

THE INFLUENCE OF MEDICAID EXPANSION UNDER
THE AFFORDABLE CARE ACT
ON OPIOID-RELATED
TREATMENT

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ABSTRACT

The U.S. Department of Health and Human Services has declared the misuse of opioid prescription drugs as a public health emergency. The Affordable Care Act's Medicaid expansion expanded the number of people with insurance and increased the demand for services related to substance abuse treatment. In the first part of this study, the researcher examines whether the Medicaid expansion reduced the likelihood of treatment delay. The second part of this study explores whether the length of stay for opioid use disorder treatment is significantly different in states that adopted Medicaid expansion versus states that did not. In both studies, the researcher analyzes administrative data from the Substance Abuse and Mental Health Services Administration to discover any treatment delays associated with the opioid treatments for the states that adopted the expansion versus the states that did not, and to determine whether there was a difference in the length of stay in the states that adopted the Medicaid versus the states that did not. A difference-in-difference approach is used in both studies to compare the states which adopted an optional Medicaid expansion to those non-adoption states. The evidence suggests that demand for opioid treatment services increased in expansion states as there is a decreased probability of obtaining treatment on the first day for initial requests for outpatient treatment. In addition, evidence suggests that Medicaid expansion increased the likelihood of staying longer in outpatient facilities, but not inpatient facilities.

This paper is dedicated to my grandparents, Nathaniel and Inez McGee.

They have encouraged me to be the best individual for my country and my family.

In addition, they have been a rock of stability throughout my life. I love you both and thank you

for providing an example of how a man worships God, loves his community,

and perseveres through all obstacles.

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CHAPTER 1

INTRODUCTION, BACKGROUND, AND SCOPE OF PROBLEM

Introduction

President Obama signed the Affordable Care Act (ACA) into law on March 23, 2010 (Blumenthal et al., 2015). Through the ACA, significant reforms were instituted to address issues within healthcare delivery in the United States (Blumenthal et al., 2015). Under the ACA, increased access to health insurance and healthcare was achieved for millions of American citizens; some additional 30 million Americans held medical insurance in 2015 due to the ACA (Blumenthal et al., 2015). In 2014, Medicaid expansions were offered to states, through which adults with incomes below 138% of the federal poverty level (FPL) could be included in Medicaid programs. The federal government initially funded this program. Not all states used the Medicaid expansions, but 38 states adopted these expansions (Centers for Medicare & Medicaid Services, n.d.). Blumenthal et al. (2015) asserted that the overall effectiveness of ACA can be established in three aspects of healthcare: (a) access to care, (b) cost of care, and (c) quality of care. In this study, the researcher focuses on access to care by examining the delivery system pertaining to treatment for opioid use disorder (OUD).

Background

Affordable Care Act

In this study, the researcher's concern is with how the OUD admissions to a particular treatment program changed after the enactment of the ACA. The current exploration of changes brought about by the ACA and Medicaid expansion centered on substance use disorder treatment (SUD), specifically OUD treatment. Under the ACA, increased access to treatment for substance abuse is available to patients (Kennedy-Stewart, 2016). Before the ACA, patients were not

guaranteed that their SUD treatment would be covered under private or public insurance plans. Insurance procedures either limited treatment-related visits or induced co-payments for OUD treatment. In addition, under the Medicaid expansion, insurance coverage treatments are now available to low-income citizens who were previously excluded from treatment due to their non-insured status and the high costs involved. One aim of the ACA's Medicaid expansion was to increase access to treatment for mental health and OUD (Wen et al., 2020). The expansion made Medicaid coverage available to a more significant number of low-income individuals. Wen et al. reported an increased uptake of both primary care and behavioral health services. In addition, these scholars reported that "post-2014 Medicaid expansions were linked with a 9.74% (95% CI, 18.83% to -0.65%) reduction in the rate of opioid-related inpatient hospitalizations" (Wen et al., 2020, p. 1). Little is known, however, about the impact of this increased uptake of OUD treatment on wait times for patients.

