are often cited by patients and their families as barriers to health care access (Syed et al., 2013). These barriers lead to increased rescheduling of appointments or missed appointments and delayed care in the outpatient setting. Indeed, patients report that transportation is the main cause for missed/rescheduled health care appointments; travel distance and time to health care providers also leads to greater health burden with associated poorer health outcomes in Appalachia (Arcury et al., 2005; Nemet & Bailey, 2000; Okoro et al., 2005). In southwest Virginia, the PT/OT/SLP supply is significantly below the Virginia state average. In addition, several counties have only one or two outpatient therapy clinics to provide therapy services to residents in counties with 400 to 600 square miles in each county. The relationship between travelling further and poor health outcomes cannot be ruled out as a social determinant of health in Appalachian rural communities (Kelly et al., 2016).

Health Impact with Limited Access to PT/OT/ST

The limited availability of PT/OT/SLPs in outpatient therapy clinics in rural counties of Virginia and the implication to a patient's treatment of acute and chronic medical conditions is reflected in research originating in multiple rural areas (Falvey et al., 2020; Mbada et al., 2019). Similar to rural southwest Virginia, in Australia, the geographic challenges of remote populations in rural communities faced limited access to SLPs. This led to decreased intervention for pediatric patients to address communication and swallowing disorders by SLPs (Hill & Miller, 2012; Hill & Theodoros, 2002; Tambyraja et al., 2021). An alternative and both viable and sustainable option to face-to-face visits in the outpatient clinic for pediatric patients in rural communities is telehealth provided by SLPs (Keck & Doarn, 2014; Kollia & Tsiamtsiouris, 2021).

The problems of decreased access to primary care physicians in rural communities has given rise to physical therapists as extended scope providers for screening and referral if clinical symptoms suggest a condition that requires the service of a physician. For oncology patients, the research is clear: limited physical activity levels necessitate the intervention by therapists to attenuate the physical decline (Bland et al., 2020; Boggs et al., 2020). The benefit of PT/OT/SLP evidence-based care improves symptoms such as fatigue, managing anxiety and depression, and improving quality of life. Without access, conditions such as musculoskeletal, cardiovascular, and neurological conditions, as well as cancer, can place profound restrictions on an individual's ability to participate in daily activities, employment, recreational activities, and life (Cottrell & Russell, 2020; Lee et al., 2018; Levy et al., 2015; Shaw, 2009).

Telehealth provides PT/OT/SLPs the flexibility to continue treating their patients while following best practices and ethical standards. Telehealth adoption is needed today more than ever, and more research is recommended to further address current and future challenges of therapist adoption of the telehealth platform. One example of telehealth adoption by PT/OT/SLPs is a case study of two families living in rural Kentucky that received therapy via the Kentucky Telehealth Network. Following program implementation, qualitative data was collected using participant journals and interviews. The results of the case study indicated that telehealth has the potential to cost-effectively meet the therapeutic needs of children living in rural areas where provider shortages exist (Sarsak, 2020).

One example of telehealth uses to address limited access and therapist availability is a study of SLPs in Australia to meet demand for services affected by workforce shortages in rural communities (Australian Senate, 2014; Edwards et al., 2012; Freckmann et al., 2017). A survey performed by SLPs in Australia regarding benefits, barriers, and facilitators to using telehealth revealed five major themes: access, time efficiency, client focus, caseload management, and cost efficiency (Hill & Miller, 2012). The research by Hill & Miller's survey revealed that 70.2% of SLPs considered telehealth cost-effective. However, SLPs acknowledged barriers to the previous five themes: problems with technology (71.9%), telecommunication connections (45.6%), and lack of assessment and treatment resources suitable for telehealth (36.8%). The literature supports acceptance by SLPs for the use of telehealth in the provision of some SLP services, but further research is needed to assess if this has led to expansion in the use of telehealth in the clinical outpatient practice setting.

The Impact of the Pandemic on Access to PT/OT/ST Outpatient Clinics

The deleterious effects associated with the cessation of physical activity seen during the pandemic quarantine are associated with an increased risk for cardiovascular mortality (Mattioli et al., 2020). In addition, higher incidence of diabetes, cancer, and osteoporosis are directly related to inactivity (Lippi et al., 2020). The pandemic variants of the COVID virus are prompting health care providers to delay elective surgeries and ration health care during local pandemic surges; municipalities are reclosing schools and placing limitations on in-person contact (CDC, 2021). The COVID pandemic exacerbated several challenges health care providers were already facing, including the treatment of patients exposed to the virus or infected by it; management of patients with non-COVID-related illnesses; commitment to providers and staff to remain healthy; and ensuring the financial viability of their practices.

Direct Impact of the Pandemic on PT/OT/SLP Outpatient Clinics.

The APTA, AOTA, and ASHA state that as of May 2021, one year into the pandemic, over a quarter of PTs/OTs/SLPs (28%) were still experiencing income loss. Outpatient clinics felt a 62-76% decrease in physician referrals for therapy during the first six months of the pandemic. Approximately 40% of PTs/OTs/SLPs experienced declines in weekly income during the first year of the pandemic. In addition, for PT/OT/SLPs in outpatient clinics, 7% were laid-off, 16% were furloughed, and 2% resigned over the past year (APTA, AOTA, ASHA, n.d.). A March 2021 American Medical Association analysis found that physical therapy was the most severely impacted specialty during the pandemic when it came to payment through the Medicare physician fee schedule, with an estimated drop of 34% in spending from January to June 2020,

because many individuals self-isolated instead of seeking care (American Medical Association in their 2021 report "Changes in Medicare Physician Spending During the COVID-19 Pandemic"). Based on these statistics, despite the gradual improvement over the past year, the impact of COVID on PT/OT/SLPs in outpatient therapy has been profound.

Non-financial Barriers

Unfortunately, in the United States, 20% of adults are not receiving timely health care due to non-financial barriers, and younger adults are impacted even more than their older counterparts (Kullgren et al., 2012). Approximately 28 million children also experience non-financial barriers to specialist care in the form of transportation and provider shortages (Children's Health Fund, 2016). The impact of the non-financial barriers may be far greater than the financial barriers that result in delayed or unmet health care (Kullgren et al., 2012). The most common non-financial barriers identified cited in the literature are accommodations (i.e., hours of operation) and availability (i.e., number of clinics and supply of providers); these barriers may raise concern for advocates of public and population health to identify alternative methods of care and distribution of supply of outpatient clinical intervention services to populations within rural communities.

TELEHEALTH

General Definitions

The definition of telemedicine, as well as telehealth, has been evolving even prior to the pandemic, and there is no consensus on the definition of either of the two terms per the American Medical Association (AMA). According to the Health Resources and

Services Administration (n.d.), telehealth is “the use of electronic information and telecommunications technologies to support and promote long distance clinical health care, patient and professional health-related education, public health, and health administration” (para. 3). Telemedicine is “the remote delivery of health care services and clinical information using telecommunications technology. This includes a wide array of clinical services using internet, wireless, satellite and telephone media” (Health Resources and Services Administration, n.d., para. 4). Both AOTA and APTA recommend the use of the term *telehealth* by OTs and PTs (as will be discussed later, ASHA recommends the use of *telepractice* by SLPs).

Telemedicine refers specifically to remote clinical services, while telehealth can refer to remote non-clinical services. The AOTA’s use of the term *telehealth* is inclusive of evaluation, intervention, consultation, supervision, and remote monitoring provided by OTs across the practice setting (AOTA, 2018). Three types of telehealth exist: 1) synchronous or real-time delivery, 2) asynchronous or store-forward where data is recorded and reviewed at a later date by a therapist, and 3) a hybrid-approach that incorporates synchronous and asynchronous modes (Swales et al., 2019).

ASHA uses the term *telepractice*. Any reference to telepractice includes telehealth, which is Medicare’s term for the health care services delivered via interactive audio and video telecommunications technology with real-time capability (ASHA, n.d.-c). The use of telehealth, according to ASHA, is the application of telecommunications technology to provide therapy services at a distance by linking a PT/OT/SLP to the patient, or therapist to therapist, for assessment, intervention, and/or consultation. ASHA, APTA, and AOTA all endorse telehealth as an appropriate and suitable service delivery

model for therapy, provided that the quality telehealth services are the same as those provided face-to-face (n.d.). A systematic review has found considerable research that synchronous telehealth use for evaluation and treatment of many communications, physical and behavioral health conditions by PT/OT/SLPs is comparable to face-to-face delivery (Dahl-Popolizio et al., 2020; Molini-Avejonas et al., 2015).

The Office for Civil Rights (OCR) at the Department of Health and Human Services (HHS) is responsible for enforcing certain regulations issued under the Health Insurance Portability and Accountability Act of 1996 (HIPAA), as amended by the Health Information Technology for Economic and Clinical Health (HITECH) Act. The HITECH Act protects the privacy and security of protected health information, namely the HIPAA Privacy, Security and Breach Notification Rules (the HIPAA Rules) as defined by U.S. Department of Health and Human Services (HHS, n.d.). As a result of the pandemic, the HHS has directed CMS to waive certain equipment and HIPAA requirements during the public health emergency. Clinicians can now use nonpublic facing platforms that allow two-way, synchronous telehealth communication that are not HIPAA-compliant. Examples of acceptable platforms listed by CMS include Apple FaceTime, Facebook Messenger video chat, Google Hangouts video, Zoom, and Skype.

A therapist's discretion applies to telehealth provided for any reason, regardless of whether the telehealth service is related to the diagnosis and treatment of health conditions related to COVID. The OCR has not provided detail as to when enforcement of HIPAA rules will resume. It is, therefore, recommended that therapists seek additional privacy protections for telehealth while using video communication products through technology vendors that are HIPAA compliant and will enter into HIPAA business

associate agreements (BAAs) in connection with the provision of their video communication products (HHS, n.d.).

Use of Telemedicine by Medical Providers

The use of telemedicine by medical providers allows for patient convenience, as the stress of transportation to the physician's office is removed. In addition, familial stress of having to accommodate office visit schedules for family members to receive proper medical attention is removed (George et al., 2018; Taber et al., 2015). Prior to the pandemic, hospitals and physician offices initiated implementation of telemedicine with the altruistic goal to improve patient outcomes; interestingly, research indicates that reluctance by primary care providers to adopt telemedicine was the most impactful reason for low implementation rates in United States hospitals and physician offices (Adler-Milstein et al., 2014; Jetty et al., 2021; Liaw et al., 2019).

The reluctance to adopt telemedicine by primary care providers has been investigated by researchers utilizing the Technology Acceptance Model (TAM) to determine factors that affect the intent of the use of telemedicine (Poellhuber et al., 2018; Sánchez-Prieto et al., 2020; Weng et al., 2018). The successful implementation of telemedicine for medical providers is dependent upon the recognition of what factors act as barriers in their adoption of the technology within hospitals and physician offices (Kamal et al., 2020). There are many documented benefits of telemedicine's impact on chronic disease management, but medical providers continue to experience difficulty accepting telemedicine, in part, due to the complexity of the technology that is required to provide the services (Kissi et al., 2020).

For medical providers, several barriers stall the adoption of telemedicine and research studies identify several key factors that present a relationship with these barriers that influence acceptance of the technology (Harst et al., 2019; Ladan et al., 2018). Kruse et al. (2018) identified the following barriers to acceptance of telemedicine for medical providers: challenges of the telemedicine technology, resistance to change and cost, and concerns with reimbursement. These findings have been confirmed by other researchers and additional barriers were identified, including lack of adequate training and support, legal barriers, and privacy and confidentiality (HIPPA) concerns, as factors affecting acceptance by medical providers of telemedicine technology (da Fonseca et al., 2021; Rahimi et al., 2018).

In Virginia, research into telemedicine is currently ongoing with the primary goal for direct-to-consumer, timely access of specialty and subspecialty services to rural and underserved populations. The Virginia General Assembly passed SB 369 authorizing the Center for Telehealth at the University of Virginia, together with the Virginia Telehealth Network (VTN), to establish a telehealth pilot program. The purpose of the pilot is to expand access to and improve the coordination and quality of health care services in rural areas of Virginia and areas of the state that have been identified as medically underserved through the use of telemedicine.

The VTN, a 501c3 nonprofit organization, has established the goal for all Virginia residents to have access to high-quality health care anywhere, anytime. The VTN seeks to understand the impact of telehealth on patients and providers and to better understand the current and future needs of the technology. The Virginia State Office of Rural Health, a federally funded office by HRSA Federal Office of Rural Health Policy, is coordinating

with the VTN to survey all health care providers in Virginia in 2021. The "Virtual Care in Virginia: 2021 Benchmark Survey" results will be made available in 2022. The goal of this survey is to identify how telehealth might provide a solution to address the same disparities in access to health care that persist between face-to-face and virtual care, including lack of insurance, language differences, literacy challenges, and broadband access issues. The VTN experiential data will explore the current and future needs of telehealth with the intention of providing policy makers insight to support increased access to high-quality health care for underserved communities in the commonwealth of Virginia.

Evidence-based Outcomes of Telehealth in Outpatient Clinics

During the initial stages of the pandemic, reimbursement expansion to include PT/OT/SLPs created a window of opportunity to study the feasibility of and patient satisfaction with telehealth. The Harvard Medical School located in Massachusetts conducted a study of the use of telehealth by PT/OT/SLPs from May 2020 to July 2020 to measure patient experience with telerehabilitation (Tenforde et al., 2020). The Tenforde et al. (2020) results revealed telehealth adoption by PT/OT/SLPs lead to high patient satisfaction measures across age, condition, and visit characteristics for both adults and pediatric populations and high reported value for future telehealth use. This singular study, combining PT/OT/SLPs use of telehealth in an urban community (teaching hospital system) did not evaluate the therapist intention to use, or attitudes toward telehealth; rather, the patient experience with telehealth alone was examined.

The face-to-face delivery of SLP services for motor and speech assessment and the treatment of Parkinson's patients is shown to be equivalent to face-to-face sessions

when using the LSVT® LOUD program via telehealth (Constantinescu et al., 2010). The maintenance program for post- LSVT® LOUD SLP therapy via telehealth has also shown to provide significant improvement in voice volume (Halpern et al., 2012; Quinn et al., 2019). The LOUD treatment program by SLPs is just one example of effective telehealth utilization to improve access to outpatient therapy for patients with chronic and progressive neurological disorders.

Furthermore, the provision of SLP telehealth services with the pediatric population presents a growing body of evidence to validate the feasibility and acceptance of these services by patients and their parents (Lincoln et al., 2014; Valentine, 2014). ASHA and AOTA provide additional continuing education for telehealth (telepractice and telerehabilitation). The APTA has a certification program for telehealth. The goal of the three organizations is to facilitate the ethical use of telehealth as an evidence-based platform, however the need for additional research to support the applications use for specific patient diagnosis remains.

Perceptions of Telehealth in Outpatient Clinics by OTs/PTs/SLPs.

The COVID pandemic is increasing research into telehealth utilization by PT/OT/SLPs. A survey of 145 SLPs in New Jersey by Kollia & Tsiamtsiouris (2021) revealed that a majority had begun using telehealth and indicated they would continue to do so as more than half of the participants reported quality similar to face-to-face services. The barriers identified were technology and client factors that were similar to multiple recent survey articles published since March 2020 (Kollia & Tsiamtsiouris, 2021). A survey conducted by ASHA (2020) presented results that were comparable to the findings by Kollia and Tsiamtsiouris for pre- versus post-pandemic and challenges

versus benefits for telehealth. The main benefits for telehealth include ability to work with clients in rural, distant, and underserved locations, and to narrow the gap of socioeconomic disparities. Telehealth will remain a large part of the SLP profession, and it is imperative that barriers and disparities be addressed by training programs and technology infrastructure investment (ASHA Live, 2020; Tucker, 2012).

One concern identified from the literature review is that negative perceptions by SLPs towards telehealth are often related to the potential adverse effect on the clinician-client relationship and the development of rapport (therapeutic alliance). The therapeutic alliance of building quality relationships, or rapport, has long been identified by SLPs as important for successful therapy (Duchan & Kovarsky, 2011; Nelson, 2011). The Therapeutic Alliance Scales for Children (TASC) is a survey instrument for therapists, children and parents that measures therapeutic alliance. Despite SLP perceptions, extensive research into the TASC provides reassurance for SLPs that relationships developed online via telehealth are similar to those developed face-to-face (Hill & Miller, 2012; May & Erickson, 2014; Simpson & Reid, 2014).

ASHA prefers the use of the term telepractice, over the term telehealth. The use of telepractice by SLPs for the assessment and treatment of a wide range of speech and language disorders, includes the following:

- Aphasia (Lavoie et al., 2017)
- Articulation disorders (Crutchley et al., 2010; Grogan-Johnson et al., 2013)
- Autism (Casale et al., 2017; Iacono et al., 2016; Parmanto et al., 2013)
- Dysarthria (Hill et al., 2006)
- Dysphagia (Cassel, 2016; Malandraki et al., 2014;)

- Fluency disorders (Carey et al., 2014; Carey et al., 2012; Lewis et al., 2008)
- Language and cognitive disorders (Brennan et al., 2018; Sutherland et al., 2016; Waite et al., 2010)
- Neurodevelopmental disabilities (Simacek et al., 2021)
- Voice disorders (Halpern et al., 2012; Mashima & Brown, 2012; Hill et al., 2006; Tindall et al., 2008; Towey, 2012)

The AOTA first published telehealth guidelines in 2005 and utilized the term *telerehabilitation*. The AOTA officially endorsed the term "telehealth" in 2013. This research project reveals that similar to SLPs, the utilization by OTs has significantly increased during the pandemic. Proffitt et al. (2021) suggest the PACE model for a framework to evaluate the utilization of telehealth by OTs; this model consists of: Population and Health Outcomes, Access for All Clients, Cost and Cost Effectiveness, Experience of Clients and OT practitioners. Using the PACE model reveals that the OT profession (as well as the SLP & PT professions) realized that the Veteran's Health Administration, schools, and early intervention programs rapidly transitioned to telehealth.

Those programs do not rely primarily on payment from third-party payors, whereas hospitals, clinics, and community settings have adopted telehealth at a much slower pace during the pandemic because they do. Population health outcomes, access, cost, and experience can allow PT/OT/SLPs to provide the "right care, at the right time, in the right place" (Wallisch et al., 2019). Research performed in the OT field identifies that telehealth can be used to overcome geographical barriers of distance and travel,

enhance access to care and increase access to OTsin rural communities (Cason, 2012; Renda & Lape, 2018; Wallisch et al., 2019).

The pandemic impact on OT service provision forced many OTs to abruptly shift to a telehealth service delivery model. Unfortunately, many shifted without advanced training or preparation. An investigation into the perceived effectiveness of telehealth in the OT practice was performed by Dahl-Popolizio et al. (2020). The research of 176 OTs from across the United States reported that 77% supported telehealth as a substitute for face-to-face services and 78% support telehealth as a permanent option for OT service delivery (Dahl-Popolizio et al., 2020). Their research identified seven themes, both positive and negative, in relation to telehealth utilization in the outpatient setting. The negative themes were technical issues, lack of personal contact, and telehealth is not effective with all populations. The more positive themes identified where parent/caregiver involvement improves effectiveness, telehealth was effective for OT delivery, it increases access to care, and telehealth should be a permanent option for patients/caregivers (Dahl-Popolizio et al., 2020). Populations or conditions that telehealth was most effective for were pediatrics (84%), children with developmental delays (47%), neurological issues (25%), and cognitive issues (21%); these were identified by survey participants as populations or conditions that OT interventions provided via telehealth were perceived as positively managed (Dahl-Popolizio et al., 2020).

The Rural Veterans TeleRehabilitation Initiative Technology and Procedure was established in 2009 with funding from the Veteran Health Administration Office of Rural Health. This program delivers patient-centered PT/OT/SLP services via telehealth to veterans with the use of Cisco E20 videophones (Cisco Systems Inc.). Once the veteran

receives training on the use of the videophone, they are connected to a Veterans Association (VA) PT/OT/SLP via a dedicated, secure, encrypted VA Internet network. A study by Levy et al. (2015) provided evidence of significant improvements in physical function, cognitive function, functional independence, and health-related quality of life with positive veteran satisfaction in the use of telehealth. This study indicates that telehealth is a promising alternative to standard face-to-face rehabilitative services.

