6-2023

The Effect of State Level Policies on Telehealth Usage During the COVID-19 Pandemic

Cole Hartman
Union College - Schenectady, NY

The Effect of State Level Policies on Telehealth Usage During the COVID-19 Pandemic

Author: Cole Hartman

Advisor: Zachary Rodriguez

* * * * * * * * *

Submitted in Partial Fulfillment

of the Requirements for

Honors in the Department of Economics

UNION COLLEGE

June 2023

ABSTRACT

Over the past two decades, telehealth has become an increasingly common form of healthcare delivery in the United States. As healthcare providers continue to invest more into telehealth, the capabilities of virtual care have expanded rapidly. This investment into telehealth has been encouraged by the important benefits it has been proven to provide, such as cost reduction and increased accessibility. During the COVID-19 pandemic, the demand for telehealth reached new heights as people were forced to quarantine indoors and avoid in person contact for extended periods of time. In order to satisfy this rise in demand, many states enacted new policies aimed at increasing telehealth usage, such as private payer laws, licensure compacts and payment parity laws. While some of these policies were implemented permanently, some were put into place with expiration dates. Therefore, it is important to understand how effective these policies were. This paper uses panel data from FAIR Health, the US Census, the Center for Connected Health Policy, and the US Bureau of Economic Analysis in order to analyze how effectively the three policies mentioned above increased telehealth usage among states and age groups. Using OLS regression and interaction terms, I intend to estimate the effects of each policy on telehealth usage within individual states and among five different age groups. This study finds that the implementation of private payer laws increases telehealth usage within an individual state, while licensure compacts and payment parity policies do not. It also finds that all three policies increase telehealth usage among individual age groups (except for licensure compacts with 19-35 year olds).

TABLE OF CONTENTS

1. INTRODUCTION

In 2001, the Committee on Quality of HealthCare in America and Institute of Medicine published the book *Crossing the Quality Chasm: A New Health System for the 21st Century,* in which they argue for a redesign of the American healthcare system in order to close the quality gap they observed to be quickly widening. This book soon became a landmark publication within the healthcare field due to the important issues within American healthcare that it exposed. The committee used *Crossing the Quality Chasm* to document the causes of this quality gap, to highlight current practices that furthered these issues and to explore how some systematic approaches could be implemented to bring about positive change. While considering these potential solutions, the committee states that "information technology must play a central role in the redesign of the health care system if a substantial improvement in quality is to be achieved." In short, the committee was supporting the use of telehealth to reach the healthcare objectives they set. In the years since this book was published, we have begun to see how advances in telecommunication and information technology can help overcome some key issues present in our healthcare system by reducing costs, extending access to care and improving the overall quality of health services.

Although forms of telehealth existed before 2000, the first two decades of the 21st century experienced exponential development and innovation in the telehealth field. The Health Resources and Services Administration (HRSA), an agency of the U.S. Department of Health, defines 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." As healthcare organizations continue to invest heavily in their digital capabilities, telehealth is becoming more mainstream and increasingly accepted as

a legitimate and, often, preferred source of care delivery. A 2021 paper titled "Telehealth Benefits and Barriers" which was published in the Journal for Nurse Practitioners, identifies the major advantages of telehealth as being increased access to care, cost reduction and improved quality of care. These have been the major selling points for telehealth for the past two decades and there have been numerous studies conducted to validate these benefits. These potential advantages offered by telehealth are especially attractive for the American healthcare system since they directly address some of its biggest issues. American healthcare spending is much higher than other high-income countries, yet this enormous expenditure is not correlated with better health outcomes (the US actually scores rather poorly on many key health measures). This shows that Americans face much more expensive care, but do not receive better quality despite paying more. Furthermore, disparities plague American healthcare as many people who are most in need of care can least afford its high cost, and regions with some of the highest need for quality health care have the least access to treatment facilities. In general, it is rural areas and disadvantaged groups that face the highest barriers to healthcare access in America (Gajarawala). These issues are not new, and have actually been studied for decades. However, little significant change has taken place, leading some experts to call for a complete overhaul and redesign of the healthcare system. While this complete overhaul is likely not going to take place any time soon, telehealth practices seem to offer a potential way to lower costs and increase access without the need for full redesign of the system.

And the demand for telehealth has only grown in recent years, as the COVID-19 pandemic has completely changed the environment of healthcare. During the pandemic, in-person contact and the ability to conduct in-person doctor's appointments was greatly reduced, forcing many providers to turn to telemedicine when they had not before. As the need for

increased telehealth capabilities during the pandemic became clear, federal regulators made accommodations aimed at increasing the access to virtual care. Before the pandemic, federal health insurance would only cover telehealth visits for people in certain designated rural areas. However, in March of the pandemic, The Centers for Medicare and Medicaid services announced that they were expanding the coverage of telehealth visits for federally funded health insurance holders. Furthermore, HIPAA privacy restrictions were relaxed so that health providers could supply virtual care through more platforms such as FaceTime and Zoom. This greatly increased the ability of providers to utilize telehealth and meet the growing demand for these asynchronous services.

Attempts to increase telehealth usage occurred at the state level as well, with the implementation of private payer laws, licensure compacts and payment parity policies. Private payer laws include any policy that requires private health plans to provide some sort of reimbursement for virtually delivered healthcare services. Licensure compacts are interstate agreements that allow specific providers to practice in states they are not licensed in via telehealth. And payment parity is a law that requires insurers to reimburse telehealth providers at the same rate as they would for equivalent in person services. While these three policies were enacted in various states, there were also many states that did not adopt them.

This paper will look at how these state policies have played a role in increasing telehealth usage during COVID-19. The pandemic is a good period in which to examine the effectiveness of these policies for multiple reasons. For one, there was a greater need for virtual health services than ever before. Also, due to the increased need for telehealth, many states were prompted to enact these policies. So there was an increase in political action aimed at making telehealth more accessible and less expensive. It is important to consider how effective this political action was.

2. LITERATURE REVIEW

This paper examines the effectiveness of select policies in increasing telehealth usage during the COVID-19 pandemic. Therefore, it is important to understand why increasing telehealth usage is a desirable policy outcome. Luckily, the benefits of telehealth, including cost reduction, increased access to care and even increased quality of care have been thoroughly researched in past studies. This literature review will highlight the important findings of some of these studies and lay out the argument for why more telehealth usage should be a prioritized political objective. Furthermore, research that supports the increased demand and necessity of telehealth that arose due the pandemic is described here. It is important to establish this rise in demand for telehealth so that context is given to the environment in which these policies are being examined.