In addition to the ACA, President Obama signed the Comprehensive Addiction and Recovery Act (CARA) into law on July 22, 2016 (Kuhn, 2017). This law supports primary prevention and training, as well as treatment and recovery support. Under the CARA, midlevel healthcare practitioners such as physician assistants and nurse practitioners can now prescribe buprenorphine, one of the pharmaceutical substances used in OUD treatment. Medical physicians dealing with OUD treatment can hire nurse practitioners or physician assistants, which may address the increase in demand for treatment and benefit profit margins (Kuhn, 2017). In addition, federal initiated improved treatment and recovery measures came into effect under the CARA, relieving states from the financial pressures in treatment and education provision. This ACA-linked legislation opens OUD treatment possibilities for patients and simultaneously increases the need for service delivery within the healthcare system. The question

is whether the healthcare system can adequately provide services to this larger number of patients of all ages. Dr. Ethan Wiener, the Pediatric Emergency Medicine and Chief of Service for an academic children's hospital in New York City, stated,

Seeing the opioid epidemic take a toll on kids has been a tremendous challenge; not just to see on a personal level children and their families suffering, but understanding the desperation of wanting to seek quality care and knowing minimal availability of any opioid treatment services for kids are so discouraging. Imagine if we, as a society, underfunded treatment for cancer or heart conditions. The lack of funding and accessible care for these conditions is a national crisis, and we could do better. (E. Wiener, personal communication, March 25, 2022)

In terms of the opioid epidemic in the United States, the effect of the ACA is seen in the following two areas: (a) increased Medicaid spending among the states that have been hit hard by the opioid epidemic and (b) increased access to opioid treatment disorder medication to rehabilitation sites and treatment facilities.

Opioid Use Dependency

The U.S. Department of Health and Human Services has declared the misuse of opioid prescription drugs as a public health emergency. The high rate of prescribed opioids to manage pain started in the late 1990s based on the reassurance of pharmaceutical companies that patients would not become addicted to the substance (U.S. Department of Health and Human Services, 2019). The resulting history of OUD in the United States and worldwide shows that this was untrue (Barnett et al., 2017). With the growth of opioid prescriptions to patients, a parallel growth in overdoses and deaths was recorded (Centers for Disease Control and Prevention [CDC], 2018).

Scope of the Problem

Roughly 130 Americans died daily from an opioid overdose in 2017 (CDC, 2018). This makes the opioid epidemic deadlier than the HIV/AIDS epidemic at its peak, with 100,777 deaths from 1981 through 1990 (CDC, 2001; Ingraham, 2017). As previously mentioned, the intention of the Medicaid expansion under the ACA was to make medical insurance accessible to a more significant percentage of low-income Americans. Although initially mandatory for all states, a Supreme Court ruling in 2012 in the case of *National Federation of Independent Business v. Sebelius* determined that states could decide on the adoption and implementation of Medicaid expansions (Centers for Medicare & Medicaid Services, n.d.; Blumenthal et al., 2015). As a result of the optional state expansion, the national increase in Medicaid enrollment was 26% and the uninsured rate of the non-elderly population dropped 7.7% between 2010 and 2015 (Rudowitz et al., 2018).

Under the Medicaid expansion, Alternative Benefit Plans (ABPs) must be offered to these newly insured individuals. The ABPs include treatment options for SUDs, among whom those with OUD form the largest portion (Grogan et al., 2016). Medicaid enrollees numbered more than 74 million by late 2017 (Centers for Medicare & Medicaid Services, 2017). An estimated 1.6 million persons with SUDs are now receiving health benefits under the Medicaid expansions (Grogan et al., 2016).

Recognized SUD treatment includes inpatient or outpatient options, inclusive of pharmacological or psychosocial interventions, all of which represent high costs to uninsured persons (Grogan et al., 2016). The pharmacological intervention options for OUD, known as medication-assisted treatment (MAT), include three substances: methadone, buprenorphine, and naltrexone (Wen et al., 2020). The use of MAT has been associated with a decrease in fatal opioid overdose, higher survival rates, and a drop in patient attrition in treatment with better

overall treatment outcomes (Substance Abuse and Mental Health Services Administration [SAMHSA], 2015).