Systematic reviews for telehealth use by PTs in the treatment of musculoskeletal conditions demonstrate comparable outcomes and patient satisfaction to face-to-face sessions (Lee et al., 2018; Wong et al., 2020). As seen in Figure 4, the research also indicates patients with chronic disease demonstrate positive outcomes and satisfaction when services were provided via telehealth by PTs in the outpatient setting.

Figure 4

Health Conditions and Telehealth Use by PTs

Chronic Disease Condition	Research Citation
cardiopulmonary disease	Bryant, Fedson & Sharafkhaneh, 2020; Cox, Alison, Button, Wilson & Holland, 2013; Shaw, 2009
neurological conditions	Burridge, Lee, Turk, Stokes, Whitall, Vaidyanathan & Yardley, 2017; Cardinale, 2018; Chatto, York, Slade & Hasson, 2018; Tenforde, Hefner, Kodish-Wachs, Iaccarino & Paganoni, 2017

post total joint replacement	Fisher, Biehl, Titmuss, Schwartz & Gantha, 2019; Kane, Thakar, Jamgochian, Lazarus, Abboud, Namdari & Horneff, 2020
COVID	Eannucci, Hazel, Grundstein, Nguyen & Gallegro, 2020; Middleton, Simpson, Bettger & Bowden, 2020; Miller, Pak, Keller & Barnes, 2021

The literature review for this project did reveal certain limitations in using telehealth for PT/OT/SLPs in the clinical performance of evaluations. One example is the evaluation of cardiopulmonary patients remotely. PTs could not perform the physical tests typically utilized to tailor the rehabilitation program: 6-min walk test (6MWT), the manual muscle test, grip strength tests, and gait assessment (Gephine et al., 2020). Research demonstrated how PT/OT/SLPs can be innovative in the telehealth environment. For cardiopulmonary patients, PTs modified the 1-min Sit-To-Stand test (1STS) to assess exercise capacity and cardiovascular responses instead of the 6MWT. The 5-time STS test is used to assess and monitor improvement in muscle strength during the course of the program (Bryant et al., 2020).

Telehealth Use by PT/OT/SLP in Response to the Pandemic.

Telehealth therapy services appear to be widely available in other countries and have proven to be effective; however, prior to the pandemic, utilization and reimbursement in the United States remained mostly limited to different government agencies, such as the U.S. Army and the Indian Health Service (Grundstein et al., 2021). Grundstein et al. (2021) wrote that the pandemic may have changed telehealth utilization, especially in rural communities, to address access, supply of therapists, and practice

patterns. Indeed, the future may see a hybrid model of care where roughly one-third of each individual patient's episode of care would be through telehealth for PT/OT/SLP services (Grundstein et al., 2021).

The utilization of telehealth by PT/OT/SLPs in the outpatient setting has increased since the pandemic began, but the utilization appears to be diminishing. In an APTA report from May 2021, just over 10% of outpatient PTs were seeing an average of at least six patients per week via telehealth. That number is down from March-April 2020 when 48% of PTs reported providing telehealth to at least 10 patients per week (APTA, 2021). The number of OT/SLPs seeing at least six patients per week via telehealth is more than double that of PTs. The service area/patient populations that represent the greatest utilization of telehealth by OT/SLPs are early intervention, school based and pediatric private practice settings (AOTA, 2021; ASHA, 2021; HHS, 2021). The literature review did not reveal evidence as to why the utilization of telehealth by PT/OT/SLPs has declined, and therefore a connection to the gradual reopening of clinics, relaxing of pandemic mandates or patient reassurance that it is safe to travel again could not be determined. The aim of this research study is to provide insight as to the very topic of PT/OT/SLP telehealth use during the pandemic, and hopefully provide insight as to the attitudes toward telehealth use into the future.

For public school systems in Virginia, one of the biggest challenges to school boards is providing SLP services to underserved areas of the state. The public-school divisions are federally mandated to provide special education services, which often include treatment by a SLP. Public school divisions across the state, especially in rural areas, often have difficulty providing SLP services due to a lack of available

practitioners. The use of telepractice in school systems is a useful resource for providing services to rural schools that have an undersupply of therapists (DHP, 2020).

Rural communities' access to health care can be improved by telehealth services, and now is the time to determine barriers to utilization, if such barriers exist. Identification of telehealth utilization will allow therapy disciplines to respond to new technologies and client demands for access with alternative service delivery options. This information may help guide policy and reimbursement allocation for telehealth in rural communities for therapy services. Utilization of any telehealth technology service will be described as the therapist performing at least one evaluation or treatment session via telehealth.

THEORIES USED in RESEARCH REGARDING TELEHEALTH

Description and History

The voluntary adoption of new technology by an individual is known as technology acceptance (Holden & Karsh, 2010). For the successful implementation and utilization, the user's willingness to adopt and adapt to the technology is an important factor (Cilliers & Flowerday, 2014; Melania et al., 2009). The technology acceptance model (TAM) was created by Fred Davis (1985) and TAM has come to represent the most established and substantial foundation of technology acceptance (Holden & Karsh, 2010; Gammon et al., 2008; Strudwick, 2015; Vassilios et al., 2009; Yi et al., 2006). The goal of TAM is to forecast the adoption of new technology among users and to identify design problems that may limit perceived usefulness by the end user (Harst et al., 2019; Weichbroth, 2018; Yi et al., 2006). The two main constructs of TAM are perceived usefulness and perceived ease of use (Fischer et al., 2020; Gagnon et al., 2011; Kamal et al., 2019).

Several research studies have identified concerns regarding usage of the original TAM constructs to explain users' intention towards health information technologies (Aggelidis & Chatzoglou, 2008; Chang et al., 2015; Holden & Karsh, 2010; Kamal et al., 2019). Utilization of telehealth is dependent upon multiple social and behavioral factors such as social influence and facilitating conditions. These factors can significantly alter the user acceptance of new technology (Kamal et al., 2019; Klaic & Galea, 2020). Additional variables are needed to detail organizational support and training in telehealth. Therefore, Marler et al.'s (2006) extended version of the TAM will be used as the framework for this research study.

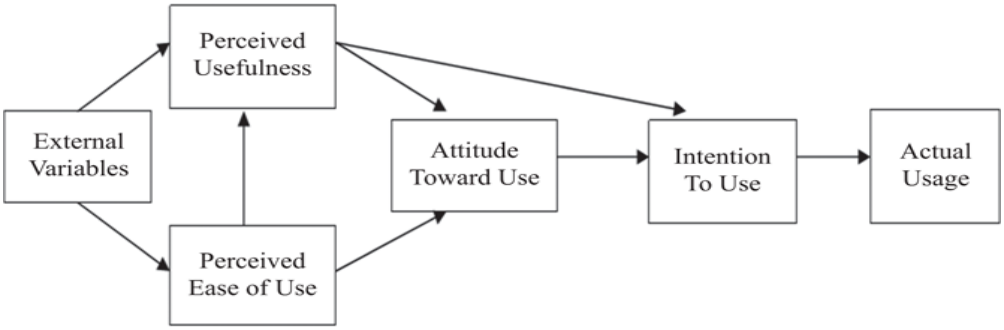
The original TAM focused on introducing technology to therapists and evaluating their preparedness to accept the technology. The original TAM factors, perceived ease of use (PEOU) and perceived usefulness (PU), were extended to include the individual's perception regarding the degree to which the information technology is applicable to their job (Marler et al., 2006). Therefore, this study will follow the extended TAM model by adding facilitating conditions and compatibility as independent variables related to the training provided by the organization (training reactions and employee resources), in addition to basic TAM variables PEOU and PU. The extended TAM will include the compatibility of telehealth in the therapists' practice in the outpatient setting and the facilitating conditions of training and resources for telehealth provided by the employer.

The foundation of TAM is the Theory of Reasoned Action (TRA) developed by Ashein and Ajzens (1975). TRA explains how a person's actual behavior can be determined by considering their prior intention, as well as if the individual considers the opinions of others regarding the exhibited behavior (Lala, 2014). TRA is one of the most

fundamental and influential theories of human behavior. It has been used to predict a wide range of behaviors; Davis et al. (1989) applied TRA to the TAM to explain the experience of the user with similar technology (Figure 5). In addition, the TAM incorporated two TRA input processes: social influence practices (subjective norm and voluntariness), and cognitive instrumental practices (relevance, output quality, and result demonstrability) (Kamal et al., 2019). The TAM is tailored to Information Technology on texts and was designed to predict IT acceptance and usage on the job.

Figure 5

Technology Acceptance Model (TAM)



Source: Adapted from Davis *et al*. (1989)

Davis and Venkatesh developed the extended TAM (referred to as TAM2 in the literature) to include subjective norm as an additional predictor of intention in the case of mandatory settings (Venkatesh & Davis, 2000). Davis and Venkatesh added subjective norm from the TRA to explain both the acceptance and rejection aspects of therapist behavior, as well as to assess whether the therapist is required to use the IT or if it is their own choice, without any pressure to placate another individual. The subjective norm also seeks to identify if the therapist believes that using the IT will improve an organization (Venkatesh et al., 2003). Holden and Karsh (2010) found, in an analysis of 20 studies that

made use of the TAM to evaluate the use of telehealth in the health care setting, subjective norm was not significant in predicting acceptance of technology. Holden and Karsh's attributed reasoning to its lack of significance was that health care workers had increased computer literacy as compared to the general population. The researchers then concluded that for technology to be accepted in health care, it must be perceived as useful to the health care worker. The analysis by Holden and Karsh identified that PEOU is not likely to affect acceptance of technology, but PEOU does appear to correlate with usefulness of telehealth. If technology is difficult to use, it cannot possibly be perceived as useful (Holden & Karsh, 2010).

The TAM2 aspect of output quality describes the therapist perceptions about what the IT is supposed to accomplish. If the output quality perception of the therapist is positive, then there is demonstrability; with demonstrability, the therapist will have a positive perception and perceived ease of use of the IT (Lala, 2014). The TAM2 is one extension of the original TAM that further investigates the perception of the therapist, which led to the development of the TAM3 by Venkatesh and Bala in 2008.

To investigate the work environment and physician acceptance of technology, Chau and Hu (2002) first realized the TAM did not support key components and that health care workers may have fundamental differences from other types of therapists when making decisions about technology acceptance. This was confirmed by Chismar and Wiley-Patton in 2003. Health care workers present distinct characteristics when they use IT, which includes constraints by time and with the need to address and respond to vital information (Tulu et al., 2005). Research indicates the TAM2 was able to predict

whether health care workers would use IT, although there were limitations to the previous models indicating additional factors should be incorporated into the TAM.

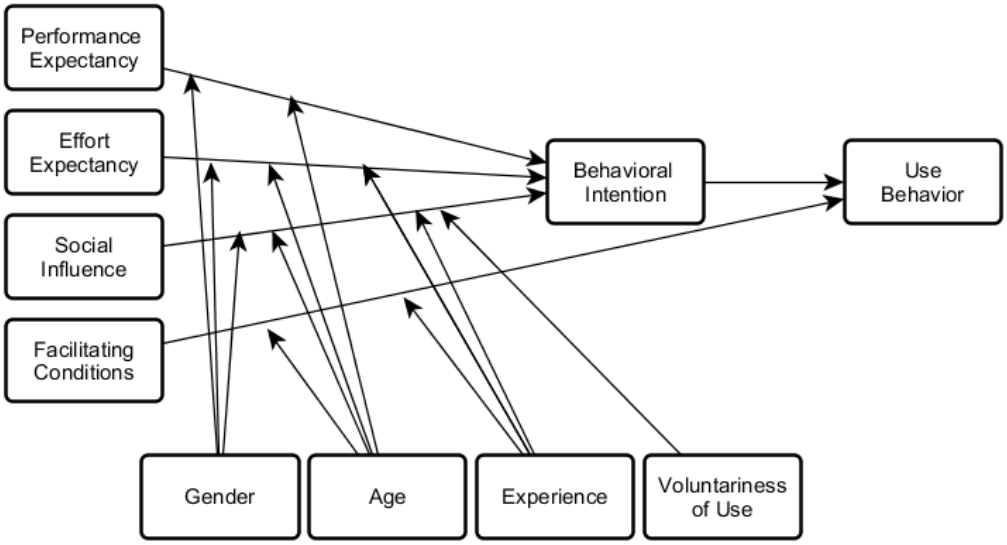
Prior to the development of TAM3 in 2008, and in order to harmonize the literature associated with acceptance of new technology, Venkatesh et al. (2003) developed a unified model that brings together alternative views on user and technology acceptance: The Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT consolidates the constructs of the following earlier research, employed to explain information technology usage behavior: Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), the combination form of TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), Motivational Model (MM), and the Social Cognitive Theory (SCT). The goal of the UTAUT was to improve the success rate of predicting whether new technology would be accepted by its users.

Figure 6 illustrates four constructs of UTAUT as direct determinants of user acceptance and use including: performance expectancy, effort expectancy, social influence, and facilitating conditions. The other three constructs of self-efficacy, anxiety, and attitude were theorized to not be direct determinants of intention to use technology, as they are fully mediated by either perceived ease of use for self-efficacy and anxiety (Venkatesh, 2000), or by other performance and effort expectancies in reference to attitude (Davis et al., 1989). The addition of facilitating conditions in the UTAUT model addresses one of the identified weaknesses of the TAM. The UTAUT survey questions investigates the therapist attitudes (ability to use and control the technology) and barriers (adequate organizational support) of telehealth adoption therapist (Kamal et al., 2019).

Schaper and Pervan (2007) found facilitating conditions greatly influence OTs continued use of telehealth in medically underserved communities. These facilitating conditions are the expected level of organizational and technical infrastructure that can support the use of technology (Venkatesh et al., 2003, p. 453).

Figure 6

UTAUT Model



Note. Venkatesh, Morris, Davis & Davis, 2003

Venkatesh et al. (2003) described performance expectancy as PU, extrinsic motivation, job-fit, relative advantage, and outcome expectation constructs (Figure 10). Health care workers' attitude toward technology and performance expectancy were found to be a significant determinant for acceptance of telehealth (Chau & Hu, 2002). Performance expectancy is a consistent predictor of health care workers' intent to use telehealth and is influenced by the attitude of the user (Chau & Hu, 2002; Chismar & Wiley-Patton, 2003). This highlights the need to address the therapist's concerns regarding technology performance and how it will impact the user's job performance.

Venkatesh et al. (2003) wrote that effort expectancy includes PEOU and complexity constructs (Figure 7). For health care workers who are willing to commit the appropriate amount of effort, the research concluded that the users intended to continue using telehealth (Almathami et al, 2020). Furthermore, Schaper and Pervan (2006) concluded that due to time demands placed on health care workers, technology is perceived as easy-to-use and will therefore be accepted more easily when the effort expectancy is low in regard to the amount of time needed to learn how to use the technology.

Figure 7

Definitions of Constructs of the UTAUT Model

Constructs	Definition
Performance Expectancy	The capability of the technology to providing benefits and enhancing the performance to the user according to his/her expectations (p. 447).
Effort Expectancy	User expectations about the ease of use of technology (p. 450).
Social Influence	The expected influence of others on the user to start and continue using the technology (p. 451).
Facilitating Conditions	The expected level of organizational and technical infrastructure that can support the use of technology (p. 453).
Behavioral Intention	The expectation of the user's intention to perform plans and decisions regarding the use of technology (p. 454).

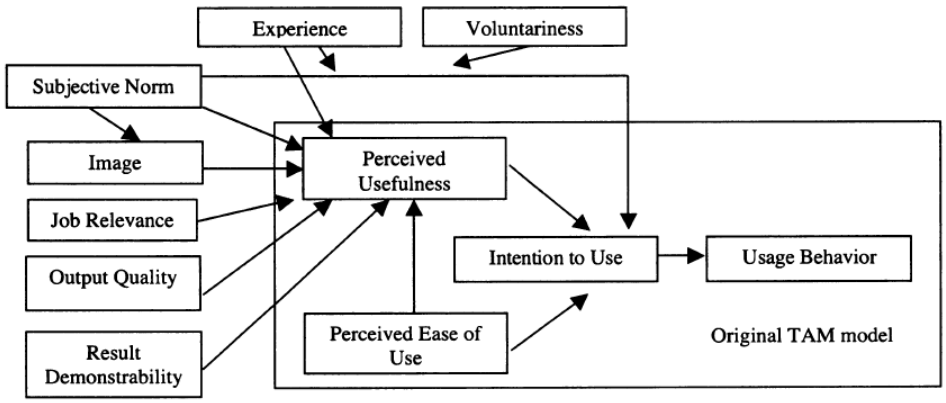
Note. Venkatesh et al. 2003

In addition, the UTAUT has four significant moderators: gender, age, voluntariness of use, and years' experience of the therapist. One of the key findings of the UTAUT model for the moderators is the marked difference between men and women for adoption of technology. The research by Venkatesh and Davis (2000) found that men will adopt technology based upon PU, while women will be influenced by PEOU. Age has also been shown as a moderator for adoption, as people over 60 tend to adopt technology much more slowly (Vankatesh & Davis, 2000).

Chao (2019) has used the term “extended TAM” and “extended UTAUT” when constructs for trust (training reactions) and management support (employee resources) are added. The research by Chao indicated that the use of the UTAUT would be more capable of predicting technology acceptance on an individual basis when adding the constructs of trust and management support. Marler et al. (2006) utilized the extended version of the TAM (Figure 8), which included the addition of the independent variables related to the training provided by the organization (training reactions and employee resources), along with PEOU and PU. The extended TAM and UTAUT survey instrument utilized in this literature review will allow investigation of PT/OT/SLPs’ acceptance of telehealth technology (Chao, 2019; Marler et al., 2006; Rouidi et al., 2022; Yarbrough & Smith, 2007). The use of the extended TAM has been identified as an acceptable model to use to predict factors that affect the adoption of technology by therapist (Al-Rahmi et al., 2019; Min et al., 2019; Teeroovengadum et al., 2017). The survey variables will inclue the following: PEOU, PU, and organizational support.

Figure 8

Extended TAM Model (TAM2)



Note. Venkatesh and Davis, 2000; Lee, Kozar and Larsen, 2003; Marler et al., 2006

Insufficient organizational support was identified as a barrier to technology acceptance by Yarbrough and Smith (2007). This included inadequate training for telehealth for health care workers. Their research identified that health care workers require more focused training as compared to other industries (Yarbrough & Smith, 2007). Due to the complexity of health care, adequate training is a key to successful adoption of telehealth. In health care, inadequate therapist training for telehealth directly impacts the acceptance of the technology (Edirippulige & Armfield, 2017; Marler et al., 2006).

The actual use of telehealth relies on the existence of intention towards using it; its use depends on two beliefs: therapist acceptance of the telehealth, and the continued usage which depends on the therapist's satisfaction (Momani, 2020). Figure 9 illustrates the relation between *acceptance* and *satisfaction* of telehealth, and their influence on the *Intention for Continuous Usage*.

Figure 9

Influence of Acceptance/Satisfaction on Continued Usage Intention

Note. (Momani, 2018)

The ability of TAM2 to predict the perceived ease of use and acceptance of technology among health care workers was found to be significant in an analysis of 20

studies; the ability to predict perception and acceptance was also significant for perceived usefulness and the intention to use new technology (Holden & Karsh, 2010). A bibliometric comparison of the usage of TAM2 and UTAUT in technology acceptance found that 70% of the highest occurring keywords in both models are repeated, meaning that the models are being applied in research in similar context (Dwivedi et al., 2010). The authors' conclusion was that the ability to predict technology acceptance by the TAM2 and UTAUT appear to be very similar.