Finally, this literature review considers some work that has already been conducted into the implementation of federal and state telehealth policies during the pandemic and explains how this paper will build off of this.

The importance of conducting economic research into the cost effectiveness and accessibility of telehealth has been well established. A paper published in 2013 by David Luxton recognizes this importance of performing economic analysis of telemental health in order to determine how to best allocate resources in the mental health care field to maximize cost efficiency and access to care. The paper also notes that there has been limited literature related to telemental health. The authors use this paper to explain the unique factors influencing telemental health (TMH) costs that must be considered when evaluating the economic benefits TMH provides. The main limitations and problems of past TMH economic analyses are presented and considerations related specifically to TMH are highlighted. The authors argue that the

perspective of cost must be clearly stated and multiple perspectives should be considered. They explain that too many studies have focused solely on short term cost savings for mental health providers. For example, cost savings for telemental health providers may be offset by technological costs, and therefore may not seem cost effective. But for the patients receiving care, money is saved by not needing transportation. Mental health illnesses also cause an estimated annual loss of earnings totaling $193.2 billion. Therefore, if telemental health produces better outcomes, its long term cost savings may be massive. Both indirect and direct costs must be considered. There are also arguments presented for standardizing outcome measurements and developing TMH economic evaluation guidelines. Although this paper was written in 2013, there had already been some important prior studies conducted into telehealth. This paper was simply reaffirming these studies are important and calling for more research to be conducted.

A 2004 multiple case study headed by Richard J. Bischoff provided preliminary evidence that BTH (behavioral telehealth) can effectively improve access to mental health care in rural communities. It also highlighted potential issues to rural usage of BTH. The study entailed a BTH program being administered to participants through a marriage and family therapy training program. All rural participants indicated that they would choose the BTH program over all other options, and especially, over not receiving treatment at all. This research also suggested that one of the primary issues to be addressed in delivering mental health care to rural communities through telecommunications is privacy and confidentiality. Another potential issue exposed was inconveniences associated with technology. However, all participants in the study naturally made accommodations to work around technological difficulties. Authors suggest that the accessibility of in person care and the convenience of BTH made participants easily forgive the technical difficulties. Participants expressed satisfaction with BTH, and successful treatment progress and

outcomes were reported. Simply, the fact that the first three cases seen through this medium can be considered treatment successes can certainly lead to speculation that effectiveness of treatment is not diminished over traditional treatments, but additional research will be needed to answer this empirical question.

In 2010, a small-scale study was conducted by Ryan Spaulding to investigate the cost-effectiveness of telehealth. His study examined the cost savings of telemedicine utilization for child psychiatry in a rural Kansas community by gathering data on the cost of receiving mental health care both in person and virtually for families in this Kansas community. The study consisted of 132 patients and their families over a 6 month period, in which 257 psychiatric telehealth consultations were given and these costs were compared with costs of visiting the closest in person mental health service facility. An average in person consultation cost was estimated to be $168.61 by using standard cost-accounting procedures. The average cost of a telepsychiatry consult was found to be only $30.99. This is just one small and specific example of how telehealth can save money for both providers and patients when receiving mental health care, but these studies are important in verifying that telemedicine can in fact reduce costs for American families and providers.

This Kansas study was not the first time economists tested the hypothesis that virtual care can have cost reducing benefits. A 1998 study headed by Paul Trott presented some of the earliest research into cost reductions associated with telemental health. The study conducted a comparison of costs associated with delivering psychiatric care through telemedicine and through conventional methods. To do this, a telemental health service was delivered to a rural mining town that was 900 km away from the closest regional hospital. Once this service was established, 54 mental health cases a month from this town were treated virtually. The estimated

savings produced from this service were estimated to be $85,380 in the first year and $112,790 in subsequent years (not allowing for equipment upgrades or maintenance.) The introduction of this telemedicine led to an estimated 40% reduction in patient transfers. These results indicate considerable savings from reduced patient and healthcare worker travel can be produced by telemental health services.

These studies all work to confirm the proposed benefits of telehealth. And while there was plenty of reason to seek out virtual care before the pandemic, COVID-19 created an entirely new need for it. Studies have been conducted to validate the rise in demand for telehealth during the pandemic and the decline of in-person healthcare receival that it generated.

A study conducted by MYZ Wong in 2021 used Google Trends, the Baidu Index and the Yandex Keyword Statistics to get data on worldwide and country level telehealth-related internet searches between the dates of Jan 1, 2020 and July 7, 2020. This data was used to illustrate an increased demand for telehealth during the pandemic. These internet search volumes were compared to the level of information and communications technology infrastructure available in the country. This ICT data came from the World Economic Forum Report. Using the data collected, this paper found an overall spike in worldwide telehealth-related search volumes (RSV's) during March that tailed off a bit in June / July. 42 of the 50 countries increased their telehealth RSVs over the evaluation period, with Canada and the US having the highest observed RSVs. This leads the authors to conclude that there is generally increased interest and demand for telehealth services across the 50 countries most affected by COVID-19. This highlights the need to scale up telehealth capabilities beyond the pandemic.

A 2022 paper headed by Jonathan Cantor aimed to quantify the effects of COVID social distancing policies on the healthcare utilization in the US. The authors gathered data on the

existence of shelter in place ordinances by US county, and then compared this to an aggregate medical claims dataset. The medical claims data was collected by Castlight Health in the form of weekly aggregates between 2019 and 2020. Their samples represented 6.4 million people in 2019 and 6.8 million people in 2020. Using this data, the paper found that shelter in place policies were associated with reductions in the use of preventive care, elective care, and the number of weekly visits to physicians offices, hospitals and other healthcare related industries.

Studies like these reveal the need for increased telehealth usage generated by the pandemic. This paper will examine how effective three specific state level policies were at addressing this need. There have been some other papers written that examine federal and state action surrounding telehealth during the pandemic. However, they don't quantify how much these policies actually increased telehealth usage.

Allison Baker wrote a paper in 2021 to explain the role the US Federal Communications Commision played in increasing telehealth capabilities as a means of closing the connectivity gap during the COVID pandemic. The US Federal Communications Commission regulates the communications marketplace and manages the US non-federal radio frequency spectrum. She uses this paper to reveal that during the pandemic, FCC economists developed initiatives aimed directly at expanding telehealth capabilities in order to close a growing connectivity gap, and initiated these policies quickly to have an immediate effect. This quick action taken at the federal level to expand telehealth capabilities shows that virtual care was recognized as a crucial way to solve healthcare deficiencies introduced by the pandemic.