Increased access to treatment under the Medicaid expansions increased the prescribed use of three OUD-related medications. For instance, Wen et al. (2020) indicated that the Medicaid expansion led to a 70% increase in prescribed buprenorphine in 2014. In addition, there was an overall increase of 13% in naloxone prescriptions in counties across the states that adopted Medicaid expansions (Saloner et al., 2018). It can be concluded that increases in OUD treatments to new Medicaid enrollees under the expansions led to substantial Medicaid spending on medications and professionals who provided treatment in outpatient, inpatient, or emergency room settings.

The problem that the researcher addresses in this study is the increase in OUD treatment uptake under the ACA and the difference—if any—in OUD treatment uptake between adopting states of Medicaid expansion and non-adoption states. In addition, it was necessary to determine whether or how states manage and cope with the increased OUD treatment access and uptake. Dr. Christopher Caspers, the Vice-Chair of Emergency Medicine and the Medical Director for the Hospital at Home Program at an academic medical center in New York City, stated,

As an emergency medicine physician, the opioid crisis has led to an increase in patients presenting to the emergency department (E.D.) with unmet pain and addiction needs. Often, these patients have underlying under-treated mental health disorders due to the overall shortage in mental health resources and care that we are currently experiencing due to social stigmas and payer policy. This complicates treating patients with opioid addiction since successful treatment relies on a patient's ability to participate in medication therapies and office visits reliably. Unfortunately, patients often

present to the E.D. as their only access point to the health care system when decompensating, receiving fragmented episodic care, and then relapse. We do our best, but we wish we could do more. (C. Caspers, personal communication, March 25, 2022)

Due to the complexity of insurance and prior authorization for follow-up care and treatment for opioids, this researcher uses wait time to treatment to measure whether and how states manage the increased OUD access under the ACA Medicaid expansion.

CHAPTER 2

LITERATURE REVIEW, OBJECTIVE, AND MODEL DEVELOPMENT

Literature Review

This literature review focuses on the topics relating to Medicaid expansions under the ACA, OUD, treatment options for OUD, including best practices, costs of OUD treatment in the current dispensation, and barriers to OUD treatment. Wherever possible, the researcher distinguishes between states that adopted Medicaid expansions versus those that did not (i.e., non-adopters) and inpatient and outpatient treatment options. This research is timely because the current literature on OUD treatment under the ACA Medicaid expansion offers little information about this issue.

Medicaid Expansions

Across the states, there is limited evidence of expansion and OUD treatment. For example, in Ohio, the effect of the Medicaid expansion on those who enjoyed Medicaid coverage and presented with OUD was that they had increased access to care, more so than those enrolled in Ohio's Medicaid program under preexpansion eligibility rules (i.e., access to overall care 75.4% versus 64.0%; Ohio Department of Medicaid, 2017). The OUD enrollees also reported more access to prescription medications than non-OUD enrollees—82.7% versus 64.8% and access to mental health care 59.3% of OUD enrollees reported access 32.2% non-OUD enrollees (Ohio Department of Medicaid, 2017).

Opioid Use Dependency

In the middle 1990s, Purdue Pharma manufactured and promoted OxyContin as a safe painkiller, resulting in increased OxyContin prescriptions (Kolodny et al., 2015). In addition, Purdue Pharma also engaged in educational programs on pain management, funding over 20,000

educational programs to promote opioids as a treatment for chronic pain (Kolodny et al., 2015). As a result, some scholars have claimed that OxyContin was one of the causative actors in the current OUD epidemic (Barnett et al., 2017; Kolodny et al., 2015; Rosner et al., 2019).