This study refers to the TAM 2 for PU, PEOU to determine the ITU, and UTAUT to explain the therapist ITU telehealth and subsequent usage behavior. The UTAUT was validated in a longitudinal study which explained 70% of technology acceptance behavior in health care workers, a considerable improvement on the previous eight models which routinely explained only 40% of acceptance (Venkatesh et al., 2003). The survey that will be utilized for this study was compiled making use of existing published questionnaires (TAM2 and UTAUT) found in the literature. This project will examine the different conditions that influence the acceptance and use of technology identified by the TAM2 and UTAUT: perceived usefulness, perceived ease of use, performance expectancy, effort expectancy, social influence, facilitating conditions, and behavioral intent.

USE of TAM2/UTAUT in PT/OT/SLP RESEARCH

The TAM2, consisting of PU, PEOU, BI, and usage behavior, was utilized to investigate the acceptance of mobile technology by PTs in their practice by Blumenthal et al. (2018). The research found that PU and PEOU were positively related to technology adoption. Also, the study found no evidence that age, gender, experience, or practice setting influenced the adoption of technology behavior. Through the use of the TAM2,

Albudoor and Peña (2021) found that the delivery of information and training for new technologies to SLPs was accurately predicted by PU and PEOU; the authors suggest that targeting factors, which were proven to accurately predict SLPs technology use, may more effectively lead to targeted changes in technology practices. The research model use of TAM2 accounted for two-thirds of the variance in SLPs' behavioral intention to use technology for clinical practice; the BI was directly influenced by a positive attitude towards the use of technology and through the influence of individuals important to the SLPs (Albudoor & Peña, 2021).

The three TAM2 themes of PU, PEOU, and ITU also accurately identified the use of technology by OTs, which lead to innovative uses of technology, responding to alternative modes of access beyond in-person care (Money et al., 2015). The use of TAM2 in rehabilitation studies provides a basis for tracing the impact of external factors on internal beliefs, attitudes, and intentions. By identifying fundamental variables on the cognitive and affective determinants of technology acceptance, the TAM2 is a reliable platform for research on the use of technology (Bellomo et al., 2020).

The UTAUT primary constructs of PE, EE, SI, and FC allow for the prediction of PT/OT/SLPs behavioral intent to use telehealth. According to Kohnke et al. (2014), the variables that potentially moderate the impact of UTAUT as a predictor of intention are therapist role, attitude, anxiety, and self-efficacy. When attitude is high (i.e., using technology is a good idea) and is coupled with a high perception of self-efficacy, then the intention to use the technology is also very high (Kohnke et al., 2014). Their research also suggested a strong relationship exists between UTAUT, self-efficacy, and BI to use telehealth technology. In research conducted by Schaper and Pervan (2007), the

constructs of UTAUT positively predicted OTs acceptance and use of telehealth technology. The research also highlighted the complexity of the constructs and relationships that influence technology acceptance and successful implementation outcomes (Schaper & Pervan, 2007).

A mixed method study of TAM2 and UTAUT stated that FC was the most notable predictor of BI, whereas EE decreased along with PE and SI in the investigation of Post-traumatic Stress-Disorder (PTSD) of veterans by PT/OT/SLPs in the clinical practice (Jones et al., 2021). The authors also stated the therapists' responses on the mixed study survey agreed or strongly agreed with the statements presented in the questionnaire. This finding represents good internal consistency, convergent validity, composite reliability, and discriminant validity of the indicators, except SI (Jones et al., 2021).

The TAM2 and UTAUT questionnaire was confirmed as reliable based upon the Cronbach's alpha coefficient in a study of PT/OTs acceptance of robotic technology (Raigoso et al., 2021). In this particular study, more than 60% of the therapists' acceptance of technology was demonstrated across the TAM2/UTAUT constructs, except EE and FC. The authors suggested that EE's data could be contributed to the complexity of robotic use training, and FC due to the therapists' desire to retain some hands-on tasks during the robotic rehabilitation treatment with the patient. This research study using the TAM2/UTAUT identified that technology acceptance requires the addition of social and cognitive support for clinicians (Raigoso et al., 2021).

In a study of SLPs' use of technology acceptance, the authors stated that PE, EE, and SI have a direct effect on intention to use and an indirect effect on actual use based upon UTAUT; FC was stated to have a direct effect on actual use (Edwards & Dukhovny,

2017; Zajc et al., 2018). The authors noted that, while EE had a significant impact on actual use in their study, female-only participants may have biased the results given that the effect of EE is greater in females than males. This research utilization of the UTAUT bridges one gap in the contribution of evidence supporting the acceptance of technology by SLPs in the outpatient setting (Edwards & Dukhovny, 2017; Zajc et al., 2018).

A study by Liu et al. in 2015 utilized the UTAUT to evaluate technology acceptance use (which is not mandatory) by PTs and OTs. The researchers found that PE, or how the technology may support the therapists' work, was the most important factor in acceptance and use (Liu et al., 2015). They also determined that EE (degree of use difficulty) and SI (social pressure to use) were not influential constructs (Liu et al., 2015). Similar to other studies, BI and FC (organizational support) were related to intent to use the new technology (Liu et al., 2015). Research for SLPs' acceptance of technology, such as utilizing UTAUT in aphasia rehabilitation and wearable technology to support early child language experiences, is consistent with the Liu et al. (2015) results (Boster & McCarthy, 2017; Choo et al., 2019; Kearns et al., 2018).

Calvo et al. (2021) utilized the TAM2 as the theory to evaluate an automatic speech recognition platform called Mobile and Personal Speech Assistant, known as mPASS. The researchers found that TAM2 assisted in identifying therapists' positive PEOU and PU, which represent important driving forces to assist with planning and implementation of technology devices and communication abilities. In addition, the TAM2 constructs reflected a positive patient satisfaction with the mPASS platform and provided insight to the continued intention to use the technology (Calvo et al., 2021).

Atwal et al. (2014) investigated OTs' use of virtual reality interior design applications (VRIDAs) to recommend home modifications prior to discharge from a hospital utilizing the TAM2. The authors identified three core themes: 1) PU, 2) PEOU, and 3) ITU; the researchers stated that the theme of PU had promising potential to increase the understanding, enrich communication and patient involvement, and improve OT/patient shared understanding of the technology (Atwal et al., 2014). Isbel et al. (2014) utilized the TAM2 to determine if OTs found E-portfolios (collection of evidence for teaching, learning and professional practice) a useful technology. These researchers found that the E-portfolio for PU, PEOU and ITU was negative in mapping student competency; however, TAM2 constructs identified the E-portfolio as useful for reflective practice by OT students and OTs (Isbel et al., 2014).

Further research utilizing the TAM2 to assess OT education and student acceptance of 3D printing technology has been conducted (Benham & San, 2020). Additional studies using UTAUT assessed OTs to determine their acceptance of virtual gaming as an intervention strategy (Walker, 2014). Research studies also utilized UTAUT to examine allied health therapists in Australia to investigate technology acceptance and use decisions (Schaper & Pervan, 2007). No studies were identified that utilized the TAM2 and UTAUT constructs to investigate technology acceptance by all three disciplines (i.e., PT/OT/SLP).

Research models applying the TAM2 and/or UTAUT accounted for 57% of the variance in PT/OTs' use of new technologies for rehabilitation (Liu et al., 2015). Furthermore, a survey of SLP graduate students by Boster and McCarthy (2017) and another survey of clinical faculty by Edwards and Dukhovny (2017) found that their

technology attitudes were influenced by constructs identified by the TAM2 and UTAUT. In these studies, student SLPs and clinical faculty's preferences toward speed/convenience and social influence were correlated with the constructs of PU, PEOU, and subjective norm (repeat citations).

USE of TAM2/UTAUT in RESEARCH of TELEHEALTH

"A Systematic Review of the Technology Acceptance Model in Health Informatics" by Rahimi et al. (2018) found 102 research articles that utilized the TAM2 to investigate technology adoption in the health care setting. Of the 102 articles, 25 were identified that specifically explored acceptance of technology for telehealth/telemedicine by health care professionals with use of the TAM2. These 25 articles reported extensions of the original TAM (TAM2), suggesting that no optimal TAM version for use in health services has been established (Rahimi et al., 2018).

Another study comparing the TAM2 and the UTAUT among physicians' acceptance of telemedicine technology concluded that ITU was strongly associated with the PE on attitude and attitude concepts (Kim et al., 2016; Liu et al., 2015). Research by Strudwick (2015), using the TAM2 and UTAUT as a theoretical platform to investigate nurses' technology acceptance, found both models acceptable in predicting therapist characteristics that would allow effective technology implementation. Both the UTAUT and TAM2 are strong predictors of health care providers' adoption of technology (Klaic & Galea, 2020; Portz et al., 2019). The UTAUT has also been utilized frequently for technology acceptance of patients, likely due to the variable, social influence (Harst et al., 2019). Social influence and performance expectancy was found in a survey of one

rehabilitation hospital as the most important factors in determining therapist adoption and use of telehealth (Liu et al., 2014).

To investigate telehealth adoption, the beneficial use of TAM2 and UTAUT key constructs in health care by providers is illustrated by Holden and Karsh (2010). The overlapping definitions of the constructs PU, PEOU, SI, and BI by TAM2 and UTAUT reflects the similar operational use of the constructs; as the overlap of these variables reappear in multiple models tested in health care, researchers are able to better understand technology use and acceptance (Holden & Karsh, 2010). The use of TAM2 and UTAUT in the investigation of telemedicine and telehealth adoption in health care has been clearly confirmed as a model for understanding the facilitators and inhibitors influencing the implementation of such technology (Aggelidis et al., 2008; Gammon et al., 2008; Hoel et al., 2021; Kamal et al., 2020; Napitupulu et al., 2021; Rahi et al., 2021).

CHAPTER THREE

METHODOLOGY

STUDY DESIGN

This study was a non-experimental, correlational quantitative design using a previously validated survey instrument. The validated survey instruments that were used for this study was the TAM 2 developed by Marler et al. (2006), and the UTAUT published by Venkatesh et al. (2003).

The study's purpose was to statistically identify the associations that influence the adoption of telehealth technology among PT/OT/SLPs that practice in outpatient clinics in southwest Virginia. The correlational method was chosen as the constructs from TAM2 and UTAUT needed to be quantified and the extent of their relationship identified. The study design also provided insight for the associations that most strongly predict the intent to use telehealth technology among PT/OT/SLPs. Furthermore, a correlational design did not seek to compare the differences among technology users, nor did it seek to find a cause-and-effect relationship (Marler et al., 2006).

This study refered to the TAM2 and UTAUT. The TAM2 was used to depict the Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) that determined the PT/OT/SLPs' intention to use telehealth technology and did, therefore, predict and validate the factors that influenced technology adoption, acceptance, and use (Hamid et al., 2016; Lanlan et al., 2019). The UTAUT explained the PT/OT/SLPs' intentions to use telehealth technology and subsequent usage behavior (Venkatesh et al., 2003). The validated survey instrument was from published research for the TAM2 constructs of PU and PEOU (Asua et al., 2012; Kissi et al., 2020; Kowitlawakul, 2011), while Garone et

al. (2019) and Shiferaw et al. (2021) was adopted for the questions regarding organizational support and previous exposure to telehealth technology.

Target Population

The study population of this research project was defined as PT/OT/SLPs practicing in outpatient settings in southwest Virginia; these settings included both hospital systems and private practice therapy clinics also located within that region. Within the 13 counties and three cities of southwest Virginia investigated, there were 46 therapy clinics (16 hospital based and 30 private practice). There were 76 physical therapists, 21 occupational therapists, and 19 speech-language pathologists among the 46 outpatient clinics. The sum of these was 116 possible participants.

Data Collection

Upon approval from the Radford University Internal Review Board (IRB), email addresses for PTs, OTs, and SLPs within the southwest Virginia region were requested from hospital and private practice clinics. The researcher made contact via email and phone with each outpatient clinic manager to detail the scope of the research project and ascertain the distribution of PT/OT/SLPs employed in each clinic. During these initial contacts, the researcher received confirmation that each clinic manager would provide the email addresses for each PT/OT/SLP upon IRB approval.

The instrument used for this study required the use of an online survey administration tool. Qualtrics (http://www.qualtrics.com) was the selected tool, and the online survey required the participant to have access to the internet. Since the population to be surveyed represented therapists that most likely have access to the internet, the effect of limitation on the sample size was determined to be very minimal.

The Instrument

The TAM2 instrument used for the study was developed by Marler et al. (2006), which was based upon the original TAM instrument (Davis, 1989) to investigate the factors that influence the adoption of technology. The Marler et al.'s (2006) survey instrument questions included perceived usefulness (PU), perceived ease of use (PEOU), intention to use (ITU), training reactions (TR), and employee resources (ER).

The UTAUT questionnaire also used in this study was compiled by making use of the survey published by Venkatesh et al. (2003). Both the TAM2 and UTAUT questionnaires have been published and repeatedly utilized in other studies to test the acceptance and use of new technology by users in health care (Divall, 2013; Fletcher, 2019; Miller et al., 2020). Miller et al. (2020) stated the validity and rigor of these survey instruments has been corroborated in past literature; these instruments have been shown to be relevant in assessing user acceptance of technology in both voluntary and mandatory use environments. In addition, research indicated that the TAM2 and UTAUT questionnaires can be applied to health care workers of varied IT competency, gender, age, and culture (Gagnon et al., 2012; Kissi et al., 2020).

Marler et al. (2006) and Venkatesh (2003) evaluated the reliability of the survey instruments by use of Cronbach's alpha to test the internal consistency reliability. Both studies Cronbach's alpha was acceptable with values for each variable being >.70 (Taber, 2017). The variables from this research project were also tested for internal consistency with the use of Cronbach alpha, and the acceptable internal consistency was >.70. As part of the data analysis, the Cronbach's alpha was determined for each subscale (PEOU, ITU, etc).

In a systematic review by Weaver et. al. (2021), 12 telehealth communication assessment instruments were identified with a mean length of 20 questions, primarily Likert-scale responses with one inclusive of free text. Only two (TAM2 and UTAUT) of the identified instruments were formatted to assess provider intention to use telehealth (Weaver et al., 2021). The TAM2 and UTAUT were the ideal survey instruments to investigate the factors influencing therapist acceptance of new technologies for rehabilitation (Liu et al., 2014).

The majority of survey questions included structured responses (closed responses), with the inclusion of one unstructured response (open-ended response) to allow participants to freely submit any additional information regarding the adoption of telehealth in their outpatient therapy practices. The structured response items were multiple choice, rating, or ranking response strategies. To evaluate the user experience with technology, unless there is a compelling reason to do otherwise, the use of TAM2 version 4 was recommended (Lewis, 2018). The sections covered by the two combined questionnaires included characteristics of the therapist's perceived ease of use, perceived usefulness, performance expectancy, effort expectancy, social influence, facilitating conditions, attitude towards telehealth technology, behavioral intention, and computer literacy and training (Leedy & Ormrod, 2015).

The survey instrument (Appendix C) Section 1 consisted of 10 demographic questions: gender (options provided in survey from Morgan et al., 2020), age, highest level of education, profession (PT/OT/SLP), place of work (hospital or private clinic), frequency of telehealth use, computer literacy level, knowledge of telehealth, population treated, and therapist years' experience. Section 2 utilized a 7-point response format as

recommended by Lewis (2018). The agreement's degree went from strongly disagree to strongly agree (1-strongly disagree, 2-disagree, 3-somewhat disagree, 4-uncertain, 5-somewhat agree, 6-agree, and 7-strongly agree). The assigned numerical value to the level of the agreement allowed the survey questions to be measured.

In Section 2, the therapist indicated the degree to which they agree or disagree with statements as they relate to telehealth, perceived usefulness (six questions), and perceived ease of use (six questions), as based upon Marler et al. (2006). Also, in Section 2 was acceptance and use of technology, which included the following: performance expectancy (two questions), effort expectancy (two questions), social influence (two questions), facilitating conditions (three questions), attitude towards the system (four questions), and behavioral intention to use (three questions), as adopted from Venkatesh (2003).

Section 3 investigated computer literacy and training of the therapist (four questions). Section 3 also included an open-ended question to which the therapist provided additional comments and/or suggestions. The researcher received permission from Marler et al. (2006) and Venkatesh (2003) to use the survey instruments. The phrase "target software" from Marler et al.'s (2006) study was replaced by the phrase "telehealth technology" to fit the topic of this study.

The aim of the analysis of the survey data was to understand the various constitutive elements through an inspection of the relationships between the theory constructs, and to identify whether there are any patterns or themes to the survey data (Goertzen, 2017). The survey gathered quantitative data that was exported to SPSS for statistical analysis (SPSS Statistics for Windows, Armonk, NY). The survey was

administered and collected by Qualtrics survey software version XM 2022 (Qualtrics, Provo, UT). Once the survey responses were collected through the web-based platform, the data was cleaned by considering only completed questionnaires.

Dissemination of the Survey and Collection of the Responses

An email with a personalized link to the Qualtrics survey was sent to the PT/OT/SLPs. The email contained a cover letter as an attachment that detailed the purpose of the study as well as the informed consent statement. The cover letter included pertinent information such as participation in the survey was completely voluntary, all responses were confidential and could not be tracked by the researcher back to the participant. The estimated amount of time to complete the survey (10 minutes or less), and a statement of the appreciation and gratitude of the researcher for completing the survey instrument. The consent form also stated that the survey instrument could only be completed once, even if the participant's clinic location is BOTH hospital and private practice (i.e., the participant worked two jobs at different clinic locations). The intention of the study was to determine the perception, behavior, and intention to use telehealth, and therefore prior use of telehealth was not a requirement of this study. Therefore, participants were informed in the cover letter that prior utilization of telehealth in any capacity was not required to participate in this research study. The cover sheet was included in Appendix A.

The participants were required to provide consent to take the survey prior to providing their views on telehealth technology adoption. Participants who had not completed the survey or had an incomplete survey received up to six email reminders. The survey window was six weeks, though this could have extended if such an extension

seemed reasonable, given possible hindrances such as technical difficulty, holidays, news events, etc. A personalized email was sent with the initial survey invitation; personalized emails were also accompanied with reminders to complete the survey as needed.

Supporting comments for this research study were also included in the participant email. The supporting comments were from The Virginia Telehealth Network (VTN), Virginia Department of Health (VDH), and Alan Levine, CEO of Ballad Health. Supporting comments often increase a participants' perception that a study is relevant and important (Liu & Wronski, 2018). In searching for another tactic to increase response rates, a literature review for the effect of either a donation incentive or egotistic appeal for a lottery prize drawing was conducted. Although the evidence was sparse and ambiguous, Pedersen and Nielsen (2016) revealed egotistic appeal improved response rates while donation incentives yielded lower response rates. To minimize non-response bias, the researcher utilized a lottery prize drawing of four $25 Amazon gift cards (Ebert et al., 2018; Evans & Mathur, 2018; Liu & Wronski, 2018; Pedersen & Nielsen, 2016). Therefore, the cover letter indicated that the participant must provide an email address if they wish to be entered into the lottery drawing for one of the gift cards.

The Qualtrics survey data was exported to SPSS v27.0, and the variables were defined by the researcher (Appendix B). The statistical tests and their relationship with the research aim (Appendix D) list the variable names associated with the raw Qualtrics data, along with the survey question, potential response values, associated data types and statistical tool. Data was downloaded from Qualtrics in standard SPSS file format.

The initial recruitment email to participants was sent by Qualtrics on May 9, 2022. The email contained the following: Cover Sheet for Research Packet with Informed

Consent Statement, the secure web link to the survey, and letters of support. Subjects read the recruitment email; the participant then selected the Qualtrics link. After selecting the survey link, the participants then reviewed the cover letter and consent statement. After reading the cover letter and consent statement, the participant indicated agreement by clicking “I consent” or “I do not consent.”

After consent to participate, the survey became available to each participant. The participant completed the consent to participate only once. After one week of survey initiation, Qualtrics sent a personalized email to participants who had not yet completed the survey or had not yet initiated the survey. Qualtrics sent out six additional email reminders every week of the survey window to all non-participants. The email reminder from Qualtrics was a duplication of the initial email only with a change in the email subject heading to identify: “This is a friendly reminder to participant in the Therapy Telehealth survey.” The researcher checked the Qualtrics survey tracker multiple times weekly for status of returned surveys. Identifying incomplete surveys in the data set was filtered in Qualtrics by the survey metadata field settings so that only completed surveys were analyzed.