Another 2021 editorial by Ryan Spaulding further explored policy changes during the pandemic and provided some initial thoughts on what factors caused the surge of telemedicine activity during COVID-19 and how this trend would continue into the future. Spaulding asserts

that this surge was compelled by the need for health care providers and patients to social distance, and further stimulated by a flurry of federal and state telehealth policy changes that aimed to accommodate as many patients as possible. Many of these policies involved increasing the number of telehealth services reimbursed by Medicare, Medicaid plans, and private insurers. Health Insurance Portability and Accountability Act requirements were also relaxed for tech platforms and controlled medications were allowed to be prescribed virtually. These rapid policy changes were crucial, and studies have shown that up to 80% of all outpatient appointments were being conducted virtually between late March and May of the pandemic. Spaulding explains that many hospitals, clinics and other healthcare facilities had to quickly implement telehealth services in order to meet this unprecedented demand. Spaulding asserts that the future of this high telehealth utilization is uncertain given many of these federal and state policies have an expiration date listed as the end of the public health emergency. The future of some federal policies is being determined through monitoring of telehealth safety, payment rates and fraud. All of these factors discussed by Spaulding have created an unprecedented utilization of telehealth services with an unclear future. Pre-covid, an estimated 10% of all patient visits were conducted virtually. During COVID, levels as high as 80%-90% were reported.

Spaulding does an excellent job of laying out the need for these state level policies and showing that virtual care rates increased dramatically during the pandemic. However, he does not actually demonstrate whether or not these individual policies were effective at increasing telehealth rates. As he explains, many of these policies were given expiration dates, and some states didn't enact them at all. This paper aims to measure how effective these policies were so that recommendations can be made as to whether these policies continue to be pursued into the future.

3. DATA

The majority of the data for this paper was provided by FAIR Health, an independent nonprofit organization that manages the data collection and organization for the nation's largest database of privately billed health insurance claims, mixed with Medicare parts A, B and D medical claims data. The dataset provided by FAIR Health includes data from the time period January 1st, 2020 until June 30th, 2022. In this dataset, FAIR Health identifies telehealth services as any claims containing Place of Service Codes 02 or 10 and CPT Modifiers FR, FQ, G0, GQ, GT 93, 95 and/or a CPT Code listed in Appendix A (which is listed below in figure 1). Mental health services are identified as any claim containing a CPT code listed in Appendix B (shown below in figure 2). With all codes organized by telehealth service and mental health service, FAIR Health then identifies the five most common mental health telehealth services and the five most common non-mental health telehealth services over the time period of January 1, 2020 and June 30, 2022.

These 10 procedure codes (the 5 most common telemental health services and the 5 most common non-mental health telehealth services) will account for most of the economic analysis conducted by this paper. For each of these ten procedure codes, FAIR Health provides the aggregate number of claim lines during this time period by month, state and age band. The different age band values are as follows: 0-18, 19-35, 36-50, 51-64, and 65 and older. For each procedure code, FAIR Health also provides the average charge amount. The different procedure codes available are listed below in Appendix A and Appendix B.

Appendix A: Telemedicine

Procedure Code	Description
98966	NON-FACE-TO-FACE NONPHYSICIAN TELEPHONE SERVICES
98967	NON-FACE-TO-FACE NONPHYSICIAN TELEPHONE SERVICES
98968	NON-FACE-TO-FACE NONPHYSICIAN TELEPHONE SERVICES
98969	ONLINE DIGITAL E&M SERVICES
98970	NON-FACE-TO-FACE NONPHYSICIAN ONLINE E&M SERVICES
98971	NON-FACE-TO-FACE NONPHYSICIAN ONLINE E&M SERVICES
98972	NON-FACE-TO-FACE NONPHYSICIAN ONLINE E&M SERVICES
98975	REM THER MNTR 1ST SETUP&EDU
98976	REM THER MNTR DEV SPLY RESP
98977	REM THER MNTR DV SPLY MSCSKL
98980	REM THER MNTR 1ST 20 MIN
98981	REM THER MNTR EA ADDL 20 MIN
99091	REMOTE PHYS MONITORING
99421	ONLINE DIGITAL E&M SERVICES
99422	ONLINE DIGITAL E&M SERVICES
99423	ONLINE DIGITAL E&M SERVICES
99441	NON-FACE-TO-FACE TELEPHONE SERVICES
99442	NON-FACE-TO-FACE TELEPHONE SERVICES
99443	NON-FACE-TO-FACE TELEPHONE SERVICES
99444	ONLINE DIGITAL E&M SERVICES
99446	INTERPROFESSIONAL TELEPHONE/INTERNET/ELECTRONIC HEALTH RECORD CONSULTATIONS
99447	INTERPROFESSIONAL TELEPHONE/INTERNET/ELECTRONIC HEALTH RECORD CONSULTATIONS
99448	INTERPROFESSIONAL TELEPHONE/INTERNET/ELECTRONIC HEALTH RECORD CONSULTATIONS
99449	INTERPROFESSIONAL TELEPHONE/INTERNET/ELECTRONIC HEALTH RECORD CONSULTATIONS
99451	INTERPROFESSIONAL TELEPHONE/INTERNET/ELECTRONIC HEALTH RECORD CONSULTATIONS
99452	INTERPROFESSIONAL TELEPHONE/INTERNET/ELECTRONIC HEALTH RECORD CONSULTATIONS
99453	REMOTE PHYS MONITORING
99454	REMOTE PHYS MONITORING
99457	REMOTE PHYS MONITORING
99458	REMOTE PHYS MONITORING
99473	REMOTE PHYS MONITORING
99474	REMOTE PHYS MONITORING
G0181	HOME HEALTH CARE SUPERVISION
G0182	HOSPICE CARE SUPERVISION
G0406	INPATIENT CONSULTATION - TELEHEALTH
G0407	INPATIENT CONSULTATION - TELEHEALTH
G0408	INPATIENT CONSULTATION - TELEHEALTH
G0425	EMERGENCY ROOM/INPATIENT - TELEHEALTH
G0426	EMERGENCY ROOM/INPATIENT - TELEHEALTH
G0427	EMERGENCY ROOM/INPATIENT - TELEHEALTH
G0459	INPATIENT PHARM MANAGEMENT - TELEHEALTH
G0508	CRITICAL CARE - TELEHEALTH
G0509	CRITICAL CARE - TELEHEALTH
G2010	REMOTE IMAGE/VIDEO EVALUATION
G2012	VIRTUAL CHECK IN BY PHYS OR QUAL HEALTH CARE PROF E&M
G2061	QUAL NONPHYS HEALTH PROF ONLINE ASSESS & MANAGEMENT SVC, EST PT 5-10M
G2062	QUAL NONPHYS HEALTH PROF ONLINE ASSESS & MANAGEMENT SVC, EST PT 11-20M
G2063	QUAL NONPHYS HEALTH PROF ONLINE ASSESS & MANAGEMENT SVC, EST PT >21M