Initial pharma and state reactions to the crises had mixed results. For example, those who became dependent on OxyContin typically crushed the pill to be used as an inhalant or an injection (Alpert et al., 2018). Thus, Purdue Pharma altered pill manufacturing to address the crushing of the medicine, which then led to an increase in heroin use and heroin overdose fatalities (Evans et al., 2019). States also implemented prescription monitoring programs, which reduced the Schedule II opioid pain killer prescriptions by 30% between 2012 and 2013 (Bao et al., 2016; Dowell et al., 2016). In the study by Buchmueller and Carey (2018), the authors did not find significant changes in opioid prescriptions for pain management due to prescription monitoring.

Even with these increased efforts, the SAMHSA (2017) reported that approximately 2.1 million people presented with an OUD in 2016 in the United States. Increased addiction spurred the manufacturing and sales of illegally manufactured synthetic opioid drugs such as fentanyl, which caused an 18% increase in the 2014–2016 overdose rate, which effectively doubled between 2015 and 2016 (Beletsky, 2018). Affordability was a significant barrier in seeking and receiving treatment for OUD, especially among the uninsured population. It appears that this situation is mitigated by the ACA Medicaid expansions (Saloner et al., 2018).

Treatment Options for Opioid Use Dependency

Opioid dependency can be treated, which means this epidemic can be turned around (Beletsky, 2018). Opioid agonist therapy (OAT) is the preferred evidence-based OUD treatment practice. Agonists used in OUD treatment are methadone, buprenorphine, and naloxone. Suboxone®, a combination of buprenorphine and naloxone, is also commonly used to manage

the withdrawal symptoms, mitigate cravings, and stabilize the patient (Beletsky, 2018, p. 346). Two of the FDA-approved opioid agonist medications used in OUD treatment, methadone and buprenorphine, may only be used in opioid treatment programs (OTPs). At the same time, there are no special regulations on the use of naltrexone. All three agonists were found to be effective during clinical trials (Sharma et al., 2017). OUD treatment requires a long-term commitment to treatment, as relapses are common (National Institute on Drug Abuse, 2018a). OAT is also successfully used in overdose cases and upon reentry into society after periods of forced abstinence (e.g., incarceration; Beletsky, 2018).

The states that adopted Medicaid expansion saw increases in OAT among OUD patients compared to non-adoption states (Mojtabai et al., 2019). Mojtabai et al. concluded that the expanded Medicaid coverage could potentially lead to increased access to intervention for persons with OUD. Patients covered under Medicaid expansion are more likely to receive OAT treatment, as providers are now more inclined to serve Medicaid patients (Andrews & Humphreys, 2019). Increased patient loads under the Medicaid expansions resulted in OTPs filling at more than 80% of their capacity, including buprenorphine-waiver physicians (Sharma et al., 2017). Buprenorphine-waiver physicians are nurse practitioners, physician assistants, clinical nurse specialists, certified nurse anesthetists, and certified nurse-midwives. Sharma et al. warned about a treatment gap of over 1 million eligible patients when all treatment facilities and physicians are occupied to capacity.

Cost of OUD Treatment Under ACA Medicaid Expansion

Saloner et al. (2019) found a 36% increase in patients seeking treatment for OUD under the ACA Medicaid expansions. The most pronounced changes occurred in intensive outpatient treatment programs for OUD. The Medicaid share of intensive outpatient treatment admissions showed an increase of 23% in expansion states compared to the non-adopters. On average, the

costs associated with a 30-day buprenorphine prescription was between \$376 in 2003, which increased to \$444 in 2013 (Roberts et al., 2018). After increases in the buprenorphine prices, the introduction of generic alternatives brought about price decreases; a 30-day prescription was \$335 in 2015. Private patients' out-of-pocket payment for a 30-day prescription of generic buprenorphine-naloxone or generic buprenorphine medication was \$10 per tablet in 2015 (Roberts et al., 2018).