Duplication of response was prevented in Qualtrics by security settings. The participant received an individualized link generated just for them via email from Qualtrics. This unique, one-time use email link established the survey access as invitation only. As there was an incentive for participating in the survey, and to reduce bias, the one-time use email link prevented participants from taking the survey more than once.

After a participant started the survey, they had until the survey window closed to complete the survey, regardless of the survey’s activation status. This allowed

participants to walk away from the survey but allowed the opportunity to complete the survey. The incomplete survey responses are recorded and stored until the survey window closed. If the participant failed to complete the survey by the survey window close, then the data was deleted. The participant survey responses were securely sent to Qualtrics servers and stored as responses in progress. If a participant closes their web browser without finishing the survey, the response will remain until the survey window closed in "response in progress" to allow the participant to finish the survey. Once a participant completed the survey, their response was moved from the "response in progress" to "recorded responses." Recorded responses showed up in reports as well as in downloadable survey data within Qualtrics. In addition, Qualtrics tracked through distribution statistics, the delivery of emails so that the researcher was able to confirm that the participant mailbox did receive the invitation. If a hard bounce indicated an error in delivery was identified, the researcher contacted the clinic to confirm the email address or if the clinician was no longer employed.

Following the invitation to participate with link to the survey, Qualtrics sent either a reminder email based upon the weekly schedule or a thank you email. The system recognized participants who had completed the survey versus those that had not begun or completed the survey. Reminder emails were only sent to participants who had not yet completed their survey and included the same individualized link for the survey. If the participants had already started the survey, they continued where they left off.

Qualtrics complied with applicable data privacy laws in its role as the data controller of its own data and as a data processor of customer data. Specifically, Qualtrics was GDPR (General Data Protection Regulation) and CCPA (California Consumer

Privacy Act) compliant and provided technology that enables customers to be compliant as well. Qualtrics server protection was with Akamai's Cloud Security Suite and high-end firewall systems. Qualtrics regularly performed scans and penetration tests to ensure that any vulnerabilities were quickly found and patched, and Qualtrics only allowed trusted data centers, independently audited using the industry standard SSAE16 method, to host their services. In addition, Qualtrics policy for data retention was indefinite unless otherwise directed by the survey creator.

The researcher enabled in Qualtrics the Anonymize Responses setting, which was an effective way to permanently scrub a survey of identifying information before saving the data. Enabling this setting was to remove the participants' IP address and location data from the survey data. Anonymizing data also limited bias for the lottery drawing by keeping the data anonymous, and therefore the researcher was unbiased in the data analysis. To anonymize the response data, the researcher created two survey instruments. The first survey was the main research project survey; it was completely anonymous and asked consent before sending the participants to the lottery. The second survey was the lottery prize drawing sign-up form. The researcher randomly selected the four winners and contacted them for a mailing address to ship the gift cards.

SAMPLE SIZE ANALYSIS

Power Analysis

Research Question 7 (RQ7) was used as one-way omnibus ANOVA for statistical analysis. Based upon a power analysis of RQ7, a priori computed sample size with alpha of 0.05, power of 80%, SD of 1.2 and 3 groups (PT/OT/SLP) revealed a total sample size of 21 for a large effect size and 66 for a small effect size. The large-effect (liberal)

estimate of sample size was based upon a 6-4-4 pattern of means for PT/OT/SLPs, respectively, for a 7-point response scale. The small-effect (conservative) estimate was based upon a 5-4-4 pattern of means for PT/OT/SLPs, respectively.

The total sample size of 21 (large-effect estimate) or 66 (small-effect estimate) ideally represented equal numbers from each therapist group. As the small-effect sample size of 66 represented 22 from each therapist group, and the anticipated number of OTs is 21 and SLPs was 19, the equal distribution was not physically possible. The researcher attempted to receive as many completed surveys from all participants as possible. The power analysis was computed with nQuery (Statsols, Ltd, Cork Ireland) and confirmed by G*Power (Faul et al., 2009).

The use of both small- and large-effect sizes was due to a lack of literature which estimated the mean differences between the groups. Therefore, the researcher utilized a conservative estimate of 1-point difference (0.154) and a liberal 2-point difference (0.617) among SLP and PT/OTs for smaller and larger effect sizes, respectively. Table 5 illustrates further detail of the ANOVA calculation for sample size.

Table 5

Sample Size Analysis

One-Way Analysis of Variance (ANOVA)	Small Effect Size	Large Effect Size
Test Significance Level, α	0.05	0.05
Number of Groups, G	3	3
Variance of Means, V	0.222	0.889
Common Standard Deviation, σ	1.200	1.200
Effect Size, $\Delta^2=V/\sigma^2$	0.154	0.617
Power (%)	80	80
Sample Size per Group, n	22	7

Note. nQuery (Statsols, Ltd, Cork Ireland) confirmed by G*Power

SAMPLING

In this study, while the prior use of telehealth technology by therapists in outpatient clinics located in southwest Virginia was determined, it was not a limiting factor regarding participation. The study participants were chosen using a convenience sampling method. This sample method was a non-probability sampling technique where subjects were selected because of their convenient accessibility and proximity to the researcher. According to Sedgwick (2013), the advantages of this sampling method were its expediency, inexpensiveness, ease of use, and readily available study subjects.

Inclusion

The participants for this study were PT/OT/SLPs licensed in the state of Virginia that practiced in outpatient setting (hospital-based or private practice) with adult, geriatric, or pediatric patients < 18 years of age. The participants had access to a device with internet connectivity. If a PT/OT/SLP should leave employment of the outpatient

practice during the survey window, the researcher removed the therapist from participation in the study.

Exclusion

Although at present, therapist assistants are also able to provide telehealth services, this research study focused only on the therapists' (PT/OT/SLP) utilization of telehealth. Furthermore, pediatrics therapists who practice in the school-based setting were excluded from this research study in order to prevent confusion whether school-based pediatrics is outpatient. PT/OT/SLPs that do not practice in the outpatient setting in southwest Virginia were excluded from this study. Any clinician that began employment during the survey window was excluded from participation. Participants were not excluded based on ethnicity, race, gender, or education level.

SAMPLE SIZE

There were 116 potential participants identified by direct communication by the researcher with each individual clinic in southwest Virginia. The clinics were identified by Google search, and "find a therapist" search applications within the APTA, AOTA, and ASHA websites. The researcher contacted each identified outpatient clinic within each county to request the actual number of PT/OT/SLPs that work there.

DATA ANALYSIS

To perform statistical analysis, the assimilated survey data was processed by making use of Statistical Package for the Social Sciences (SPSS). SPSS was selected for this purpose as it is an effective and efficient means of managing data (Purwanto et al., 2020). As stated by Purwanto et al. (2020), the SPSS package allowed the researcher to undertake a wide range of statistical analysis relatively easily. In order to analyze data in

SPSS, each variable required a unique variable name. The variable names were predetermined and included in the exported Qualtrics to SPSS containing the survey response data. The variable name for each survey question, the potential response values, and data type are listed in the Code Book for SPSS Data Analysis (Appendix B). The Qualtrics survey data was compiled and exported into SPSS for analysis.

The participant's demographic information (section 1), including gender, age, highest level of education, profession (PT/OT/SLP), place of work (hospital or private clinic), frequency of telehealth use, population primarily treated, and years' experience as a therapist was tabulated. The descriptive statistics, with percentages and frequencies, were used to provide information about the study population. The data was collected from the survey instrument using single choice questions and was analyzed with SPSS v27.0.

The inferential statistics for this study utilized Pearson's Correlation to evaluate the Research Question 1, 3, 4, and 6 (RQ1, RQ3, and RQ6) hypothesis ($H1_0$ – $H9_0$, $H11_0$, and $H14_0$ – $H28_0$). Additional inferential statistics utilized included the t-test for Research Question 2 (RQ2) hypothesis ($H10_0$). Finally, inferential statistics utilized included the ANOVA for Research Question 4, 5, and 7 (RQ4, RQ5, and RQ7) hypothesis ($H12_o$, $H13_o$, and $H29_0$) and multiple regression analysis for Research Question 8 (RQ8) hypothesis ($H30_0$). The correlation coefficients between the independent variables (PU, PEOU, attitude/usage behavior toward telehealth technology, computer literacy and training (Organizational Support), and the dependent variable (ITU) were analyzed. According to Schober et al. (2018), correlational coefficients that are 0.4 or greater can be

considered moderate to strong correlations. Appendix D outlines the statistical tests utilized for analysis for each research question and null hypothesis.

In response to section 1 of the survey, the demographic data will be presented based upon the statistical tool utilized for analysis: gender - mean for each of the eight options, age - distribution of all participants, mean for each of the four academic qualification options, actual number of PTs/OTs/SLPs, actual number of therapists that practice in hospital-based versus private practice, mean for each option of population treated, mean for each category of how often the therapist utilizes telehealth, distribution for all participants number of practice years. In section 2, the mean for each discipline (PT/OT/SLP) for PU, PEOU, behavior (PE, EE, SI, FC, and ATT) was statistically analyzed to the association with each discipline mean for ITU. In section 3, the mean for each discipline for computer literacy and training was used for statistical analysis for the association with the therapist mean for ITU.

The final open-ended question for comments or suggestions regarding the use of telehealth technology in outpatient clinics by PT/OT/SLPs was provided as a synopsis, utilizing Qualtrics Text iQ to tag text entries with topics for analysis. Topics will include the following: physical therapist, occupational therapist, speech-language pathologist, intention to use (lemmatization to dissect intention to use for roots and tag accordingly), computer, training, and patient. These topics provided further illumination within the discussion chapter.

The researcher anticipated there would be questions left unanswered on the survey. The researcher decided not to omit a survey if some questions were not answered.

The missing question data was assigned a value of 999 and listing 999 as a discrete missing value in SPSS.

Operational Definitions of Variables

Variables are shown in Appendix C. The statistical tests and their associations with the variables and hypotheses are provided in Appendix D.

Dependent Variables

- Intent to Use (ITU) Telehealth Technology – The mean response of the 7-point Likert Scale from survey questions ITU1-3.

Independent Variables

- Clinic Location (WORK), therapist years of experience (YRPRACT), age (AGE), profession (PROF), and gender (GENDER).
- Perceived Usefulness (PU) – The mean response of the 7-point Likert Scale from survey questions PU1-6.
- Perceived Ease of Use (PEOU) – The mean response of the 7-point Likert Scale from survey questions PEOU1-6.
- Performance Expectancy (PE) – The mean response of the 7-point Likert scale from survey questions PE1-2.
- Effort Expectancy (EE) – The mean response of the 7-point Likert scale from survey questions EE1-2.
- Social Influence (SI) – The mean response of the 7-point Likert scale from survey questions SI1-2.
- Facilitating Conditions (FC) – The mean response of the 7-point Likert scale from survey questions FC1-3.

- Attitude towards Telehealth (ATT) – The mean response of the 7-point Likert scale from survey questions ATT1-4.
- Computer literacy and training for Organizational Training (OS) – The mean response of the 7-point Likert Scale from survey questions OS1-4.

Institutional Review Board

The involvement of human subjects in research studies necessitates the balance between the benefits of the study with the potential ethical and legal risks and the entire social system (Lapid et al., 2019). The Institutional Review Board (IRB) of Radford University determined that an Institutional Authorization Agreement was not required, and this research project was Exempt level at the IRB (Appendix E). To adhere to IRB principles and procedures, the researcher considered ethical issues such as therapist freedom to consent, research beneficence, respect of persons, and justice to avoid biases and manipulation of this research project findings (Lapid et al., 2019).

The researcher informed the therapists surveyed about the study's purpose and the confidentiality of their information. The informed consent statement was included as part of the survey instrument, and the responses remained anonymous. The purpose and consent were contained within the participant cover letter (Appendix A). The researcher addressed confidentiality by use of Qualtrics to assimilate the data for analysis. The private information of participants was protected to avoid being disclosed to the general public or the researcher. The researcher followed factors related to ethics: informed consent, privacy and confidentiality, anonymity, risk of harm, and exploitation of participants (Reijers et al., 2018).

LIMITATIONS

Although online surveys offered the advantage of minimizing cost and ease of use, the participants could have experienced access issues, lost email invitations to the survey, and incomplete survey due to internet interruptions (Theofanidis & Fountouki, 2018). The structure of the research questions could cause bias or mislead the participants, but this survey used Marler et al. (2006) and Venkatesh (2003) survey instruments to account for reliability and validity. The researcher also collected data and performed analysis (through Qualtrics) while attempting to ensure that the targeted sample size was be maintained (Theofanidis & Fountouki, 2018).

It has been suggested that a main reason for inconsistent predictive performance of the TAM in health services was the poor match between construct operationalization and the context in which the construct is measured (Sharp, 2006). In addition, the literature review did not reveal a specific survey instrument specific to PT/OT/SLPs adoption of telehealth technology. Likewise, no research was identified that examined technology adoption of PT/OT/SLPs, and specifically not in the outpatient setting.

Bell & Waters (2018) stated that even though an individual may choose to participate in a study, the researcher must be aware that the studied population may not possess the knowledge being sought. It may be possible that the therapists who completed the survey did not have knowledge or experience in the use of telehealth technology. Additionally, a limited response rate could have resulted from the impact of the COVID pandemic on outpatient staffing levels.

DELIMITATIONS

Research delimitations were factors and conditions over which the researcher has total control, such as sample size, location, and research questions (Theofanidis & Fountouki, 2018). A primary set of delimitations of this research study focused on demographics. This project was limited to therapist working within counties in southwestern Virginia. PTs/OTs/SLPs within outpatient clinics was investigated. There were likely other locations (within the state of Virginia as well as across the United States), individuals who provide health care related services (e.g., health care administrators, policymakers, social workers) and settings in which telehealth technology has been adopted that could have been surveyed and assessed; for this particular project, however, the researcher focused on these populations, setting, and location.

Additional delimitations in this study included access by participants to the internet to complete the online survey; the restriction of variables to those constructs identified by Marler et al.'s (2006) and Venkatesh (2003) survey instruments; and the intentional (versus random) selection of participants.

PROPOSAL SUMMARY

The survey instrument utilized for the research project was based upon the TAM2 and UTAUT to determine the intent to use telehealth technology in the outpatient settings across southwest Virginia by PTs/OTs/SLPs. The core of this research was therefore to identify how the characteristics of outpatient therapy practices and the attitudes of PT/OT/SLPs affected the usage intention of telehealth technology. The researcher identified items tested in the TAM2 and UTAUT models for the operationalization of the constructs necessary to determine the behavioral intention to use telehealth in the outpatient clinic. These were PU, PEOU, Intention to Use the System based upon TAM2; Performance and Effort Expectancy and Usage Intention based upon UTAUT.

The purpose of the research project was to assess what critical factors influenced the adoption and intention to use telehealth technology by PT/OT/SLPs in the outpatient setting in southwest Virginia. This research may contribute to the identification of barriers related to the adoption of telehealth and lead to the long-term use of telehealth as a means through which to improve access to physical, occupational, and speech therapy services in rural southwest Virginia. This research investigated the attitudes and training provided for telehealth services with the intention to provide PT/OT/SLPs the opportunity to provide specific feedback regarding the benefits and challenges of this modality of service delivery.

CHAPTER FOUR

This study examined the perceived usefulness of telehealth in the outpatient setting by PTs/OTs/SLPs. The Institutional Review Board (IRB) at Radford University approved this study on April 19, 2022. The Qualtrics survey link was sent via email to the 116 potential participants practicing in outpatient clinics across southwest Virginia.

The survey opened on May 9, 2022, and the survey closed on June 17, 2022. The survey instrument is provided in Appendix C. The data from the Qualtrics survey was exported to SPSS. The descriptive statistics, with percentages and frequencies, was used to provide information about the study population. Inferential statistics were utilized to identify associations between the dependent and independent variables. The code book for SPSS data analysis to include data codes of variables and linkage to research and questionnaire questions is provided in Appendix B.

RESULTS

SAMPLE

The 6-week survey window required biweekly email reminders to produce 34 physical therapist, 18 occupational therapist, and 16 speech language pathologist completed surveys. The 59% response rate exceeded the a priori computed sample size with alpha of 0.05, power of 80%, SD of 1.2 and 3 groups (PT/OT/SLP) for a small effect size.

Recruitment Strategies

The initial invitation email included the cover sheet for internet research packet and the informed consent statement; these are provided in Appendix A. Once all 116 email addresses were entered into Qualtrics, the email body contained a short paragraph

highlighting the research project. Subsequent biweekly email reminders only contained the research project title, survey link, very brief description of the project, and the thank you for considering participation salutation. The questionnaire was designed to take 7-10 minutes to complete.

Demographics

Of the 116 potential participants, 76 were physical therapists, 21 occupational therapists, and 19 speech language pathologists. Of the 76 physical therapists, 34 completed the survey for a 45% participation rate. In regard to occupational therapists, 18 of the 21 potential participants completed the survey for an 86% participation rate. Speech language pathologist responses included 16 out of the potential 19 participants for a participation rate of 84%. The distribution of participation per county is depicted in Table 6.

Table 6

PT/OT/SLPs Participation Rate by County

County	Physical Therapists	Participation rate	Occupational Therapists	Participation rate	Speech-Language Pathologists	Participation rate
Bland	1	100%	1	100%	0	0%
Buchanan	2	50%	1	0%	1	100%
Carroll (to include Galax City)*	3	67%	1	100%	1	100%
Dickenson	3	33%	0	0%	0	0%
Grayson	6	33%	1	100%	1	100%
Lee	3	33%	0	0%	0	0%
Russell	3	33%	0	0%	0	0%

Scott	3	33%	0	0%	0	0%
Smyth	10	80%	2	100%	3	100%
Tazewell	8	50%	3	67%	3	67%
Washington (to include Bristol City)*	16	44%	6	83%	5	80%
Wise (to include Norton City)*	8	38%	3	100%	3	67%
Wythe	10	40%	3	100%	2	100%
Total	**34**	**45%**	**18**	**86%**	**16**	**84%**

Published on January 29, 2021 by the Weldon Cooper Center for Public Service Demographics Research Group. Retrieved from: https://demographics.coopercenter.org. In the public domain.

Descriptive Analysis

Of the 68 participants, 10 (15%) were male and 58 (85%) were female. The mean age was 41 years (male 42 years and female 41 years, SD 11.7). The distribution for degree level was as follows: bachelor's degree: 11%; master's degree: 41%; doctorate degree: 41%; four participants did not provide the degree level. According to the 2020 APTA Physical Therapy Workforce Analysis the median PT age was 41, 68% were female, with 38% holding a bachelor's degree, 37% holding a doctorate, and 25% holding a master's degree. The AOTA 2021 Occupational Therapy Workforce Analysis revealed the median OT age was 40, 83% were female, with 29% holding a bachelor's, 13% holding a doctorate, and 58% holding a master's degree. The ASHA 2021 Speech Language Pathologist Health Care Survey identified that the median SLP age was 45, 96% were female, with 3% holding a doctorate and 97% holding a master's degree.

The survey participant response for outpatient setting was 55% hospital-based and 45% private practice clinic setting. The patient population treated in the outpatient setting were 29% pediatric, 56% adult, and 15% geriatric. The survey participants reported frequency of current telehealth utilization was “none” 75.7%, “daily” 1.4%, “weekly” 7.1%, and “monthly” 15.8% with SD of 1.07. The mean number of years practicing in the profession was identified as PTs at 18 years, OTs at 14 years and SLPs at 15 years with SD of 10.8.

Research Question 1

Is there a statistically significant association between PEOU of telehealth technology, PU, and organizational support for telehealth training with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

For RQ1, survey question number four was utilized to select data based upon profession. The data was then analyzed by Pearson’s Correlation for ITU mean (survey questions 34-36) and PU mean (survey questions 9-14), PEOU mean (survey questions 15-20), and OS mean (survey questions 37-40). Table 7 outlines the correlations for PEOU, PU, and OS for ITU based upon profession, and the outcome of the null hypothesis. Of the nine null hypothesis for RQ1, the following three null hypothesis were rejected:

$H4_0$ There is no statistically significant association between perceived usefulness of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in Southwest Virginia.