G2250	REMOT IMG SUB BY PT, NON E/M
G2251	BRIEF CHKIN, 5-10, NON-E/M
G2252	BRIEF CHKIN BY MD/QHP, 11-20
S9110	TELEMONITORING/HOME PER MNTH
Q3014	TELEHEALTH ORIGINATING SITE FACILITY FEE
T1014	TELEHEALTH TRANSMISSION

Figure 1

Appendix B: Mental Health Procedure Codes

Procedure Code	Description
90785	PSYCHOTHERAPY COMPLEX INTERACTIVE
90791	PSYCHIATRIC DIAGNOSTIC EVALUATION
90792	PSYCHIATRIC DIAGNOSTIC EVAL W/MEDICAL SERVICES
90832	PSYCHOTHERAPY W/PATIENT 30 MINUTES
90833	PSYCHOTHERAPY W/PATIENT W/E&M SRVCS 30 MIN
90834	PSYCHOTHERAPY W/PATIENT 45 MINUTES
90836	PSYCHOTHERAPY W/PATIENT W/E&M SRVCS 45 MIN
90837	PSYCHOTHERAPY W/PATIENT 60 MINUTES
90838	PSYCHOTHERAPY W/PATIENT W/E&M SRVCS 60 MIN
90839	PSYCHOTHERAPY FOR CRISIS INITIAL 60 MINUTES
90840	PSYCHOTHERAPY FOR CRISIS EACH ADDL 30 MINUTES
90845	PSYCHOANALYSIS
90846	FAMILY PSYCHOTHERAPY W/O PATIENT PRESENT 50 MINS
90847	FAMILY PSYCHOTHERAPY W/PATIENT PRESENT 50 MINS
90849	MULTIPLE FAMILY GROUP PSYCHOTHERAPY
90853	GROUP PSYCHOTHERAPY
90863	PHARMACOLOGIC MANAGEMENT W/PSYCHOTHERAPY
90865	NARCOSYNTHESIS PSYC DX&THER PURPOSES
90867	REPET TMS TX INITIAL W/MAP/MOTR THRESHLD/DEL&M
90868	THERAP REPETITIVE TMS TX SUBSEQ DELIVERY & MNG
90869	REPET TMS TX SUBSEQ MOTR THRESHLD W/DELIV & MN
90870	ELECTROCONVULSIVE THERAPY
90875	INDIV PSYCHOPHYS BIOFEED TRAIN W/PSYTX 30 MIN
90876	INDIV PSYCHOPHYS BIOFEED TRAIN W/PSYTX 45 MIN
90880	HYPNOTHERAPY
90882	ENVIRONMENTAL IVNTJ MGMT PURPOSES PSYC PT
90885	PSYCHIATRIC EVAL HOSPITAL RECORDS DX PURPOSES
90887	INTERPJ/EXPLNAJ RESULTS PSYCHIATRIC EXAM FAMILY
90889	PREP REPORT PT PSYCH STATUS AGENCY/PAYER
90899	UNLISTED PSYCHIATRIC SERVICE/PROCEDURE

Figure 2

Real per capita income data at the state level was gathered from the US Bureau of Economic Analysis. State population data and the estimated numbers of households with a computer and broadband internet connection by state came from the US census.

Data on the presence of licensure compacts, private payer laws and payment parity laws in each state was collected from the Center for Connected Health Policy, which is a program run by the Public Health Institute that has a mission of advancing beneficial healthcare policies. The CCHP.

The summary stats of these variables are listed in figure 3 below.

Variable	Obs	Mean	Std. dev.	Min	Max
Claims	75,386	2492.924	10512.01	3	892003
Population	75,386	6570982	7358198	576837	3.95e+07
Income	75,386	58248.37	41510.74	44912	526577
InternetAc~s	75,386	2172.585	2336.486	198.588	12391.06
Charge	75,386	150.5049	53.36439	51.31	356.742
Claims2	75,386	31.62257	93.72575	.0075876	5974.638

Figure 3

4. MODEL

There are two key components to the economic analysis performed in this paper; an evaluation of how telehealth claims were distributed among states and age groups during the pandemic, and how certain state telehealth policies impacted this distribution.

The dependent variable in my multiple regression equations therefore is Claims, so that I can measure how the amount of claims vary among age group and state variables. However, since state population has such a large effect on the number of claims filed within a state, the claims variable was also manipulated into another variable called “Claims2”. Claims2 is the number of claims divided by state population multiplied by 100,000. Claims2 helps control for

the large population differences among states. Using this variable, the first regression equation (which measures the claim distribution during the pandemic) is:

1) $Claims2 = \beta_0 + \beta_1 PCC + \beta_3 I + \beta_4 J + \beta_5 K + \beta_6 L + \beta_7 Over65Age + \beta_8 Charge + \beta_9 Income + \beta_{10} InternetAccess + \beta_{11} PrivatePayer + \beta_{12} LC + \beta_{13} PP + YearFixedEffects + StateFixedEffects + \epsilon$

The most important variables in this regression are the age group dummy variables, the state fixed effects, and the policy variables (PrivatePayer, LC and PP). The age group dummy variables include I (0-18 age group), J (19-35 age group), K (36-50 age group), L (51-64 age group) and Over65Age (65 and older age group). The coefficients on these variables will indicate which age groups filed the most telehealth claims during the pandemic period and which filed the least. The Over65Age variable is omitted and the coefficients on the rest of the age variables indicate how many more or less claims that age files in average compared to the 65 and older age group.

The coefficients on the three policy variables (β_{11}, β_{12} and β_{13}) describe how private payer policies, licensure compacts and payment parity policies impacted the number of claims filed within a state. Since these variables are equal to 1 when a state has the specific policy in place, and equal to 0 when it does not, then (depending on the significance) the coefficients on these variables will be equal to how many more or less claims were filed within a state during the pandemic if that policy had been enacted.

Regression 1 helps determine if the three policies increase telehealth usage within individual states. However, in order to determine whether or not they increase usage specific age groups, additional regressions that contain interaction terms between the policies and age groups

are needed. In total, there are three additional regressions, one for each policy. These regressions are listed below.