Barriers to OUD Treatment Under ACA Medicaid Expansions

Sharma et al. (2017) discussed interrelated barriers to OUD treatment—namely, financial, regulatory, geographic, attitudinal, and logistical. Pharmacological treatment in OUD is costly. Around 50% of the OTPs are private for-profit organizations that limit access to low-income Medicaid patients. This is a barrier because “treatment is only available in these programs if they are within driving distance and the patient can pay out-of-pocket or has insurance that the programs accept” (Sharma et al., 2017, p. 2). Insurers' prior authorization requirements for pharmacotherapy complicate access and cause long wait times that deter physicians from implementing medication in treating OUD. The co-payments charged under some medical insurance plans put treatment out of reach of patients (Sharma et al., 2017). In addition, specific regulations in the use of buprenorphine to treat OUD are imposed on U.S. physicians. This includes additional training after the practitioner is eligible for a buprenorphine waiver, but this restricts the number of patients the physician can treat (Sharma et al., 2017). Sharma et al. reported geographical differences in OUD treatment availability and areas of high opioid addiction. The attitudes of officials in the criminal justice system can lead to individuals with OUD not receiving pharmacotherapy despite it being available. Sharma et al. indicated that the interplay between the barriers mentioned above and transportation issues form the logistical barriers to treatment.

Sigmon et al. (2016) asserted that OUD patients might have to wait months on treatment facility waiting lists for treatment to commence. It is possible that some such patients may face death due to overdose while being on these waiting lists. To mitigate this situation, Sigmon et al. conducted a quasi-experimental research where buprenorphine was prescribed to 25 patients via Med-O-Wheel Secure dispenser (a device that is utilized/programmed to make a daily dose of medication available during a 3-hour window), in combination with regular follow-up and urine tests. Another 25 patients were waitlist only patients. The interim use of buprenorphine treatment was effective, and the researchers suggests a more extensive use of this approach in patients waiting for OUD treatment. In North America, one million patients are on a waiting list for OUD treatment (Guitar, 2017). The National Institute on Drug Abuse (2018a) has stated that the cost of an untreated OUD treatment has social and financial implications (\$78 billion) such as “criminal justice, medical costs associated with babies born dependent on opioids, medical treatment for overdoses, injuries associated with intoxication, increased risk of infectious diseases, and lost productivity” (p. 1). Waiting lists were found to be deterrents to reporting for OUD treatment. Guitar suggested that an interim treatment plan should be utilized to support waiting-listed patients and prevent attrition or overdose fatalities, both economically and socially costly. Different researchers have found increases in OAT-related prescriptions in expansion states (85% in the U.S. States or 65% in U.S. counties), indicating that patients receive OUD treatment (Grooms & Ortega, 2019; Saloner et al., 2018; Wen et al., 2020). Miller and Wherry (2017) found that longer wait times also occurred with increased access to treatment. This finding was confirmed by Beetham et al. (2019). Grooms and Ortega (2019) pointed out that more extended wait periods before treatment are linked with poorer treatment retention. Therefore, the quality of care is reduced due to longer waiting times.

Economic Significance of Treatment Delay

In 2017, “the economic cost of the opioid epidemic in the United States was estimated at \$1,021 billion, including the cost of OUD estimated at \$471 billion, and cost of fatal opioid overdose estimated at \$550 billion” (Luo et al., 2021, p. 1). It is hard to calculate the economic impact of opioid misuse and abuse. Economic indications provide an imprecise—but potentially helpful—way to understand and compare the impact of OUD on individuals, families, and society. The effects of OUD on organizations include absenteeism and presenteeism of addicted employees, which carry costs to companies of approximately \$10 billion annually (Kuhn, 2017). West Virginia, the epicenter of opioid overdose fatalities, reported three times more fatalities (43.4 per 100,000) than other states in the United States. Opioid overdose fatalities over the past 20 years amount to approximately 400,000 deaths and \$11 billion annually in direct hospital costs nationally (Wen et al., 2020). This economic calculation does not reflect the cost to families in lost income, lost consortium, and society in terms of the loss of valuable social participation. Finally, the crisis severely impacts all OUD-related services, including healthcare, social, and law enforcement (Saloner et al., 2019).