$H5_0$ There is no statistically significant association between perceived usefulness of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in Southwest Virginia.

$H6_0$ There is no statistically significant association between perceived usefulness of telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in Southwest Virginia.

Of the independent variables PU, PEOU, and OS, only perceived usefulness of telehealth was correlated with intention to use the technology by physical therapists, occupational therapists and speech language pathologists in outpatient clinics in southwest Virginia. The Pearson correlation coefficient was computed to assess the linear relationship between variables. For physical therapists in outpatient clinics located in southwest Virginia, the correlation between PU and ITU was significantly associated, $r(32) = .745$, $p < .001$. A correlation between PU and ITU was also identified for occupational therapists, $r(16) = .605$, $p < .008$. Likewise, speech language pathologists also provided a significant association between the two variables (PU and ITU), $r(14) = .669$, $p < .005$.

Table 7

RQ1 Pearson's Correlation

Variable	Pearson Correlation	Significance (2-tailed)	Number of Participants
PEOU/ITU - PT	.300	.84	34
PEOU/ITU – OT	.439	.069	18

PEOU/ITU - SLP	-.453	.078	16
PU/ITU - PT	.745	<.001	34
PU/ITU - OT	.605	.008	18
PU/ITU - SLP	.669	.005	16
OS/ITU - PT	-.148	.403	34
OS/ITU - OT	.069	.784	18
OS/ITU - SLP	.130	.630	16

Research Question 2

Is there a relationship between the practice geographic location (hospital-based outpatient clinic versus a private practice clinic) with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

For RQ2, survey question number five was utilized to select data based upon the clinic location (hospital-based versus private practice). The data was then analyzed by Student's t-test for ITU mean (survey questions 34-36) and an N = 68. The T-test analysis was to determine if there was a difference in ITU mean between the hospital-based and private practice clinics in southwest Virginia. Findings indicated that $t(66) = 2.31$, $p < .024$ with homogeneous variances, and that the private practice clinic ($M = 4.63$, $SD = 1.46$) setting ITU for telehealth was a half standard deviation greater than in the hospital-based clinic ($M = 3.79$, $SD = 1.52$) setting.

The Cohen's d (pooled standard deviation) was utilized for effect size to identify the number of standard deviation units the means differed. Cohen's d = .563 identified

that the means differ by .06 standard deviation, and this indicated a reasonable effect size. The Hedges' correction and Glass's delta are almost identical with the Cohen's d value.

The T-test findings indicated the null hypothesis to be rejected. The private practice clinic setting had greater ITU telehealth by a half standard deviation difference. In Chapter 5, the discussion provided detail from the free-text comment section of the survey that illuminated the ITU telehealth differences among private practice and hospital-based clinics by PTs, OTs, and SLPs. There exists a statically significant difference between private practice and hospital-based ITU telehealth. The private practice clinics had greater intention to use telehealth.

$H10_o$ There will be no statistically significant correlation between the clinic location and therapist utilization of telehealth.

Table 8

RQ2 Student T-test

	What is your place of work?	N	Mean	SD	Std. Error Mean
Mean of ITU Items	Hospital-based clinic	37	3.793	1.520	.249
	Private practice clinic	31	4.634	1.464	.263

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Int. of the difference	
		F	Sig.	t	df	Sig. 2-tailed	Mean Diff	Std. Error Diff	Lower	Upper
Mean of ITU Items	Equal variances assumed	.447	.506	2.312	66	.024	.842	.364	-1.568	.115
	Equal variances not assumed			2.320	64.69	.024	.842	.363	-1.566	.117

Independent Samples Effect Sizes

			95% Confidence Interval	
		Standardizer[a]	Point Est.	Lower	Upper
Mean ITU Items	Cohen's d	1.495	.563	1.048	.074
	Hedges' correction	1.512	.557	1.036	.073
	Glass' delta	1.464	.575	1.069	.072

a. The denominator used in estimating the effect sizes
Cohen's d uses the pooled standard deviation
Hedges' correction uses the pooled standard deviation, plus a correction factor
Glass's delta uses the sample standard deviation of the control group

Research Question 3

Does a relationship exist between the years of clinical experience with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

For RQ3, survey question number eight was utilized to select data based upon the the number years of clinic experience. The data was then analyzed by Pearson's Correlation for ITU mean (survey questions 34-36) and an N = 68. The number of years clinical experience ranged for 1 to 48 years, and the mean years' experience was 16 with SD of 10.8. The mean years' experience for PT was 18 with SD of 11.49, OT was 14 years' with SD of 12.11 and SLP was 15 years with SD of 7.17. The mean years' experience for hospital-based therapist was 19 with SD of 12.18 and private practice clinics was 14 years with SD of 8.23. A correlation between years of clinical experience and ITU was not identified for PTs, OTs or SLPs, $r(66) = .085$, $p = .488$. The null hypothesis was accepted.

$H11_o$ There will be no statistically significant correlation between the years of clinical experience and therapist utilization of telehealth.

Research Question 4

Is there a relationship between patient demographic of age (pediatric, adult or geriatric) with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

For RQ4, survey question number six was utilized to select data based upon the population primarily treated (pediatric, adult, or geriatric). The data was then analyzed by One-way ANOVA with Tukey's – b as a post-hoc test for ITU mean (survey questions 34-36) and an N = 68. The results of the ANOVA testing indicated that the demographic of age treated by the therapist significantly predicted the intention to use telehealth by the therapist, $F(2, 64) = 9.68$, $p < .001$. Tukey's – b indicated that the adult demographic was

different from pediatrics and geriatrics population. The adult (Mean = 3.53, SD = 1.41) demographic treated by PTs, OTs, and SLPs in the outpatient clinic mean was associated with a significantly lower intention to use telehealth when compared to the demographic means for pediatrics (Mean = 4.90, SD = 1.47) and geriatrics (Mean = 5.25, SD = .58). The null hypothesis was rejected.

$H12_o$ There will be no statistically significant correlation between patient demographics of age and therapist utilization of telehealth.

Table 9

RQ4 One-way ANOVA with Tukey's – b post hoc

Population treated	N	Mean	SD
Pediatrics	20	4.90	1.47
Adult	39	3.53	1.41
Geriatrics	8	5.25	.58
Total	67	4.14	1.53

ANOVA

Mean of ITU items	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	35.92	2	17.96	9.68	<.001
Within Groups	118.79	64	1.86		
Total	1.54	66			

Tukey B [a,b] Subset for alpha = 0.05

Population treated	N	1	2
Adult	39	3.53	
Pediatrics	20		4.90
Geriatrics	8		5.25

Means for groups in homogeneous subsets are displayed

a. Uses Harmonic Mean Sample Size = 14.95
b. The group sizes are unequal. The harmonic mean of the groups sizes is used. Type 1 error levels are not guaranteed.

Research Question 5

Is there a relationship between therapist gender with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

For RQ5, survey question number one was utilized to select data based upon the identified gender (male, female, agender, genderqueer or genderfluid, non-binary, questioning or unsure, two-spirit and/or prefer not to disclose). The data was then analyzed by One-way ANOVA for ITU mean (survey questions 34-36) and an N = 68. For the analysis of RQ5, Tukey's – b as a post-hoc test was not performed as only two possible answers were given (male and female).

The results of the ANOVA analysis indicated that the therapist gender of male (Mean = 3.53, SD = 1.93) nor female (Mean = 4.29, SD = 1.46) did not significantly predict the intention to use telehealth by the therapist, $F(1, 66) = 2.07$, $p = .155$. The null hypothesis was accepted.

$H13_o$ There will be no statistically significant association between therapist gender and therapist utilization of telehealth.

Table 10

RQ5 One-way ANOVA

Gender	N	Mean	SD
Male	10	3.53	1.93
Female	58	4.29	1.45
Total	68	4.18	1.54

ANOVA

Mean of ITU items	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.85	1	4.85	2.07	.16
Within Groups	154.59	66	2.34		
Total	159.44	67			

Research Question 6

Is there a statistically significant association between Behavior and Attitude toward Telehealth Technology to include Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC) and Attitude towards Telehealth (ATT) with the intent to use (ITU) the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

For RQ6, survey question numbers 21-22 were utilized to select data based upon Performance Expectancy (PE), 23-24 for Effort Expectancy (EE), 25-26 for Social Influence (SI), 27-29 for Facilitating Conditions (FC) and 30-33 for Attitude Towards

Telehealth (ATT). The data was then analyzed by Pearson Correlation for ITU mean (survey questions 34-36) and an N = 68. For PTs in outpatient clinics located in southwest Virginia, the correlation between PE and ITU was significantly associated, $r(32) = .735$, $p < .001$. A correlation between PE and ITU was also identified for OTs, $r(16) = .545$, $p < .019$. A correlation between PE and ITU was not identified for SLPs, $r(14) = .317$, $p = .231$. The null hypothesis was rejected for PTs and OTs but accepted for SLPs.

$H14_o$ There is no statistically significant association between PE of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.

$H15_o$ There is no statistically significant association between PE of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.

$H16_o$ There is no statistically significant association between PE of telehealth technology and the intention to use telehealth by speech language pathologists in outpatient therapy clinics located in southwest Virginia.

As effort expectancy increased the intention to utilize telehealth by therapist in southwest Virginia clinics decreased. An inverse relationship between EE and ITU was identified for physical therapists, $r(32) = -.539$, $p < .001$ and speech language pathologists, $r(14) = -.512$, $p = .043$. There was not a significant inverse relationship for occupational therapists, $r(14) = -.253$, $p = .311$. The null hypothesis was rejected for PTs and SLPs, but the null was accepted for OTs.

$H17_o$ There is no statistically significant association between EE of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.

$H18_o$ There is no statistically significant association between EE of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.

$H19_o$ There is no statistically significant association between EE of telehealth technology and the intention to use telehealth by speech language pathologists in outpatient therapy clinics located in southwest Virginia.

For physical therapists in outpatient clinics located in southwest Virginia, the correlation between SI and ITU was significantly associated, $r(32) = .604$, $p < .001$. There was not an association for OTs, $r(16) = .151$, $p = .550$ or SLPs, $r(14) = .292$, $p = .272$. Therefore, the null hypothesis was rejected for PTs, but the null was accepted for OTs and SLPs.

$H20_o$ There is no statistically significant association between SI of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.

$H21_o$ There is no statistically significant association between SI of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.

$H22_o$ There is no statistically significant association between SI of telehealth technology and the intention to use telehealth by speech language pathologists in outpatient therapy clinics located in southwest Virginia.

Facilitating Conditions such as resources, necessary knowledge or a specific person allocated for assistance in the use of the technology was not associated with intention to utilize telehealth by PTs, $r(32) = .003$, $p = .984$, OTs, $r(16) = .089$, $p = .724$ or SLPs, $r(14) = -.006$, $p = .982$. The null hypothesis for FC and ITU was accepted for PTs, OTs, and SLPs.

$H23_o$ There is no statistically significant association between FC of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.

$H24_o$ There is no statistically significant association between FC of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.

$H25_o$ There is no statistically significant association between FC of telehealth technology and the intention to use telehealth by speech language pathologists in outpatient therapy clinics located in southwest Virginia.

The Attitude Toward Telehealth survey questions for promotion of good clinical practice, making therapist work more interesting, the use of telehealth would imply major changes in practice and dehumanization with the use of telehealth was significantly correlated with ITU for PTs, $r(32) = .369$, $p = .032$, but not associated for OTs, $r(16) = .467$, $p = .051$ or SLPs, $r(14) = .246$, $p = .358$. The null hypothesis for ATT and ITU was rejected for PTs, but the null was accepted for OTs and SLPs.

$H26_o$ There is no statistically significant association between ATT of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.

$H27_o$ There is no statistically significant association between ATT of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.

$H28_o$ There is no statistically significant association between ATT of telehealth technology and the intention to use telehealth by speech language pathologists in outpatient therapy clinics located in southwest Virginia.

Table 11

RQ6 Pearson's Correlation

Variable	Pearson Correlation	Significance (2-tailed)	Number of Participants
PE/ITU - PT	.735**	<.001	34
PE/ITU – OT	.545*	.019	18
PE/ITU - SLP	.317	.231	16
EE/ITU - PT	-.539**	<.001	34
EE/ITU - OT	-.253	.311	18
EE/ITU - SLP	-.512*	.043	16
SI/ITU - PT	.604**	<.001	34
SI/ITU - OT	.151	.550	18
SI/ITU - SLP	.292	.272	16
FC/ITU - PT	.003	.984	34
FC/ITU - OT	.089	.724	18
FC/ITU - SLP	-.006	.982	16
ATT/ITU - PT	.369*	.032	34
ATT/ITU - OT	.467	.051	18
ATT/ITU - SLP	.246	.358	16

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

Research Question 7

Is there a relationship between therapist type and intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

For RQ7, survey question number four was utilized to select data based upon the therapist type (physical therapists, occupational therapists, or speech language pathologists). The data was then analyzed by One-way ANOVA with Tukey's – b as a post-hoc test for ITU mean (survey questions 34-36) and an N = 68. The results of the ANOVA testing indicated that the therapist type significantly predicted the intention to use telehealth by the therapist, $F(2, 65) = 6.35$, $p < .003$. Tukey's – b indicated a significant difference between PTs and SLPs with OTs in the middle. The PT (Mean = 3.65, SD = 1.49) therapist type was associated with a significantly lower intention to use telehealth when compared to SLPs (Mean = 5.19, SD = 1.42) and OTs (Mean = 4.28, SD = 1.31). The null hypothesis was rejected.

$H29_o$ There is no statistically significant association between therapist type and the intention to use telehealth by therapists in outpatient therapy clinics located in outpatient therapy clinics located in southwest Virginia.

Table 12

RQ7 One-way ANOVA with Tukey's – b post hoc

Population treated	N	Mean	SD
PT	34	3.65	1.49
OT	18	4.28	1.31
SLP	16	5.19	1.43
Total	68	4.18	1.54

ANOVA

Mean of ITU items	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	26.07	2	13.035	6.35	.003
Within Groups	133.37	65	2.05		
Total	159.44	67			

Tukey B [a,b]

Population treated	N	Subset for alpha = 0.05 1	2
PT	34	3.65	
OT	18	4.28	4.28
SLP	16		5.19

Means for groups in homogeneous subsets are displayed

c. Uses Harmonic Mean Sample Size = 20.34

d. The group sizes are unequal. The harmonic mean of the groups sizes is used. Type 1 error levels are not guaranteed.

Research Question 8

Among the variables that are associated with the intent to use, which are the most important predictors for intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

Finally, for RQ8, all survey questions were utilized to select data for analysis by multiple regression analysis for ITU mean (survey questions 34-36) and an N = 68. The results of the multiple regression analysis testing indicated that the independent variables do predict ITU, $R^2 = .632$, $F(8, 59) = 12.65$, $p < .001$. Furthermore, the coefficients table of the multiple regression analysis, with a constant = 1.217, indicated that PU, $b = .575$, $t(59) = 3.40$, $p = .001$, and EE, $b = -.249$, $t(59) = -2.23$, $p = .03$ were significantly associated with ITU. As PU and EE were the only predictive variables with a p-value less than .05, the beta value for PU identified this variable as the strongest predictor of ITU. In addition, the negative value for EE corresponds to the inverse relationship with ITU. The variable OS (which is not a predictor variable) had sufficient standard deviation to indicate sufficient variability, and to identify that the data did not have a restrictive range problem.

As the strongest predictor variable, an increase in PU by one standard deviation will coincide with an increase of .58 standard deviation units in ITU. Conversely, an increase in EE by one standard deviation will coincide with a decrease of .25 standard deviation units in ITU. All other independent variables were not predictors of ITU. The null hypothesis was rejected.

$H30_o$ There is no statistically significant association with the perception and behavioral variables and the intent to use telehealth by physical therapists, occupational and speech-language pathologist in outpatient therapy clinics located in southwest Virginia.

Table 13

RQ8 Multiple Regression Analysis

Descriptive Statistics

	Mean	*SD*	*N*
Mean of ITU items	*4.18*	*1.54*	*68*
Mean of PU Items	*4.46*	*1.35*	*68*
Mean of PEOU Items	*5.34*	*1.05*	*68*
Mean of PE Items	*4.46*	*1.50*	*68*
Mean of EE Items	*4.54*	*1.37*	*68*
Mean of SI Items	*3.76*	*1.29*	*68*
Mean of FC Items	*4.16*	*1.25*	*68*
Mean of ATT Items	*4.36*	*.76*	*68*
Mean of OS Items	*4.42*	*1.17*	*68*

Model Summary[b]

R	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
.795	*.63*	*.58*	*.998*

a. *Predictors: (Constant), Mean of OS, SI, EE, PEOU, ATT, FC, PE and PU Items*
b. *Dependent Variable: Mean of ITU items*

ANOVA

Model	Sum of Squares	df	Mean of Squares	F	Sig.
Regression	*100.70*	*8*	*12.59*	*12.65*	*<.001*[b]
Residual	*58.73*	*59*	*.995*		
Total	*159.44*	*67*			

a. Dependent Variable: Mean of ITU items
b. Predictors: (Constant), Mean of OS, SI, EE, PEOU, ATT, FC, PE and PU Items

Coefficients

Model	*Unstandardized Coefficients Beta*	*Coefficients Std. Error*	*Standardized Coefficients Beta*	*t*	*Sig.*
(Constant)	*1.217*	*.95*		*1.28*	*.21*
Mean of PU Items	*.66*	*.19*	*.58*	*3.40*	*.001*
Mean of PEOU Items	*.19*	*.14*	*.13*	*1.40*	*.17*
Mean of PE Items	*.02*	*.15*	*.02*	*.12*	*.90*
Mean of EE Items	*-.28*	*.13*	*-.25*	*-2.23*	*.030*
Mean of SI Items	*.02*	*.14*	*.02*	*.17*	*.87*
Mean of FC Items	*-.14*	*.14*	*-.11*	*-1.02*	*.31*
Mean of ATT Items	*.27*	*.23*	*.13*	*1.20*	*.24*
Mean of OS Items	*-.11*	*.15*	*-.09*	*-.78*	*.44*

The final survey question was an open text option for any comments or suggestions regarding the use of telehealth technology in outpatient clinics by PT/OT/SLPs. The responses received are provided below and were directly taken from the survey response data. No thematic analysis was performed.