2) $Claims = \beta_0 + \beta_1 PCC + \beta_3 PP + \beta_4 I + \beta_5 J + \beta_6 K + \beta_7 L + \beta_8 Over65Age + \beta_9 PPI + \beta_{10} PPJ + \beta_{11} PPK + \beta_{12} PPL + \beta_{13} PPO + \beta_{13} Charge + \beta_{14} LC + \beta_{15} PrivatePayer + \beta_{16} Population + \beta_{17} Income + \beta_{18} InternetAccess + YearFixedEffects + StateFixedEffects + \epsilon$

3) $Claims = \beta_0 + \beta_1 PCC + \beta_3 LC + \beta_4 I + \beta_5 J + \beta_6 K + \beta_7 L + \beta_8 Over65Age + \beta_9 LCI + \beta_{10} LCJ + \beta_{11} LCK + \beta_{12} LCL + \beta_{13} LCO + \beta_{13} Charge + \beta_{14} PP + \beta_{15} PrivatePayer + \beta_{16} Populaiton + \beta_{17} Income + \beta_{18} InternetAccess + YearFixedEffects + StateFixedEffects + \epsilon$

4) $Claims = \beta_0 + \beta_1 PCC + \beta_3 PrivatePayer + \beta_4 I + \beta_5 J + \beta_6 K + \beta_7 L + \beta_8 Over65Age + \beta_9 PrivI + \beta_{10} PrivJ + \beta_{11} PrivK + \beta_{12} PrivL + \beta_{13} PrivO + \beta_{13} Charge + \beta_{14} PP + \beta_{15} LC + \beta_{16} Populaiton + \beta_{17} Income + \beta_{18} InternetAccess + YearFixedEffects + StateFixedEffects + \epsilon$

The most important part of these regressions are the interaction terms, for they indicate how much a certain policy increased usage among the specific age group. In all three regressions, the interaction terms have the coefficients $\beta_9 + \beta_{10} + \beta_{11} + \beta_{12} + \beta_{13}$, one for each age group. If the coefficient is positive and significant, that means the policy increased telehealth usage among people that age during the pandemic. If the coefficient is negative and significant, that means the policy increased telehealth usage among people that age during the pandemic.

5. HYPOTHESIS

The goal of this paper is to determine how effective certain policies were in increasing telehealth usage during the COVID-19 pandemic. By making inferences about the policies'

effectiveness, recommendations can be made about the continuance or adoption of these policies. These recommendations are important considering many states opted out of implementing these policies during the pandemic, and some states that did enact them set expiration dates.

Each of the three policies contain regulations that should increase the demand and or supply of telehealth, therefore increasing its usage. Private payer policies incorporate any law that requires private payers to provide some type of reimbursement for telehealth delivered services. When costs of telehealth are reimbursed by health plans, the services become cheaper for both providers and consumers. Licensure compacts allow healthcare providers to practice outside of the state they are licensed in, and healthcare consumers to receive care from physicians outside of their home state. This should allow for more healthcare to be supplied and consumed. The payment parity law requires health plans to reimburse virtual healthcare services by the same amount as they would for equivalent in person services. It is basically more specific private payer law that gives a required reimbursement amount. This decreases the cost involved with receiving healthcare services for both suppliers and consumers.

All of these policies create external shocks that should shift either the demand curve or supply curve for telehealth services to the right. A rightward shift of either curve would result in an increased quantity of telehealth services consumed, as depicted in the figure 4 below. If supply shifts from S1 to S2, or if demand shifts from D1 to D2, then the quantity of telehealth consumed would increase from Q1 to Q2. If both the demand and supply curve shift rightward, then the quantity of telehealth consumed would shift from Q1 to Q3.

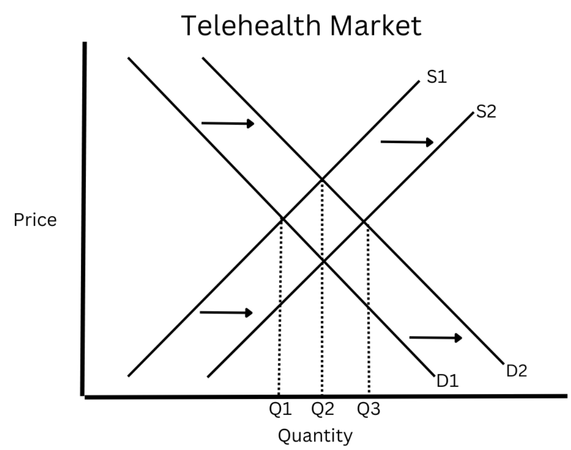

Figure 4

Because of the potential for these policies to shift the demand and supply curve rightward, I hypothesize that regression 1 will show that all three policies increased telehealth usage within states that had them enacted during the pandemic. However, I believe that the private payer variable will have the largest effect since it consists of a wide variety of possible policies that involve telehealth reimbursement by private health plans. It supplies the most basic level of telehealth cost coverage and has the potential to impact the largest number of people.

The effect that these policies have among specific age groups is a bit harder to predict. As for the private payer and payment parity policies, the effect will likely be much smaller or nonexistent among the 65 and older age group, since these citizens are highly likely to be insured by medicare, which is public insurance. The payment parity and private payer policies apply to private insurance. Therefore, they will likely have positive impacts on the usage of telehealth among age groups below 65. However, I predict that both these policies will have the greatest impact among the 19-35 age group since these are the people already seeking out telehealth the most. They seem to have the greatest interest in telehealth, and are also likely to be privately insured. Therefore, I believe that the payment parity and private payer laws will have increased the usage among this age band the most during the pandemic.

Licensure compacts have the potential to increase telehealth usage for all age groups by increasing the number of virtual health providers available to them. However, people who have residences in multiple states would likely benefit the most from it, since it would allow them to meet with their physicians across state borders. According to iProperty Management, a company that conducts real estate industry research, 64 to 75 year olds have the highest multiple home ownership rate. Because older people are more likely to own multiple residences including a vacation home, I am predicting that licensure compacts increased telehealth usage among the 65 and older age group the most. These licensure compacts would have allowed the elderly to meet with their home state physicians while staying in a residence in a different state.

6. RESULTS

The results of this analysis come from four different OLS regressions depicted in the regression results table (figure 7) at the end of this section.

Regression 1 estimates which age groups in the US filed the most telehealth claims during the pandemic and which age groups filed the least. The 65 and older age group variable is omitted, making it so that the coefficients generated on the other age groups illustrate their telehealth usage in comparison to people 65 and older. The coefficients on all these other age groups (variables I, J, K and L) are significant and positive, suggesting that these ages all filed more telehealth claims during the pandemic than people 65 and older. The 19-35 age group is estimated to have filed the most telehealth claims, and the 0-18 age group is estimated to have filed the second most amount of claims on average. While people 65 and older filed the least amount of telehealth claims, people 51-64 filed the second least amount on average. The average

amount of telehealth claims filed by each age group during this time period is depicted in figure 5 below.

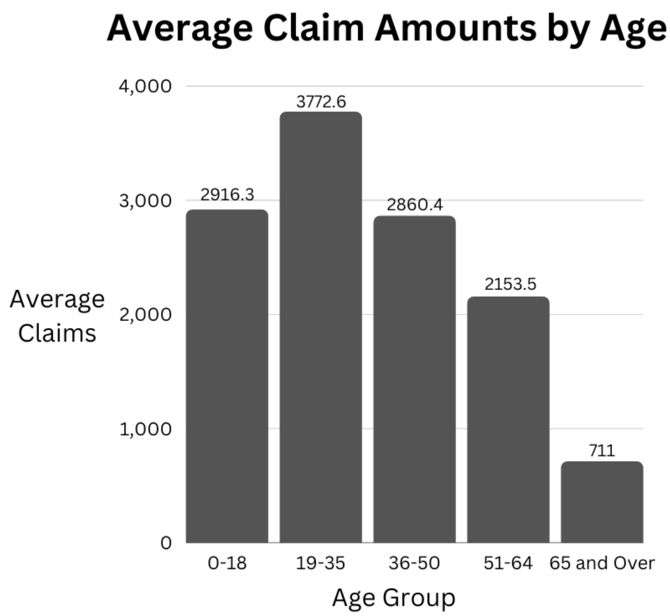

Figure 5

Regression 1 also estimates the effects that each of the three state telehealth policies had on the amount of claims filed within a state during the pandemic period, when controlling for population, income and internet access. The regression implies that the presence of a payment parity law did not have a significant impact on telehealth usage within a state. Furthermore, the coefficient on licensure compacts is negative, indicating that this policy also did not increase telehealth claims within a state during this period. However, the coefficient on private payer policy is positive and significant, suggesting that private payer laws were effective at increasing telehealth usage within individual states during the pandemic. These results do not support the hypothesis that payment parity laws and licensure compacts increased telehealth usage within individual states during the pandemic. However, the results do support the hypothesis that private payer laws increased telehealth usage within individual states during the pandemic, and that private payer policies would be the most impactful of the three on a state usage level.

Regressions 2, 3 and 4 use interaction terms between policy and age group variables in order to estimate how these policies impacted telehealth usage across individual age groups during the pandemic. In each of these three regressions, the interaction term between the policy variables and the over 65 age group variable is omitted. This means that the four interaction variables left measure increased or decreased usage among that age group in comparison to people 65 and older.

Regression 2 relates to payment parity, and indicates that a payment parity law increased telehealth usage among all age groups, but had the most dramatic effect on the 19-35 age group. This regression says that, on average, about 14,260 more claims were filed among 19-35 year olds when a payment parity law was in place. It also says that a payment parity law caused an increase of about 1,970 more claims for 19-35 year olds than it did for people over 65 years old. These results support the hypothesis that payment parity policies increased telehealth usage among all age groups, and that this increase was largest among 19-35 year olds (who already utilize telehealth the most). Figure 6 below shows the estimated amount of increased telehealth claims among each age group that resulted from a payment parity law being in place. Figure 6 suggests that claims increased significantly among all age groups as a result of payment parity policies.

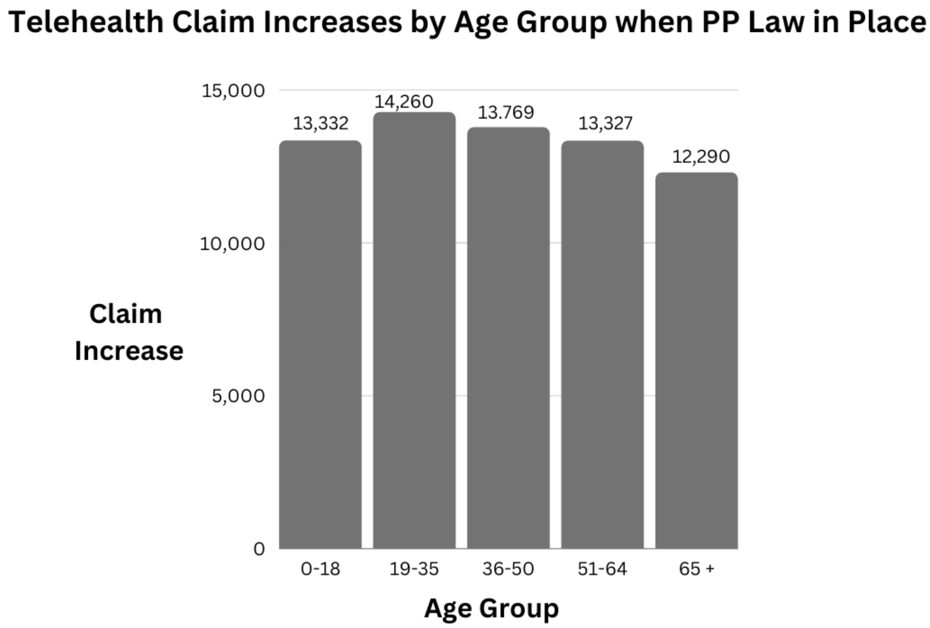

Figure 6

Regression 3 relates to licensure compacts, and indicates that the existence of a licensure compact increased telehealth usage for all age groups except for the 19-35 age group. Licensure compacts caused the largest increase in telehealth claims filed for the over 65 age group. The regression suggests that, on average, people 65 and older filed about 8,182 more telehealth claims when a licensure compact was in place. Licensure compacts caused the second largest increase in telehealth claims for the 51-64 age group. The regression suggests that, on average, people 51-64 years old filed about 4,502 more telehealth claims when a licensure compact was in place. The results support the hypothesis that licensure compacts increased telehealth usage the most among older age groups with a higher home ownership rate. Figure 7 below illustrates the estimated amount of increased telehealth claims among each age group that resulted from a licensure compact being in place. This graph suggests that no increase occurred for the 19-35 age group, and that licensure compacts caused the largest increase for the oldest two age groups.