Table 14

Open Text Comments from Survey

Private practice - OT	*In my opinion telehealth should be a second option, for patients who otherwise would not be able to receive treatment. For example in the low income area I practice in, many patients struggle with consistent transportation but do consistently have access to internet or cell phone service in order to complete a telehealth visit. For the children in our area who desperately need the services we provide, a telehealth visit would be better than not receiving services at all if there were transportation issues, illness, etc. In my opinion the flow would be face to face appointment, then given the option of telehealth if necessary, then cancellation or reschedule. I feel this would be the best method to honor our patients and the best option to provide treatment in the most beneficial setting possible.*
Hospital based - PT	*Standardization of the provision of care needs to be clearly outlined for therapists. Having a 4-minute interaction versus a 35-minute interaction and the elements of the visit should be skilled and necessary. Cell phone visits may not be protective enough of patient information. Use of video files along with audio, should be allowed as supplementary documentation.*
Private practice - PT	*We do not offer telehealth services, however I had previous telehealth experience within the school systems. It was awful.*
Hospital based - SLP	*My clinic has not even entertained the use of telehealth throughout the pandemic. The main positives for telehealth at my clinic would be reducing the drive to the clinic for a lot of my rural patients (some drive 1 hour 45 minutes to therapy). However these same patients that have a long drive are often also not computer literate or would require lots of training to participate in telehealth. Many do not already have wifi. A con for me as a clinician would be acquiring all new materials to interface with telehealth platform (boom cards etc), learning how to use them effectively.*
Private practice - PT	*It certainly has potential, as long as the internet is available in certain locations.*
Hospital based - PT	*I believe telehealth could expand the reach of PTs. Although my practice is heavily hands on - I believe that I could be effective using telehealth. I believe PTs are well equipped to use this means of treatment.*
Hospital based - SLP	*In my experience, I did telehealth with mostly preschool aged children and it was VERY difficult. It was a lot of caregiver education and the carryover was poor. I think treating children face to face is much superior to telehealth, although the option is better than no therapy at all.*
Hospital based - PT	*I think telehealth may be helpful as a check-in for follow up for assessing compliance and correctness of HEP or for patient education. However, much of what a physical therapist does is based on hands-on assessment of what the body is doing and how the body responds to corrective input. Many of the tests and treatment is hands on. Probably 80% or more of what I do is hands on the patient. Telehealth has its uses but it would be very limited. It's a tool in the toolbox but definitely not the whole toolbox. Im not opposed to change or technology at all, but my physical hand-on assessment and treatment is vital to accuracy and quality of pt care. There is also potential for abusing the system in telehealth.*
Hospital based - PT	*I completely agree telehealth dehumanizes PT. In speaking with patient's who have telehealth visits with MDs, there is a sort of frustration and distance. The one benefit I see is for patient's who lack transportation getting to therapy. Beyond that, I think telehealth gets away from what PT does best which is to improve functional mobility by patient engagement. It's the same as Zoom fatigue that everyone has where the engagement is distant and has very little buy-in.*

Hospital based – OT	*I have experienced CEU course work with Telehealth, but have not used it. I think it would be beneficial for those patients who have difficulty getting to their appointments or have other health issues precluding their visits.*
Private practice - OT	*Telehealth is a disservice to patients with therapists unable to make that physical contact leading to a decrease in success with patient understanding, proper completion of tasks, and maintaining the attention of the patient.*
Hospital based - OT	*Telehealth has its place in outpatient clinic practice w/ some patient populations when hands on care/treatment isn't required. It can be very beneficial to patient's in rural areas where distance to services hinder ability to receive needed services.*
Hospital based - OT	*In some cases, I feel as though attendance would be improved as the client would be available in their own home. Regarding pediatric or family training, it would be positive in terms of a mandatory participation since they do not have the therapist onsite to perform the task. Some areas of practice such as traumatic hand injuries just require the use of clinic-based modalities and manual skills of a therapist.*
Private practice - PT	*We implemented Telehealth services at the height of COVID to continue with care in our clinic. It was difficult in the rural setting due to poor internet services and patients did not have a computer that had the ability to use our system. Care was minimal and outcomes were not optimal with the use of Telehealth in our area.*
Hospital based - PT	*We briefly attempted some telehealth visits at the beginning of Covid, but there were a lot of hurdles with technology on our end as well as the patient end. One clinic that saw more college students had a little more success, but I don't think they utilize telehealth any longer*
Private practice - OT	*Telehealth was a good option during the peaks of COVID and with rural patients. However, planning was much more time consuming and no manual assistance was able to be given to patients. I have the technology and the knowledge, so it was not difficult, but many people are not appropriate for telehealth in my practice, and I do not like the limitations it provides. Nothing can replace in-person care.*
Hospital based - OT	*As a lymphedema therapist, it is vital that my patients are in person for manual training. However, I think that telehealth could be an excellent education tool for post-operative cancer care for preventative education.*
Hospital based - SLP	*My only experience with telehealth is in the Early Intervention and School Based Settings. I did not find it a functional means of therapy intervention in these settings given the reduced attention spans of children and fixation on the technology. Currently working with adults, I think the modality would be more appropriate for this population, but I don't think it will ever compare to face-to-face intervention.*
Hospital based - SLP	*Telehealth may be the answer for rural areas and those without reliable transportation options.*
Private practice - OT	*Preparation and communication with family is key to success with using Telehealth platform. I personally feel that face to face is the best option when available; however, Telehealth does offer more flexibility to meet needs of clients in certain situations (medically fragile during heightened times of illness in community, issues with transportation, opportunity to explore home environment with family, etc). The challenges are connectivity in rural areas and accessibility to these services. This is the greatest barrier and challenge for rural communities regarding Telehealth.*

To determine the internal consistency of the survey questions, the Cronbach's Alpha was determined for each variable. ITU survey question #3 was reverse coded as the question was a negatively worded question. Cronbach's alpha for each survey section was calculated and is represented in Table 15.

Table 15

Cronbach's Alpha

Variable	*Cronbach's alpha*
PU	.95
PEOU	.95
PE	.90
EE	.70
SI	.70
FC	.70
ATT	.22
OS	.64
ITU	.83
All Subscales	.90

In summary, the independent variables of Perceived Usefulness (PU) and Effort Expectancy (EE) were the only predictive variables for ITU, but both were strong predictors of intention to use telehealth by PTs/OTs/SLPs in outpatient therapy clinics located in southwest Virginia. In addition, therapist practicing in private practice clinics were .5 standard deviation more likely to utilize telehealth. Furthermore, the population

treated by therapist with associated utilization of telehealth was identified as significant for the pediatric and geriatric groups. Finally, based upon this research study the findings suggest that among the therapist type, SLPs and OTs are more likely to utilize telehealth than PTs in outpatient clinics located in southwest Virginia.

CHAPTER FIVE

DISCUSSION

The purpose of the research project was to assess what critical factors influenced the adoption and intention to use telehealth technology by PT/OT/SLPs in the outpatient setting in southwest Virginia. This research data was used to analyze behaviors related to the adoption of telehealth and identify barriers in adoption of telehealth as a means through which to improve access to physical, occupational, and speech therapy services in rural southwest Virginia. The survey provided insight as to the similarity and differences among PT/OT/SLPs opinion of telehealth utility. The utilization of telehealth by therapist in outpatient clinics requires such investigation of the modality to determine the efficacy in providing care in underserved regions.

The survey results identified an association between perceived usefulness (PU) and effort expectancy (EE) and the dependent variable intention to use (ITU) telehealth. In addition, the location of the clinic, hospital-based versus private practice, also was associated with ITU. Likewise, the patient population treated, pediatric, adult, or geriatric, was also correlated with the intention to use telehealth. Finally, therapist type of SLPs and OTs were more likely to utilize telehealth compared to PTs in outpatient settings in southwest Virginia.

TELEHEALTH has IMPROVED CARE ACCESS in DISADVANTAGED AREAS

On March 6, 2020, CMS announced telehealth waivers for the utilization by PTs/OTs/SLPs with Medicare and Medicaid beneficiaries. According to an investigation by the APTA (Lewis, 2021), prior to the pandemic the utilization of telehealth by PTs was 0.42%, but up until March 31, 2021, the rate increased to 9.97%. A survey of 259

SLPs in a variety of employment settings from across the country found that 52% had performed an evaluation via telehealth during the pandemic (Campbell & Goldstein, 2022). Another study of OTs (N = 64), SLPs (N = 44), and PTs (N = 43) in outpatient clinics found that 58% of the therapists utilized telehealth during the pandemic, but that only 17.8% of participants agreed that telehealth is as effective as in-person therapy (Mihevc et al., 2022; Sprianu et al., 2022). Similarly, Mihevc et al. (2022) reported from a systematic review of therapist utilization of telehealth that initially the modality replaced face-to-face interventions but quickly lost momentum as the pandemic restrictions were eased. Medicaid does provide telehealth reimbursement, but not in all states. In addition, continued reimbursement by Medicare for PTs/OTs/SLPs utilization of telehealth is uncertain once the pandemic has ended (APTA, 2022).

This study examined telehealth utilization in clinics located in southwest Virginia. SLPs and OTs were significantly more associated with an intention to use telehealth than PTs. The text comments provided by survey participants allows some insight as to the potentially divergent perceptions of telehealth. One OT documented (or commented) that telehealth allows more flexibility to meet needs of clients in certain situations, and an SLP commented, “Telehealth may be the answer for rural areas and those without reliable transportation options.” A PT suggested that access to telehealth proved difficult in the rural setting due to poor internet services, and issues with patient access to a computer led to minimal outcomes in the rural community.

The greater intention to use telehealth by SLPs and OTs over PTs, in this research survey, perhaps corresponds to the greater utilization by SLPs prior to the pandemic. The number of OT/SLPs seeing at least six patients per week via telehealth is more than

double that of PTs. The service area/patient populations that represent the greatest utilization of telehealth by OT/SLPs are early intervention, school based and pediatric private practice settings (AOTA, 2021; ASHA, 2021; HHS, 2021). The utilization of telehealth by SLPs (Campbell & Goldstein, 2021) and OTs (Little et al., 2021) remains significantly above pre-pandemic levels while PT practice has returned to pre-pandemic level (Ferguson, 2022).

Finally, the increase in telehealth uses by SLPs, as a primary delivery method, is an opportunity for research into the feasibility, validity, and reliability of therapy services being provided remotely. Likewise, additional training and resources may facilitate the other therapy disciplines utilization of telehealth (Bolden, 2022). Although this research study was specific to outpatient clinics in southwest Virginia, results from this survey may be used to inform outpatient therapy clinics in other underserved communities with limited access to therapist with decision-making processes related to the implementation of telehealth.

The use of the TAM and UTAUT as theoretical models allowed for the investigation of the perceptions of telehealth, as well as organizational support and attitude toward the modality in the clinical setting. Both the UTAUT and TAM2 are strong predictors of health care providers' adoption of technology (Klaic & Galea, 2020; Portz et al., 2019). The use of TAM2 and UTAUT in the investigation of telemedicine and telehealth adoption in health care has been clearly confirmed as a model for understanding the facilitators and inhibitors influencing the implementation of such technology (Aggelidis & Chatzoglou, 2008; Gammon et al., 2008; Hoel et al., 2021; Kamal et al., 2019; Napitupulu et al., 2021; Rahi et al., 2020). The finding in this study

that perceived usefulness and effort expectancy is correlated with intent to use telehealth cooperates with the TAM2 and UTAUT original research by Marler et al. (2006) and Venkatesh et al. (2003).

The subscales of PU and EE from the TAM2 and UTAUT models, for this research study, were associated with greater intention to use telehealth in the outpatient therapy clinics. The perceived usefulness of the equipment and the effort expectancy to utilize the technology are important indicators in the process of therapists adopting telehealth. Furthermore, ensuring therapists are aware of their attitudes toward telehealth may help improve the acceptance of the modality for improved patient access. The usefulness and expected effort in intention to use the equipment significantly correlated with adoption of telehealth technology.

Based on the subscale results from the TAM2 and UTAUT survey, future education on telehealth adoption might include information obtained on PU and EE to improve self-efficacy by therapists in the outpatient setting. To facilitate behavioral change, user support and education to address attitude toward telehealth adoption would be indicated. In a study by Diño and de Guzman (2015), the UTAUT constructs, particularly effort expectancy yielded a significant influence on the behavioral intention to utilize telehealth by health care professionals. Furthermore, gender showed no moderating effect on ITU. Results of the study supported the advocacy of the UTAUT Model as a framework for promoting telehealth use.

Therapists have utilized telehealth for the last two decades, but the utilization among therapist type and setting has varied greatly. Although telehealth has been identified as a means to improve access in underserved rural communities, the results of

this study indicated private outpatient practice clinics in southwest Virginia were significantly more likely to utilize telehealth compared to hospital-based clinics. In a study by Blumenthal et al. (2018) of physical therapist adoption of telehealth, no significant correlation was identified in relation to practice setting. Similarly, a study of OTs by Atwal et al. (2014) and SLPs by Albudoor and Peña (2021) also did not identify a correlation between practice setting location (hospital-based versus private practice) and the intention to use telehealth. Perhaps the practice setting is not a crucial indicator for telehealth adoptive behavior, and research focus should be applied to PU and EE as more informative subscales.

The years of PTs/OTs/SLPs clinical experience was not a statistically significant marker of therapist utilization of telehealth. Despite concerns reported by the participants, including technical and internet issues, training and difficulty using telehealth when compared to in-person visits, the clinical experience of the therapist was not an indicator for ITU. The participant text responses did indicate a general agreement that telehealth offers unique opportunities for improved care via access to services and a possibly an alternative cost-effective mode of therapy for rural areas.

In a study of SLPs, no relationship was found between the years of clinical experience and ITU, but that therapists of any experience level found potential in telehealth utilization in areas such as counseling, rehabilitation/treatment, screening, and the evaluation of different cases, including speech and language disorders, stuttering, and voice disorders (Al Awaji et al., 2022). In the ASHA Healthcare Survey (2021), years of experience did correlate with telehealth use. In this study of 638 SLPs, the results of current telepractice workflow in relation to years of experience show the following: 1-5

years at 38%, 6-10 at 33%, 11-15 at 34%, 16-20 at 39%, 21-25 at 52%, 26-30 at 54%, and 31 or more at 56%. In addition, the 2021 ASHA Healthcare Survey revealed that of the 638 SLPs surveyed, 49% of those practicing in outpatient clinics identified the top reason for not utilizing telepractice was because patients on caseloads were not appropriate for telepractice due to clinical presentation. Finally, the survey also revealed that 77% of SLPs practicing in outpatient clinics have utilized telepractice at least once in their practice.

The statistically significant correlation between patient demographics of age (pediatric and geriatric versus adult) and therapist utilization of telehealth found in this study was also found in investigations by other researchers (Choo et al., 2019; Mihevc et al., 2022; Schaper & Pervan, 2007; Sprian et al., 2022). Prior to the pandemic, research indicated that SLPs utilization of telehealth (telepractice) was more prevalent in the pediatric population but increased significantly during the pandemic (Campbell & Goldstein, 2021). The geriatric population though could have a negative correlation with telehealth use due to technology aversion, but the counter argument would be that telehealth improves access to care for the older adult population (Gurupur & Miao, 2022). The correlation of pediatric and geriatric populations in this study having increased telehealth utilization does speak to access to care in rural communities, pandemic restrictions, and improvement in broadband services.

The therapist identified gender (male, female, agender, genderqueer or genderfluid, non-binary, questioning or unsure, two-spirit and/or prefer not to disclose) was not associated with intention to use telehealth. In similar studies, gender showed no moderating effect on intention to use telehealth (Diño & de Guzman, 2015; Ghaddar et

al., 2020; Russell et al., 2022). Although beneficial for descriptive demographics, gender is not a predictor for telehealth adoption.

The analysis of the UTAUT model for Behavior and Attitude toward Telehealth Technology included Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), and Attitude towards Telehealth (ATT). For PTs and OTs in outpatient clinics located in southwest Virginia, the correlation between PE and ITU was significantly associated, but there was not a significant correlation for SLPs. The survey questions for PE focused on productivity in relation to telehealth use. The difference in the SLPs mean for PE could be related to most billing codes reported by SLPs are untimed and do not include time designations. An untimed code is billed once per day, regardless of the time spent providing the service (ASHA, 2022).

For effort expectancy (EE), an inverse relationship was identified for therapists, and the relation of increased effort with decreased intention to use telehealth seems plausible. Effort Expectancy was found to have the greatest impact on behavioral intention among health care professionals, and previous studies explained that the use of telehealth was greatly dependent on its ease of use (Gupta et al., 2008). Effort expectancy, performance expectancy, and social influence appear to positively predict the behavioral intention to use telehealth. In addition, the UTAUT model demonstrated evidence of construct validity through convergent and discriminant measures (Diño & de Guzman, 2015).

For PTs in outpatient clinics located in southwest Virginia, the correlation between SI and ITU was significantly associated, but there was not correlation for OTs or SLPs. The survey questions for social influence pertained to the therapist opinion for how

peer and patients' perceptions influence the behavior to use telehealth. In a study of health care professionals use of telehealth during the pandemic, social influence was significantly associated with ITU. Moreover, performance expectancy is significantly affected by the health care professionals' opinions and effort expectancy was strongly influenced by computer anxiety (Napitupulu et al., 2021).

Facilitating conditions such as resources, necessary knowledge or a specific person allocated for assistance in the use of the technology was not associated with intention to utilize telehealth by PTs/OTs/SLPs. The attitude toward telehealth survey questions for promotion of good clinical practice, making therapist work more interesting, the use of telehealth would imply major changes in practice and dehumanization with the use of telehealth was significantly correlated with ITU for PTs, but not for OTs or SLPs. Attitude toward using telehealth was highly influenced by performance expectancy, self-efficacy, and facilitating conditions. Therefore, improving health professionals' knowledge and perception could result in higher levels of attitude toward using telehealth (Shiferaw et al., 2021).

LIMITATIONS

This research study was a sample of convenience of outpatient clinics located in southwest Virginia. In addition, telehealth utilization by PTs/OTs/SLPs within each clinic was not available for comparison to this survey result. In addition, the literature review did not reveal a specific survey instrument specific to PT/OT/SLPs adoption of telehealth technology. Likewise, no research was identified that examined technology adoption of PT/OT/SLPs, and specifically not in the outpatient setting.

DELIMITATIONS

A primary set of delimitations of this research study focused on demographics. This project was limited to therapists working within counties in southwest Virginia. PTs/OTs/SLPs within outpatient clinics was investigated. There were likely other locations both hospital-based and private practice (within the state of Virginia as well as across the United States) that could also provide telehealth utilization insight. Individuals who provide health care related services (e.g., health care administrators, policymakers, social workers) and settings in which telehealth technology has been adopted could have been surveyed and assessed. For this particular project, however, the researcher focused on these populations, setting, and location.

Additional delimitations in this study included access by participants to the internet to complete the online survey; the restriction of variables to those constructs identified by Marler et al.'s (2006) and Venkatesh (2003) survey instruments; and the intentional (versus random) selection of participants.

RECOMMENDATIONS and FUTURE RESEARCH

One area for future research is the intention to use telehealth by PTs/OTs/SLPs practicing in urban communities, as well as other rural outpatient clinics beyond those run by private practices. This investigation will provide greater insight as to access to therapy and intention to use telehealth by therapists in larger populations. Further research as to the underlying difference in utilization rates among SLPs and OTs versus PTs, and possible identification as to why there may be a disparity in telehealth use. Likewise, this study found that private practice clinics had greater utilization of telehealth versus hospital-based clinics. Investigation into the likelihood of this being a trend versus

an anomaly in southwest Virginia might provide insight as to why there is a difference based upon location of the clinic. Although organizational support and telehealth training was not associated with greater intention to use telehealth in this study, further research could include how training on the benefits to the clinic for telehealth use might be beneficial. Finally, only certain survey questions appear to correspond to intention to use. The length of the survey was 10 minutes, and the subsequent survey instruments likely focus on PE, EE, ITU, and demographics for better participant response rates.

CONCLUSION

The latest HHS extension for the Public Health Emergency is effective until October 13, 2022. If therapy is to continue with utilization of telehealth, therapists must incorporate new clinical, business, and marketing principles to allow integration of the modality to a greater population seeking access to care (Ferguson, 2022).

The future of therapy professions may be a hybrid model of traditional face-to-face interventions, but could a digital health opportunity in telehealth allow access to underserved communities? The question of telehealth's impact on society and the availability of different access points to therapy interventions also raises ethical considerations. The therapy professions have grown over the last century, and further investigation into the technologies that can improve patient access to health care should be considered.

Based on the subscale results from the TAM2 and UTAUT survey, future education on telehealth adoption might include information obtained on PU and EE to improve self-efficacy by therapists in the outpatient setting. To facilitate behavioral change, user support and education to address attitude toward telehealth adoption would

be indicated. In addition, the pediatric and geriatric populations in this study having increased telehealth utilization does speak to access to care in rural communities, and that therapist of any experience level found potential in telehealth utilization.

There exist challenges in implementing telehealth in rural areas: (I) organizational willingness to implement telehealth to improve patient access; (II) availability of infrastructure for telehealth implementation; (III) effective models for reimbursement; (IV) availability of training, knowledge, and education; and (V) quality assurance models to determine telehealth efficacy (Batsis et al., 2017). Telehealth can improve access to care with similar patient satisfaction as to face-to-face interactions for rural communities, and there is a place for high-value telehealth therapy services in the outpatient clinics.