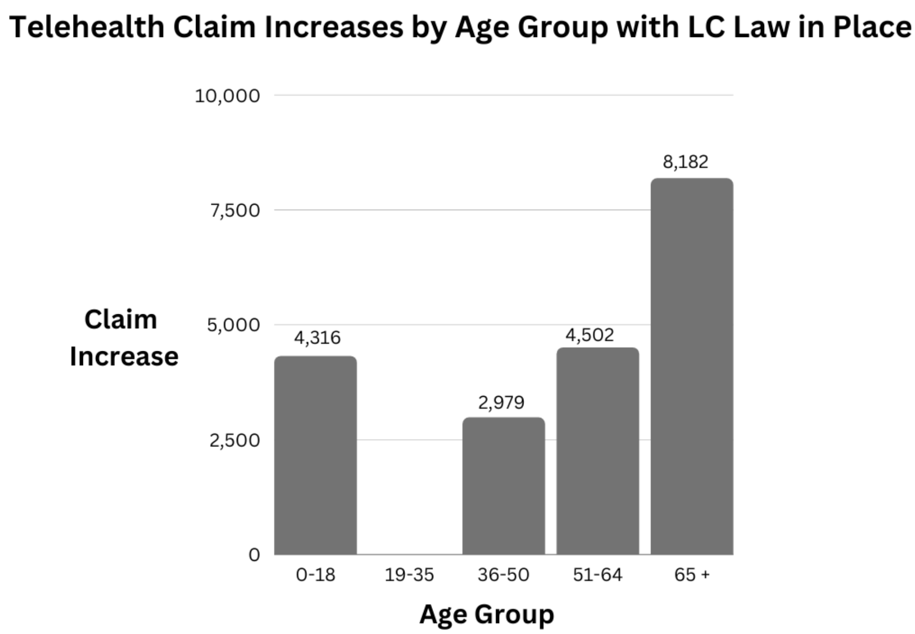

Figure 7

Regression 4 relates to private payer laws, and indicates that private payer laws increased telehealth usage among all age groups, but the most dramatically for 19-35 year olds. This is a similar outcome as was found for payment parity laws. Regression 4 indicates that, on average, 19-35 year olds filed about 3,820 more telehealth claims when a private payer law of some sort was in place. It also says that a private payer law caused an increase of about 1,995 more claims for 19-35 year olds than it did for people over 65 years old. These results support the hypothesis that private payer laws increased telehealth usage among all age groups, and that this increase was largest among 19-35 year olds (who already utilize telehealth the most). Figure 8 below shows the estimated amount of increased telehealth claims among each age group that resulted from a private payer law being in place.

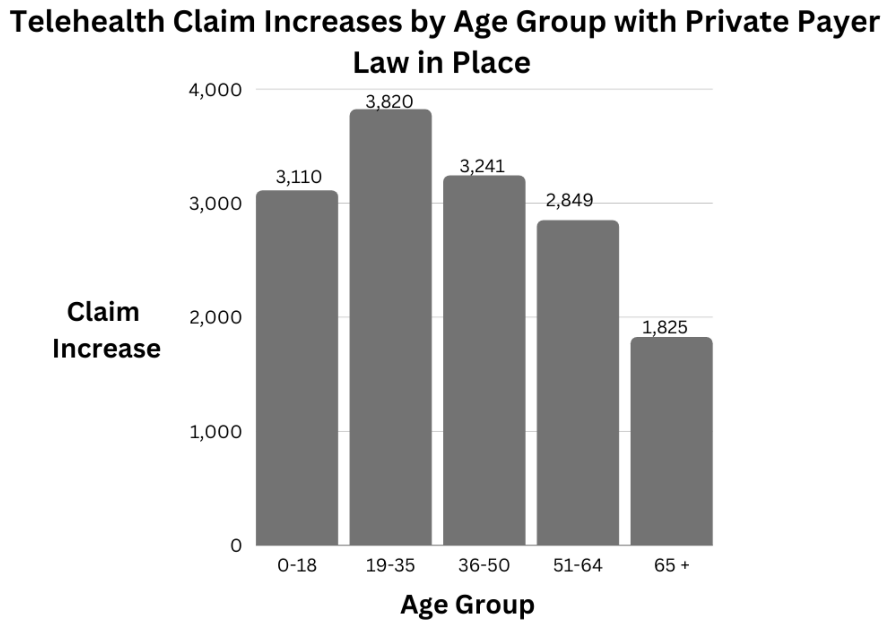

Figure 8

Regressions 2, 3 and 4 imply that all three policies increased telehealth usage across all age groups, with the exception of licensure compacts not increasing claim amounts among 19-35 year olds. All three policies caused increases, it was payment parity laws that generated the largest estimated increase in telehealth claims. For example, the regressions estimate that payment parity laws increased claims among 19-35 year olds by about 10,440 more claims than private payer laws did. Furthemore, the regressions suggest that payment parity laws increased claims among those 65 and older by about 4,108 more claims than licensure compacts did.

Regressions 2, 3 and 4 were all run with Claims2 as the dependent variable in order to ensure that the results did not change when accounting for population differences. All regressions showed the same results with Claims2 as the dependent variable.

It is also worth noting that private payer laws and payment parity laws are very similar, however the correlation between the two variables is 0.4, which is not very strong.

Regression Results (Figure 7)

	(1) Claims2	(2) Claims	(3) Claims	(4) Claims
PCC	5.107***	678.068***	678.663***	679.654***
	(.648)	(70.969)	(70.621)	(70.99)
I	31.986***	1714.107***	5732.622***	1141.49***
	(1.005)	(157.918)	(348.407)	(299.064)
J	36.739***	2101.505***	12434.463***	1389.848***
	(1.005)	(157.77)	(348.634)	(298.373)
K	25.72***	1442.358***	6889.722***	979.391***
	(1.005)	(157.763)	(348.348)	(298.512)
L	16.777***	953.606***	4802.148***	603.56**
	(1.006)	(157.942)	(348.521)	(298.864)
Over65Age				
Charge	.268***	22.229***	22.209***	22.222***
	(.006)	(.708)	(.705)	(.709)
Income	0	0	0	0
	(0)	(.001)	(.001)	(.001)
InternetAccess	.004	-.233	-.233	-.232
	(.003)	(.297)	(.296)	(.297)
PrivatePayer	13.309***	2981.229***	2985.339***	1824.892**
	(3.413)	(695.585)	(692.183)	(726.45)
LC	-14.414***	3553.386***	8182.119***	3553.4***
	(3.36)	(629.167)	(668.105)	(629.358)
PP	-8.656	12290.306***	13403.85***	13390.441***
	(6.538)	(2958.313)	(2940.632)	(2955.972)
PPI		1042.198***		
		(220.276)		

PPJ		1970.218***		
		(220.173)		
PPK		1478.788***		
		(220.138)		
PPL		1037.13***		
		(220.39)		
PPO				
Population		-.002***	-.002***	-.002***
		(.001)	(0)	(.001)
LCI			-3865.766***	
			(367.024)	
LCJ			-10339.803***	
			(367.219)	
LCK			-5202.834***	
			(366.944)	
LCL			-3680.01***	
			(367.153)	
LCO				
Over65Age				
PrivI				1284.96***
				(321.664)
PrivJ				1995.274***
				(321.015)
PrivK				1416.374***
				(321.134)
PrivL				1024.286***
				(321.512)
PrivO				
_cons	-42.238***	-7318.812***	-12059.269***	-6889.03***
	(4.437)	(542.123)	(573.973)	(566.951)
Observations	75386	75386	75386	75386
R-squared	.141	.181	.189	.181

Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Figure 9

7. CONCLUSION

These regression results both confirm and disprove parts of the hypothesis. However, they do validate that each of the three policies studied can effectively increase telehealth usage in some capacity.

We know from past research how advantageous an asset telehealth is to the American healthcare system. It offers benefits that directly address two of the biggest issues facing American healthcare today: high prices and low accessibility. However, regression 1 shows that the utilization of telehealth varies significantly between age groups and states. This means that it is being underutilized in some places and among some people, leaving opportunities to increase the efficiency of our healthcare system by boosting its usage. The regressions in this paper show how these policies offer a means of capitalizing on these opportunities.

Private payer laws were the one policy that created a significant increase in telehealth claims within individual states across all age groups. This makes sense because private payer laws are one of the most basic telehealth policies and function to simply assure that some portion of virtual care is being reimbursed by private health plans. They have the ability to impact the largest group of people, because they will lead to increased telehealth coverage for anyone with private health insurance. If individual states want to simply increase their level of telehealth usage, then some form of private payer laws will likely be the most effective.

Regressions 2, 3 and 4 reveal that attempts to increase telehealth usage can not only be targeted at individual states, but age groups as well. Regression 1 reveals that the older population (specifically those ages 51 and older) were much less likely to engage in virtual care. This means that there is a lot of potential for increased usage among this older population. Payment parity policies seemed to cause the largest increases in telehealth usage across all age

groups. The implementation of payment parity laws should effectively stimulate more telehealth usage among both younger and older generations according to these results.

If politicians wanted to further stimulate telehealth usage among older generations, then the addition of a licensure compact would also likely be an effective measure. Licensure compacts seem to target older generations the most and could provide additional encouragement for this group to boost their telehealth demand. Older people with homes in multiple states would be able to meet with their physician from home whenever they wanted. If licensure compacts became more mainstream, then there would likely be an increase in telehealth usage among the older US population.

All in all, each of the results of this paper imply that all three policies offer an effective way to increase telehealth usage in the US.

8. BIBLIOGRAPHY

Baker, Allison, et al. "Economics at the FCC 2020–21: Closing the Connectivity Gap, COVID-19 and Telehealth, Spectrum Auctions, Communications Marketplace Report, and Economic Research." *Review of Industrial Organization* 59 (2021): 599-627.

Cantor, Jonathan, et al. "The impact of the COVID-19 pandemic and policy response on health care utilization: evidence from county-level medical claims and cellphone data." *Journal of health economics* 82 (2022): 102581.

Bischoff, Richard J., et al. "Addressing the mental health needs of the rural underserved: Findings from a multiple case study of a behavioral telehealth project." *Contemporary Family Therapy* 26 (2004): 179-198.

Gajarawala SN, Pelkowski JN. Telehealth Benefits and Barriers. J Nurse Pract. 2021 Feb;17(2):218-221. doi: 10.1016/j.nurpra.2020.09.013. Epub 2020 Oct 21. PMID: 33106751; PMCID: PMC7577680.

Luxton, David D. "Considerations for planning and evaluating economic analyses of telemental health." *Psychological Services* 10.3 (2013): 276.

"Regional Data: GDP and Personal Income." *BEA Interactive Data Application,* https://apps.bea.gov/iTable/?reqid=70&step=1&acrdn=2#eyJhcHBpZCI6NzAsInN0ZXBzIjpbMSwyNCwyOSwyNSwzMSwyNiwyNywzMF0sImRhdGEiOltbIlRhYmxlSWQiLCI2MDAiXSxbIkNsYXNzaWZpY2F0aW9uIiwiTm9uLUluZHVzdHJ5Il0sWyJNYWpvcl9BcmVhIiwiMCJdLFsiU3RhdGUiLFsiMCJdXSxbIkFyZWEiLFsiWFgiXV0sWyJTdGF0aXN0aWMiLFsiOCJdXSxbIlVuaXRfb2ZfbWVhc3VyZSIsIkxldmVscyJdLFsiWWVhciIsWyIyMDIxIl1dLFsiWWVhckJlZ2luIiwiLTEiXSxbIllYXJfRW5kIiwiLTEiXV19.

Spaulding, Ryan, and Carol E. Smith. "How telehealth care exploded due to COVID: What nurse

researchers need to know." *Research in nursing & health* 44.1 (2021): 5.

Spaulding, Ryan, et al. "Cost savings of telemedicine utilization for child psychiatry in a rural Kansas community." *Telemedicine and e-Health* 16.8 (2010): 867-871.

“Telehealth Policy Trend Maps.” *CCHP,* 15 Apr. 2021, https://www.cchpca.org/policy-trends/.

Trott, Paul, and Ilse Blignault. "Cost evaluation of a telepsychiatry service in northern Queensland." *Journal of Telemedicine and Telecare* 4.1_suppl (1998): 66-68.

“US Census Bureau.” *United States Census Data,* https://data.census.gov/table?q=internet+access+by+state&tid=ACSDT5Y2020.B28003.

“What is Telehealth?” *HRSA,* https://www.hrsa.gov/rural-health/topics/telehealth/what-is-telehealth.

Wolfe, A. "Institute of Medicine report: crossing the quality chasm: a new health care system for the 21st century." *Policy, Politics, & Nursing Practice* 2.3 (2001): 233-235.

Wong, Mark Yu Zheng, et al. "Telehealth demand trends during the COVID-19 pandemic in the top 50 most affected countries: Infodemiological evaluation." *JMIR public health and surveillance* 7.2 (2021): e24445.