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ADDENDUM

Documentation requirements

The pandemic has led to CMS altering documentation requirements. Although Medicare only allows established patients to receive telehealth services, CMS has said it will not conduct audits to ensure that a prior relationship existed during the public health emergency. This means that clinicians may provide telehealth services to both new and established patients in the outpatient setting. Clinicians should consider state practice acts or other local laws and regulations before beginning services with new patients. Clinicians may be required to evaluate new patients face-to-face before providing clinical recommendations or treatment before providing telehealth services (CMS, 2021 - https://www.cms.gov/files/document/telehealth-toolkit-providers.pdf).

CMS also removed limitations on where Medicare patients must be located to be eligible for telehealth services. During the public health emergency, clinicians may provide services from their own homes rather than only from an outpatient setting. APTA, AOTA and ASHA, recommend for PT/OT/SLPs to work with the hospital or clinic registration department to ensure each patient's home is registered with the regional office, and that services are provided remotely only when clinically appropriate for the patient. In cases where both audio and visual are not available, during this time the service can be furnished exclusively with audio (ASHA n.d. - https://www.asha.org/practice/reimbursement/medicare/providing-telehealth-services-under-medicare-during-the-covid-19-pandemic/#SLP).

The documentation guidelines provided by ASHA (for telepractice) are identical to the APTA and AOTA recommendations for telehealth. The documentation

recommendations are complete documentation at the time of service, record the amount of time you spent providing the service, document, and code for place of service (POS), verify that your records support the codes used, and use the CPT modifier 95 for telehealth services provided in real-time. Documentation for benefits or services delivered via telehealth should be the same as for comparable face-to-face services (Cason & Cohn, 2014; Virginia DMAS, 2021 - https://www.dmas.virginia.gov/media/3428/telehealth-services-supplement-updated-05-19-2021.pdf).

Reimbursement considerations –Medicare (Medicaid, etc.)

Once the pandemic ends, Medicare will no longer reimburse PT/OT/SLPs directly for any telehealth services unless the Expanded Telehealth Access Act of 2021 is passed. The Expanded Telehealth Access Act of 2021 (H.R. 2168), which would make the current temporary policy permanent that allows PT/OT/SLPs to deliver and bill for services provided via telehealth under Medicare. The bill would instruct the U.S Centers for Medicare & Medicaid Services to permanently adopt what is a temporary waiver of restrictions on payment for telehealth services delivered by PT/OT/SLPs. The Secretary of Health and Human Services would also be allowed to further expand the list of authorized telehealth providers.

The state of Virginia currently contracts with six health plans for the MEDALLION 3.0 program (Medicaid): these health plans are the for-profit national plans (Anthem HealthKeepers, CareNet, and AmeriGroup); a local, for-profit plan (Virginia Premier); and local, not-for-profit plans (Optima Family Care, MajestaCare). All six plans have different coverage guidelines for telehealth, and according to the Department of Medical Assistance Services (DMAS), not all Medicaid plans cover

telehealth services provided by PT/OT/SLPs (DMAS, 2021 - https://www.dmas.virginia.gov/news-and-updates/posts/2021/september/take-advantage-of-telehealth/).

For private insurance, the variability of plans and benefits within providers can often be confusing for patients and therapists. In an ever-changing health care atmosphere, patients are often unaware of changes in their benefits from year-to-year, particularly for unexpected new onset conditions, and therapists are often unaware of changes in insurance coverage that occur frequently. The APTA, AOTA and ASHA recommend that the therapist confirm coverage for telehealth services with the insurance provider prior to initiation of the service.

The CPT codes utilized by PT/OT/SLP for Medicare beneficiaries during the pandemic include: G2061 (98966) which is for assessment and management, for an established patient, for up to 7 days, cumulative time during the 7 days; 5-10 minutes. The G2062 (98967) CPT code is for 11-20 minutes, and G2063 (98968) for 21 or more minutes (CMS, 2020 - https://www.cms.gov/newsroom/fact-sheets/medicare-telemedicine-health-care-provider-fact-sheet). The reimbursement rates by CMS for these codes are: $13.32, $26.64 & $39.60, respectively, which are only 36% of the reimbursement rate for telehealth services provided by physicians, nurse practitioners, clinical nurse specialists, certified nurse midwives and physician assistants (CMS, 2020 - https://www.cms.gov/files/document/covid-final-ifc.pdf)

Regulations regarding therapy and telehealth

The Federation of State Medical Boards provides the following updated regulations regarding the provision of telehealth services. In regard to modality, a healthcare practitioner may use any non-public facing audio or remote communication product that is available to communicate with patients. This exercise of discretion applies to telehealth provided for any reason, regardless of whether the telehealth service is related to the diagnosis and treatment of COVID-19. Virginia Governor Ralph Northam signed legislation (HB 5046/SB 5080) that amends the Commonwealth's telehealth laws to eliminate originating site restrictions and the requirement that the patient be accompanied by a care provider during the telehealth session. The bill expands the telehealth platform to allow care providers to treat patients in their own homes or other locations, including businesses, schools, and clinics. It also mandates that providers cover telehealth services regardless of the originating site, whether a clinician is with the patient and directs the state Medicaid program to continue covering audio-only phone services (DMAS, 2021 – 'States waiving licensure requirement' - https://www.fsmb.org/siteassets/advocacy/pdf/states-waiving-licensure-requirements-for-telehealth-in-response-to-covid-19.pdf

The Virginia Board of Medicine, the Board of Physical Therapy and the Virginia Board of Audiology and Speech-Language Pathology recognize that using telehealth can enhance care by facilitating communication between health care providers and their patients. The Virginia General Assembly has not established statutory parameters regarding the provision and delivery of telehealth services. Therefore, PT/OT/SLPs must apply existing state laws and regulations to the provision of telehealth services. A

practitioner should conduct all appropriate evaluations and patient histories consistent with traditional standards of care for the particular patient presentation. The practitioner is responsible for making this determination, and in doing so, must adhere to applicable laws and standards of care. The three Virginia Boards also state the expectations are that practitioners maintain the highest degree of professionalism and place the welfare of patients first; maintain acceptable and appropriate standards of practice; adhere to recognized ethical codes governing the applicable profession; adhere to applicable laws and regulations; and protect patient confidentiality.

The Boards for PT/OT/SLPs also state it is the expectation that practitioners recognize the obligations, responsibilities, and patient rights associated with establishing and maintaining a practitioner-patient relationship. A therapist is discouraged from initiating telehealth services without fully verifying and authenticating the location and, to the extent possible, confirming the identity of the requesting patient. Upon initiation, a therapist is encouraged to disclose and validate their identity and applicable credential(s). they must also obtain appropriate consents from requesting patients after disclosures regarding the delivery models and treatment methods or limitations, including any special informed consents regarding the use of telehealth services.

The PT/OT/SLP must be licensed by, or under the jurisdiction of, the regulatory board of the state where the patient is located and the state where the therapist is located. To ensure appropriate insurance coverage, practitioners must make certain that they are compliant with federal and state laws and policies regarding reimbursements. (AOTA, 2021 ‘Telehealth-State-Statutes-Regulations-Regulatory-Board-Statements’https://www.aota.org/-

/media/Corporate/Files/Advocacy/State/telehealth/Telehealth-State-Statutes-Regulations-Regulatory-Board-Statements.pdf). A study by Calouro et al., 2014 revealed that the majority of PT/OT/SLP boards are silent on telehealth in regard to state practice laws and regulations. A handful of state boards address "consultation by means of telecommunication", but do not provide any guidance for the practitioner seeking to provide telehealth services to patients. Of the few states that do provide guidance, the laws and regulations policies had the guidance to provide clarity or inhibit delivery of telehealth. Virginia, Tennessee, and North Carolina have no regulations or laws for PT/OT/SLP delivery of telehealth; while Pennsylvania (PT only), Kentucky (PT/OT/SLP) are the only central Appalachia states that do have regulations or laws that speak to telehealth delivery by therapist (Calouro, Kwong & Gutierrez, 2014).

Telehealth IT requirements for the therapist and clinic

The Virginia Telehealth Network (VTN) states that telehealth is often lauded as a solution for inequities in health care. But many of the same disparities persist from in-person to virtual care: Lack of insurance, language differences, literacy challenges, broadband access issues and more. The rapid expansion of telehealth nationwide during the pandemic brought to light many of these existing inequalities, emphasizing the drastic need for addressing the systemic disparities of health care via telehealth. (Virginia Telehealth Network, n.d., https://www.ehealthvirginia.org/equity-telehealth/).

The Rural Health Information Hub provides the following guidelines for telehealth implementation in outpatient clinics. There must be private telehealth workspaces that maximize patient confidentiality. A staff member must serve as a

telehealth coordinator who can manage telehealth referrals, brief the patient, coordinate with the telehealth provider, and schedule follow-ups as necessary. The clinic must have videoconferencing software, telemedicine carts equipped with cameras and screens, and remote patient monitoring devices (National Telehealth Technology Assessment Resource Center and Telehealth Resource Center for additional information).

The University of Virginia Center for Telehealth, Virginia Telehealth Network, Appalachian Regional Commission, and the Mid-Atlantic Telehealth Resource Center are also resources for outpatient clinics seeking assistance to establish telehealth services. PT/OT/SLPs are well-suited for telehealth - primarily as an enhancement of in-person services. Therapists can use telehealth as a supplement to in-person services to evaluate and treat a variety of conditions prevalent in the rural population, including but not limited to Alzheimer's disease, arthritis, vestibular disorders, multiple sclerosis, musculoskeletal conditions, Parkinsons disease, pelvic floor dysfunction, frailty, and sarcopenia.

Telehealth IT requirements for the patient

While telehealth is an instrumental tool in expanding access to health care for rural communities, it is nearly impossible to conduct without access to broadband – for both providers and patients. In today’s day and age, it is an essential need for quality living. The Commonwealth Connect is Virginia’s comprehensive effort to achieve universal broadband access by 2024. In 2021, there are 233,500 rural localities in Virginia with limited or no access to broadband, down significantly from 2018 when efforts first began, and it was estimated that there were upwards of 500,000 underserved

locations. The Virginia Department of Housing and Community's Office of Broadband, supported by the Commonwealth Connect Coalition, will bring access to broadband to our rural communities so that health disparities can be improved.

Financial barriers, access to technology and technical skill levels need to be addressed to ensure equitable delivery of telehealth services. The Surmounting Obstacles for Low-Income and Vulnerable Populations Everyday Using Health Technology (SOLVE Health Tech) program seeks to identify those being left behind in the digital health space. Those patients include older adults who may lack digital health skills and literacy, as well as residents of rural communities who do not have quality broadband access. The three main barriers to telehealth are shortages of video-enabled devices, high-speed data access and digital literacy. The Virginia Telehealth Network also identified barriers that exist at the clinician and system level: a lack of capacity linked to a need for more video-enabled devices; digital platform issues such as security, privacy, and ease of use; and workforce issues (VTN, n.d.). Factors such as costs, availability of diagnostic/intervention resources, and patient needs should be considered when selecting the telehealth infrastructure for service delivery (Keck & Doran, 2014).

Appendix A

Cover Sheet for Internet Research Packet with Informed Consent Statement

Invitation to Participate in a Therapy Telehealth Use in southwest Virginia Research Project

You are being invited to participate in a research study of therapist perceived usefulness and intention to use telehealth technology. You were selected as a possible participant because you are a PT/OT or SLP practicing in an outpatient clinic located in southwest Virginia. We ask that you read this form and ask any question you may have before agreeing to be in the study. Participation is completely voluntary. The study is being conducted by Dr. Jeanine Everhart, PhD, MPH, MBA, MCHES®, and Scott Rinehardt, DPT, MBA, CDRS, SCS (a Smyth County-native and doctoral student) of the Doctoral program in *Health Sciences* at *Radford University* Carilion 101 Elm Avenue SE, Roanoke, VA 24013, 540-985-4046 gsrinehardt@radford.edu or jeverhart1@radford.edu.

Purpose of the Study: The purpose of this quantitative correlational study is to determine if the users' perceived ease of use (PEOU), perceived usefulness (PU), and organizational support (OS) for telehealth training is associated with the intention to use telehealth technology by physical and occupational therapists and speech-language pathologists in outpatient therapy clinics in southwest Virginia. There are 116 potential participants for this study. You are free to contact the investigator at the above address and phone number to discuss the survey.

Major Requirements of the Study: Access to the internet.

Significant Risks to Participants: There are no anticipated risks from participating in this research.

Potential Benefits: This research may contribute to the identification of barriers related to the adoption of telehealth and lead to the long-term use of telehealth as a means through which to improve access to physical, occupational, and speech therapy services in rural southwest Virginia.

Duration of Participation: Completion of the survey is voluntary. Estimated length of time to complete the survey is 10 minutes.

Eligibility: You are eligible to complete the survey if all of the following are true:

-You are a practicing physical therapist, occupational therapist, or speech-language pathologist.

-You practice in an outpatient clinic (hospital-based or private practice) located in Bland, Buchanan, Carroll, Dickenson, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wise, and Wythe County, or the City of Bristol, of Galax, or of Norton.

-You have not already completed this survey instrument at this location or any other location.

Please note you can complete the survey instrument regardless of whether or not you have ever utilized telehealth. Please answer the questions based on either previous experience, or perception of telehealth use by physical therapist, occupational therapist, or speech-language pathologist in an outpatient clinic in southwest Virginia. In December 2021, the Virginia Telehealth Network (VTN) conducted a survey of therapist across Virginia. Although this researcher will share the data from this project with the VTN, this survey is not associated with that project entitled 'VIRTUAL CARE IN VIRGINIA: 2021 BENCHMARK SURVEY'.

Participation: Answering the attached survey is completely voluntary. You may refuse to participate at all or may refuse to answer any particular question or questions for any reason. Please answer the questions honestly based on your experiences and/or perception of telehealth in relation to therapy use in the outpatient setting. It is estimated that the survey will take you 10 minutes or less to complete, but you can take as much time as you need to answer the questions. If you consent to participate, please press the arrow button at the bottom right of the screen. Otherwise use the X at the upper right corner to close this window and disconnect. After consent to participate, the survey will begin. At the completion of the main survey, participants will have the option to enter the $25 Amazon Gift Card lottery drawing survey or exit. Participants who wish to be included in the gift card drawing will proceed to a second survey that will request a personal email address. The researcher will not be able to link email addresses to the survey responses. The researcher will randomly select the four winners and contact them for mailing address to ship the gift cards.

Privacy of Information: The research team will work to protect your data to the extent permitted by technology. It is possible, although unlikely, that an unauthorized individual could gain access to your responses because you are responding online. This risk is similar to your everyday use of the internet. Study findings will be presented only in summary form. The researcher will enable in Qualtrics the **Anonymize Responses** setting, which is an effective way to permanently scrub a survey of identifying information before saving the data. A limited number of research team members will have access to the data during data collection. The researcher will not be collecting IP addresses from participants. No identifying information is collected in the dataset.

Contact Information: This study was approved by the Radford University Committee for the Review of Human Subjects Research. If you have questions or concerns about your rights as a research subject or have complaints about this study, you should contact Dr. Jeanne Mekolichick, Institutional Official and Associate Provost for Research, Faculty Success, and Strategic Initiatives, jmekolic@radford.edu, 540.831.6504.

Consent: By answering the survey, you agree that you have read the above information, work in a clinic located in one of counties listed above, are at least 18 years old, a physical therapist, occupational therapist, or speech-language pathologist, and have not already completed this survey previously. You also agree that you are participating under your own free will and want your responses to be included in this research study. Thank you for agreeing to participate in this telehealth research project in southwest Virginia. Your honest answers and the valuable time you spent participating are very much appreciated and will contribute to helping improve access to therapy services across southwest Virginia.

Appendix B

Code Book for SPSS Data Analysis

Section 1 – Demographics (Independent Variables)

Survey Question	Variable Name	Values*	Data Type
1. Indicate your gender (select all that apply):	GENDER	1: male 2: female 3: agender 4: genderqueer or genderfluid 5: non-binary 6: questioning or unsure 7: two-spirit 8: prefer not to disclose	Nominal categorical
2. Indicate your age	AGE	18 to N	Continuous
3. What is your highest academic qualification?	DEGREE	1: Bachelor's degree 2: Master's degree 3: Doctorate degree	Nominal categorical
4. What is your profession?	PROF PROF=1 for PT PROF=2 for OT PROF=3 for SLP	1: physical therapist 2: occupational therapist 3: speech-language pathologist	Nominal categorical
5. What is your place of work?	WORK	1: Hospital-based clinic 2: Private practice clinic	Nominal categorical
6. What population do you primarily treat?	TREAT	1: Pediatrics 2: Adult 3: Geriatrics	Categorical nominal
7. How often do you use Telehealth?	USETELE	1: None 2: Daily 3: Weekly 4: Monthly	Ordinal categorical
8. The number years you have been practicing in your profession.	YRPRACT	0 to N	Continuous

*Any survey question that is blank will be assigned a value of 999 and coded in SPSS as "System Missing".

Section 2 – PU & PEOU mean response per discipline (Independent Variables)

Survey Question*	Variable Name	Values*	Data Type
PU: 1. The use of Telehealth could improve the quality of the work I do.	PU01	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
2. The use of Telehealth could give me greater control over my work.	PU02	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
3. The use of Telehealth could improve my job performance.	PU03	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
4. Using Telehealth could allow me to accomplish more work than would otherwise be possible.	PU04	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
5. Using Telehealth could enhance my effectiveness on the job.	PU05	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
6. Overall, I find Telehealth could be useful in my job.	PU06	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree	Categorical Ordinal

		7: Strongly Agree	
Calculated mean of PU1+PU2+PU3+PU4+PU5+PU6	PU_PT (PROF=1)	Mean value for physical therapist PU response	Continuous
***SPSS process for variable mean**: 'Transform'→'Compute Varible'→Name 'Target Variable' (PU_PT, OT or*	PU_OT (PROF=2)	Mean value for occupational therapist PU response	Continuous
SLP)→'Function Group is 'Statistical'→'Functions and Special Variables is 'mean'.	PU_SLP (PROF=3)	Mean value for speech-language pathologist PU response	Continuous
	PU_ALL	Mean value for ALL therapist PU response	Continuous
PEOU: 1. Learning to operate the Telehealth system would be easy for me.	PEOU01	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
2. Interacting with the Telehealth system would often be easy for me.	PEOU02	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
3. I would find the Telehealth system is flexible to interact with.	PEOU03	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
4. My interaction with the Telehealth system would be clear and understandable.	PEOU04	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal

5. It would be easy for me to become skillful at using the Telehealth system.	PEOU05	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
6. Overall, I would find the Telehealth system easy to use.	PEOU06	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
Calculated mean of PEOU1+PEOU2+PEOU3+ PEOU4+PEOU5+PEOU6	PEOU_PT	Mean value for physical therapist PEOU response	Continuous
See above for ***SPSS process for variable mean***	PEOU_OT	Mean value for occupational therapist PEOU response	Continuous
	PEOU_SLP	Mean value for speech-language pathologist PEOU response	Continuous
	PEOU_ALL	Mean value for ALL therapist PEOU response	Continuous

*Any survey question that is blank will be assigned a value of 999 and coded in SPSS as "System Missing".

Behaviour and Attitude toward telehealth mean response per discipline (Independent Variables)

Survey Question*	Variable Name	Values*	Data Type
PE: 1. The use of Telehealth would enable me to perform more tasks more quickly.	PE01	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
2. The use of Telehealth would	PE02	1: Strongly Disagree 2: Disagree	Categorical Ordinal

enable me to be more productive.		3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	
Calculated mean of PE1+PE2	PE_PT	Mean value for physical therapist PE response	Continuous
See above for ***SPSS process for variable mean***	PE_OT	Mean value for occupational therapist PE response	Continuous
	PE_SLP	Mean value for speech-language pathologist PE response	Continuous
	PE_ALL	Mean value for ALL therapist PE response	Continuous
EE: 1. It would take more effort to maintain patient records with Telehealth as compared to face-to-face interactions.	EE01	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
2. It would take more effort to provide patient treatment with Telehealth as compared to face-to-face interactions.	EE02	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
Calculated mean of EE1+EE2	EE_PT	Mean value for physical therapist EE response	Continuous
See above for ***SPSS process for variable mean***	EE_OT	Mean value for occupational therapist EE response	Continuous
	EE_SLP	Mean value for speech-language pathologist EE response	Continuous
	EE_ALL	Mean value for ALL therapist EE response	Continuous

SI: 1. People who influence my behavior think I should use Telehealth.	SI01	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
2. My patients would welcome the use of Telehealth in the clinic.	SI02	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
Calculated mean of SI1+SI2	SI_PT	Mean value for physical therapist SI response	Continuous
See above for ***SPSS process for variable mean***	SI_OT	Mean value for occupational therapist SI response	Continuous
	SI_SLP	Mean value for speech-language pathologist SI response	Continuous
	SI_ALL	Mean value for ALL therapist SI response	Continuous
FC: 1. I have the resources necessary to use Telehealth.	FC01	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
2. I have the knowledge necessary to use Telehealth.	FC02	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
3. There is a specific person allocated for assistance if I	FC03	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree	Categorical Ordinal

experience Telehealth system difficulties.		4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	
Calculated mean of FC1+FC2+FC3	FC_PT	Mean value for physical therapist FC response	Continuous
See above for ***SPSS process for variable mean***	FC_OT	Mean value for occupational therapist FC response	Continuous
	FC_SLP	Mean value for speech-language pathologist FC response	Continuous
	FC_ALL	Mean value for ALL therapist FC response	Continuous
Attitude Towards Telehealth: 1. The use of Telehealth would promote good clinical practice.	ATT01	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
2. Telehealth would make work more interesting.	ATT02	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
3. The use of Telehealth would imply major changes in my clinical practice.	ATT03	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
4. I feel that Telehealth technology dehumanizes PT/OT/SLPs care of the patient?	ATT04	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal

Calculated mean of ATT1+ATT2 +ATT3+ATT4	ATT_PT	Mean value for physical therapist ATT response	Continuous
See above for ***SPSS process for variable mean***	ATT_OT	Mean value for occupational therapist ATT response	Continuous
	ATT_SLP	Mean value for speech-language pathologist ATT response	Continuous
	ATT_ALL	Mean value for ALL therapist ATT response	Continuous
Organizational Support: 1. Do you consider yourself computer literate?	OS1	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
2. I have received training for the use of Telehealth?	OS2	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
3. I have the necessary computer equipment to provide Telehealth services?	OS3	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
4. I have received training for the documentation and billing of Telehealth services?	OS4	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
Calculated mean of OS1+OS2 +OS3+OS4	OS_PT	Mean value for physical therapist OS response	Continuous

See above for ***SPSS process for variable mean***	OS_OT	Mean value for occupational therapist OS response	Continuous
	OS_SLP	Mean value for speech-language pathologist OS response	Continuous
	OS_ALL	Mean value for ALL therapist OS response	Continuous

*Any survey question that is blank will be assigned a value of 999 and coded in SPSS as "System Missing".

Behavioral Intention to Use (ITU) average response per discipline (Dependent Variable)

Survey Question*	Variable Name	Values*	Data Type
ITU: 1. I intend to use Telehealth in the next 12 months.	ITU01	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
2. I have the intention to use Telehealth when it becomes available in my clinic.	ITU02	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
3. I intend NOT to use Telehealth in my patient care even when it becomes available in my clinic.	ITU03	1: Strongly Disagree 2: Disagree 3: Somewhat Disagree 4: Uncertain 5: Somewhat Agree 6: Agree 7: Strongly Agree	Categorical Ordinal
Calculated mean of ITU1+ITU2+ITU3	ITU_PT	Mean value for physical therapist ITU response	Continuous
See above for ***SPSS process for variable mean***	ITU_OT	Mean value for occupational therapist ITU response	Continuous
	ITU_SLP	Mean value for speech-language	Continuous

		pathologist ITU response	
	ITU_ALL	Mean value for ALL therapist ITU response	Continuous

*Any survey question that is blank will be assigned a value of 999 and coded in SPSS as “System Missing”.

Open-ended free-form survey question: Please share any comments or suggestions regarding the use of telehealth technology in outpatient clinics by PT/OT/SLPs.

The participant text responses for the open-ended question will be stored and presented in the Discussion section of the research paper.

Appendix C

SURVEY INSTRUMENT

Section 1 - Demographics

1. Indicate your gender (select all that apply):

   a. Male b. Female c. Trans (male to female)

   d. Trans (male to female) e. Non-binary

   f. Prefer not to disclose

2. Indicate your age

   a. Enter number in years:___

3. What is your highest academic qualification?

   a. Bachelor's degree b. Master's degree c. Doctorate degree

4. What is your profession?

   a. Physical Therapist c. Occupational Therapist

   b. Speech-Language Pathologist

5. What is your place of work?

   a. Hospital-based outpatient clinic

   b. Private practice clinic

6. What population do you primarily treat?

   a. Pediatrics b. Adults c. Geriatrics

7. How often do you use Telehealth?

   a. None c. Weekly

   b. Daily d. Monthly

8. The number years you have been practicing in your profession.

   a. Enter number in years:____

Section 2

Please indicate the degree to which you agree or disagree with the following statements as they relate to using Telehealth in your outpatient practice.

1-Strongly Disagree 2-Disagree 3-Somewhat Disagree 4-Uncertain

5-Somewhat Agree 6-Agree 7-Strongly Agree

Perceived Usefulness (PU)

Direction: The following statements refer to whether telehealth technology can enhance patient care in your outpatient practice. Please read each statement carefully, and then indicate only one answer for each statement.

Items	Strongly Disagree	Disagree	Somewhat Disagree	Uncertain	Somewhat Agree	Agree	Strongly Agree
1. The use of Telehealth could improve the quality of the work I do.	1	2	3	4	5	6	7
2. The use of Telehealth could give me greater control over my work.	1	2	3	4	5	6	7
3. The use of Telehealth could improve my job performance.	1	2	3	4	5	6	7
4. Using Telehealth could allow me to accomplish more work than would otherwise be possible.	1	2	3	4	5	6	7
5. Using Telehealth could enhance	1	2	3	4	5	6	7

my effectiveness on the job.							
6. Overall, I find Telehealth could be useful in my job.	1	2	3	4	5	6	7

Adopted from Marler et al., 2006

Perceived Ease Of Use (PEOU)

Direction: The following statements refer to whether telehealth technology is easy to use in your outpatient practice. Please read each statement carefully, and then indicate only one answer for each statement.

Items	Strongly Disagree	Disagree	Somewhat Disagree	Uncertain	Somewhat Agree	Agree	Strongly Agree
1. Learning to operate the Telehealth system would be easy for me.	1	2	3	4	5	6	7
2. Interacting with the Telehealth system would often be easy for me.	1	2	3	4	5	6	7
3. I would find the Telehealth system is flexible to interact with.	1	2	3	4	5	6	7
4. My interaction with the Telehealth system would be clear and understandable.	1	2	3	4	5	6	7

5. It would be easy for me to become skillful at using the Telehealth system.	1	2	3	4	5	6	7
6. Overall, I would find the Telehealth system easy to use.	1	2	3	4	5	6	7

Adopted from Marler et al., 2006

Attitude toward and Intent To Use (ITU) Telehealth Technology

Direction: The following statements refer to your attitude toward and intention to use telehealth technology in your outpatient practice. Please read each statement carefully, and then indicate only one answer for each statement.

Performance Expectancy (PE)							
Items	Strongly Disagree	Disagree	Somewhat Disagree	Uncertain	Somewhat Agree	Agree	Strongly Agree
1. The use of Telehealth could enable me to perform more tasks more quickly.	1	2	3	4	5	6	7
2. The use of Telehealth could enable me to be more productive.	1	2	3	4	5	6	7
Effort Expectancy (EE)							
1. It would take more effort to maintain patient records with Telehealth as compared to	1	2	3	4	5	6	7

face-to-face interactions.							
2. It would take more effort to provide patient treatment with Telehealth as compared to face-to-face interactions.	1	2	3	4	5	6	7
Social Influence (SI)							
1. People who influence my behavior think I should use Telehealth.	1	2	3	4	5	6	7
2. My patients would welcome the use of Telehealth in the clinic.	1	2	3	4	5	6	7
Facilitating Conditions (FC)							
1. I have the resources necessary to use Telehealth.	1	2	3	4	5	6	7
2. I have the knowledge necessary to use Telehealth.	1	2	3	4	5	6	7
3. There is a specific person allocated for assistance if I experience Telehealth	1	2	3	4	5	6	7

system difficulties.							
Attitude towards Telehealth							
1. The use of Telehealth would promote good clinical practice.	1	2	3	4	5	6	7
2. Telehealth would make work more interesting.	1	2	3	4	5	6	7
3. The use of Telehealth would imply major changes in my clinical practice.	1	2	3	4	5	6	7
4. I feel that Telehealth technology dehumanizes PT/OT/SLPs care of the patient?	1	2	3	4	5	6	7
Behavioral Intention to Use (ITU)							
1. I intend to use Telehealth in the next 12 months.	1	2	3	4	5	6	7
2. I have the intention to use Telehealth when it becomes	1	2	3	4	5	6	7

available in my clinic.							
3. I intend NOT to use Telehealth in my patient care even when it becomes available in my clinic.	1	2	3	4	5	6	7

Adopted from Venkatesh 2003

Section 3

Computer literacy and training (Organizational Support)

Direction: The following statements refer to your computer literacy and training in your outpatient practice. Please read each statement carefully, and then indicate only one answer for each statement.

Computer literacy and training							
Items	Strongly Disagree	Disagree	Somewhat Disagree	Uncertain	Somewhat Agree	Agree	Strongly Agree
1. Do you consider yourself computer literate?							
2. I have received training for the use of Telehealth?							
3. I have the necessary computer equipment to provide Telehealth services?							

4. I have received training for the documentation and billing of Telehealth services?							

Adopted from Marler et al., 2006

Please share any comments or suggestions regarding the use of telehealth technology in outpatient clinics by PT/OT/SLPs.

_____

_____

_____

Appendix D

Research Questions and Hypotheses

RQ1: Is there a statistically significant association between PEOU of telehealth technology, PU, and organizational support for telehealth training with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

	Hypothesis	IV(s)	Data Type	DV(s)	Data Type	Statistical Test
$H1_0$	There is no statistically significant association between perceived ease of use of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in Southwest Virginia.	PEOU_PT (PROF=1)	Continuous	ITU_PT	Continuous	Pearson's Correlation
$H2_0$	There is no statistically significant association between perceived ease of use of telehealth technology and the intention to use telehealth by occupational therapists	PEOU_OT (PROF=2)	Continuous	ITU_OT	Continuous	Pearson's Correlation

	in outpatient therapy clinics located in Southwest Virginia.					
$H3_0$	There is no statistically significant association between perceived ease of use of telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in Southwest Virginia.	PEOU_SLP (PROF=3)	Continuous	ITU_SLP	Continuous	Pearson's Correlation
$H4_0$	There is no statistically significant association between perceived usefulness of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in Southwest Virginia.	PU_PT (PROF=1)	Continuous	ITU_PT	Continuous	Pearson's Correlation
$H5_0$	There is no statistically significant association between perceived usefulness of telehealth	PU_OT (PROF=2)	Continuous	ITU_OT	Continuous	Pearson's Correlation

	technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in Southwest Virginia.					
$H6_0$	There is no statistically significant association between perceived usefulness of telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in Southwest Virginia.	PU_SLP (PROF=3)	Continuous	ITU_SLP	Continuous	Pearson's Correlation
$H7_0$	There is no statistically significant association between organizational support for telehealth training and the intention to use telehealth by physical therapists in outpatient therapy clinics located in Southwest Virginia.	OS_PT (PROF=1)	Continuous	ITU_PT	Continuous	Pearson's Correlation

$H8_0$	There is no statistically significant association between organizational support for telehealth training and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in Southwest Virginia.	OS_OT (PROF=2)	Continuous	ITU_OT	Continuous	Pearson's Correlation
$H9_0$	There is no statistically significant association between organizational support for telehealth training and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in Southwest Virginia.	OS_SLP (PROF=3)	Continuous	ITU_SLP	Continuous	Pearson's Correlation

RQ2: Is there a relationship between the practice geographic location (hospital-based outpatient clinic versus a private practice clinic) with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

	Hypothesis	IV(s)	Data Type	DV(s)	Data Type	Statistical Test
$H10_o$	There will be no statistically significant correlation between the clinic location and therapist utilization of telehealth.	WORK	Nominal	ITU_ALL	Continuous	t-test

RQ3: Does a relationship exist between the years of clinical experience with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

	Hypothesis	IV(s)	Data Type	DV(s)	Data Type	Statistical Test
$H11_o$	There will be no statistically significant correlation between the years of clinical experience and therapist utilization of telehealth.	YRPRACT	Continuous	ITU_ALL	Continuous	Pearson's Correlation

RQ4: Is there a relationship between patient demographic of age (pediatric, adult or geriatric) with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

	Hypothesis	IV(s)	Data Type	DV(s)	Data Type	Statistical Test

$H12_o$	There will be no statistically significant correlation between patient demographic of age and therapist utilization of telehealth.	TREAT	Continuous	ITU_ALL	Continuous	ANOVA

RQ5: Is there a relationship between therapist gender with the intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

	Hypothesis	IV(s)	Data Type	DV(s)	Data Type	Statistical Test
$H13_o$	There will be no statistically significant association between therapist gender and therapist utilization of telehealth.	GENDER	Nominal Categorical	ITU_ALL	Continuous	ANOVA

RQ6: Is there a statistically significant association between Behaviour and Attitude toward Telehealth Technology to include Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC) and Attitude towards Telehealth (ATT) with the intent to use (ITU) the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

	Hypothesis	IV(s)	Data Type	DV(s)	Data Type	Statistical Test

$H14_0$	There is no statistically significant association between PE of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.	PE_PT (PROF=1)	Continuous	ITU_PT	Continuous	Pearson's Correlation
$H15_0$	There is no statistically significant association between PE of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.	PE_OT (PROF=2)	Continuous	ITU_OT	Continuous	Pearson's Correlation
$H16_0$	There is no statistically significant association between PE of telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy	PE_SLP (PROF=3)	Continuous	ITU_SLP	Continuous	Pearson's Correlation

	clinics located in southwest Virginia.					
$H17_0$	There is no statistically significant association between EE of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.	EE_PT (PROF=1)	Continuous	ITU_PT	Continuous	Pearson's Correlation
$H18_0$	There is no statistically significant association between EE of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.	EE_OT (PROF=2)	Continuous	ITU_OT	Continuous	Pearson's Correlation
$H19_0$	There is no statistically significant association between EE of telehealth technology and the intention to use telehealth by speech-language pathologists in	EE_SLP (PROF=3)	Continuous	ITU_SLP	Continuous	Pearson's Correlation

	outpatient therapy clinics located in southwest Virginia.					
$H20_0$	There is no statistically significant association between SI of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.	SI_PT (PROF=1)	Continuous	ITU_PT	Continuous	Pearson's Correlation
$H21_0$	There is no statistically significant association between SI of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.	SI_OT (PROF=2)	Continuous	ITU_OT	Continuous	Pearson's Correlation
$H22_0$	There is no statistically significant association between SI of telehealth technology and the intention to use telehealth by speech-	SI_SLP (PROF=3)	Continuous	ITU_SLP	Continuous	Pearson's Correlation

	language pathologists in outpatient therapy clinics located in southwest Virginia.					
$H23_0$	There is no statistically significant association between FC of telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.	FC_PT (PROF=1)	Continuous	ITU_PT	Continuous	Pearson's Correlation
$H24_0$	There is no statistically significant association between FC of telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.	FC_OT (PROF=2)	Continuous	ITU_OT	Continuous	Pearson's Correlation
$H25_0$	There is no statistically significant association between FC of telehealth technology and the intention to use	FC_SLP (PROF=3)	Continuous	ITU_SLP	Continuous	Pearson's Correlation

	telehealth by speech-language pathologists in outpatient therapy clinics located in southwest Virginia.					
$H26_0$	There is no statistically significant association between Attitude towards Telehealth technology and the intention to use telehealth by physical therapists in outpatient therapy clinics located in southwest Virginia.	ATT_PT (PROF=1)	Continuous	ITU_PT	Continuous	Pearson's Correlation
$H27_0$	There is no statistically significant association between Attitude towards telehealth technology and the intention to use telehealth by occupational therapists in outpatient therapy clinics located in southwest Virginia.	ATT_OT (PROF=2)	Continuous	ITU_OT	Continuous	Pearson's Correlation
$H28_0$	There is no statistically significant association	ATT_SLP	Continuous	ITU_SLP	Continuous	Pearson's Correlation

	between Attitude towards telehealth technology and the intention to use telehealth by speech-language pathologists in outpatient therapy clinics located in southwest Virginia.	(PROF3=)				

RQ7: Is there a relationship between therapist type and intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

	Hypothesis	IV(s)	Data Type	DV(s)	Data Type	Statistical Test
$H29_0$	There is no statistically significant association between therapist type and the intention to use telehealth by therapists in outpatient therapy clinics located in southwest Virginia.	PROF	Ordinal Categorical	ITU_ALL	Continuous	ANOVA (and post-hoc)

RQ8: Among the variables that are associated with the intent to use, which are the most important predictors for intent to use the technology among physical therapists, occupational therapists, and speech-language pathologists in outpatient therapy clinics located in southwest Virginia?

	Hypothesis	IV(s)	Data Type	DV(s)	Data Type	Statistical Test
$H30_0$	There is no statistically significant association with the perception and behavioral variables and the intent to use telehealth by physical therapists, occupational and speech-language pathologist in outpatient therapy clinics located in southwest Virginia.	PU_ALL, PEOU_ALL, PE_ALL, EE_ALL, SI_ALL, FC_ALL, ATT_ALL, OS_ALL	Continous	ITU_ALL	Continuous	multiple regression analysis

Appendix E

IRB Approval Letter

RADFORD UNIVERSITY
Research Compliance Office

Institutional Animal Care and Use Committee / Institutional Review Board

April 19, 2022

TO:	Frances Everhart, PhD, MPH, MBA, CHES
RE:	Exemption Determination
STUDY TITLE:	The Perceived Usefulness of Telehealth in Outpatient Practice by Physical Therapists, Occupational Therapists, and Speech-Language Pathologists in Southwest Virginia.
IRB REFERENCE #:	2022-043
SUBMISSION TYPE:	IRB Initial Submission
ACTION:	Determination of Exempt IRB Review
DECISION DATE:	April 19, 2022

The above-referenced study has been determined by Radford University's Institutional Review Board (IRB) to be exempt from review. A copy of your IRB protocol is available for your records in IRBManager under your dashboard of active protocols.

Your study has been determined to be exempt under Exempt Category 2: Educational tests, surveys, interviews, or observation of public behavior. Detailed explanations of the exempt review categories are available on the Research Compliance Office webpage.

You are approved for the enrollment of 116 participants.

Note: The number approved is the number of study participants is defined as the number who enroll in the project and NOT the number of subjects with usable data for analysis. If this should change, you must submit an amendment to increase subject numbers.

Should you need to make changes in your protocol, you must submit a request for amendment for review to determine if the application still remains in an Exempt review category before implementing the changes. Amendments must be submitted via the IRBManager system. Please contact our office for assistance, if needed.

As the principal investigator for this project, you are ultimately responsible for ensuring that your study is conducted in an ethical manner. You are also responsible for filing all reports related to this project.

If you have any questions, please contact the Research Compliance Office at 540.831.5290 or irb-iacuc@radford.edu. Please include your study title and reference number in all correspondence with this office.

Good luck with this project!

Radford University Institutional Review Board (IRB)
Research Compliance Office
irb-iacuc@radford.edu

Radford University IRB
Approval Date: April 19, 2022