There is a social cost of a person not receiving timely treatment or no treatment. It is possible to examine the effects of delays in acute medical treatment on total cost due to the coronavirus-2019 to understand the economic significance of delays in treatment. In a 2021 study published in the Harvard Public Health Review, Haque used the State of California Public Patient Discharge data to examine over 1.7 million patients to account for medical treatment delays on the total cost. In this study, the delay was defined as “the number of days between a patient’s initial diagnosis and hospital admission until treatment” (Haque, 2021, p. 2). This author defined total cost as “the total monetary charge for services rendered during the length of stay at the hospital facility” (Haque, 2021, p. 1). The researcher uses an Ordinary Least Squares

regression model comprised of diagnosis, hospital fixed effects, and patient-specific controls to run a regression of log total cost on delay. The researcher's findings were as follows:

On average and *ceteris paribus*, an additional day of delay resulted in a 10.6 log point (11.2%) increase in total cost. Results were found to be statistically significant ($p < 0.01$).

When compared with Day 0 (no delay), a delay of one day increased total cost by 14.1% (\$40,619.3USD), 30.5% the second day (\$46,443.9USD), 46.5% the third day

(\$52,156.3USD), 62.9% the fourth day (\$57,988.5USD), and 78.4% the fifth day

(\$63,513.0USD). When comparing a delay of six days to no delay, there was an increased total cost of 95% (\$69,424.8), approximately double the cost of treatment of Day 0

(\$35,596.4USD). (Haque, 2021, p. 1)

This information can be used to conclude that patients who experience a delay in treatment can potentially increase the cost of their care depending on the number of days before receiving treatment.

Furthermore, a team of decision scientists and staff members from the United States Department of Veterans Affairs Palo Alto Health System developed a mathematical model to examine the economic cost of interventions to treat OUD. First, the researcher developed a model that considered 26 different treatment combinations involving MAT, such as “oral buprenorphine or methadone and injectable, extended-release naltrexone, combined with a treatment such as psychotherapy and overdose education” (Duff-Brown, 2021, p. 2). The model consists of an estimate of quality-adjusted life years (QALYs) associated with each MAT treatment. Prieto and Sacristan (2003) defined QALY as “a measure of the value of health outcomes. The calculation is the change in utility value induced by the treatment is multiplied by the duration of the treatment effect to provide the number of QALYs gained” (p. 1). The aim of

this study was to determine which MAT would prevent a significant number of overdoses and result in one additional QALYs for the patient who receives the appropriate treatment. The conclusion was “that by providing medication-assisted treatment, combined with overdose education and naloxone and contingency management to everyone with an opioid disorder in the United States; 41,000 lives over the next five years could be saved, and \$200 billion in health care and criminal justice costs over these individuals lives” (Duff-Brown, 2021, p. 2). The calculation consisted of the researchers taking the mean of fatal/non-fatal overdoses and the total number of deaths over 5 years for a simulated cohort of 100,000 OUD individuals in the United States and expected total lifetime costs and QALYs gained to the individuals not receiving treatment. The researcher found that the total number of deaths decreased for all treatment options compared to individuals with no treatment. The results study showed that when MAT was combined with contingency management, overdose education and the distribution of naloxone; the number of deaths dropped by nearly 17% for methadone and 23.7% for buprenorphine and naltrexone. In addition, the treatment led to an increase of 1.7 additional QALYs per person for all three forms of MAT. This information can be used to determine that the likelihood of someone not receiving treatment is the reduction of 1.7 QALYs or death.

Objective

The objective of this study was to explore the Medicaid expansion under the ACA to determine whether there were any treatment delays associated with the opioids for the states that adopted the Medicaid expansions versus the states that did not. The following general research question was posed to achieve the objective of the study:

RQ: Is the likelihood of delay in obtaining treatment (if there is a delay) for opioid-related treatment in states that adopted Medicaid Expansion different from non-adopters?

Hypothesis

Given the purpose of the study and insights gained from the literature, the following hypothesis was formulated:

H1: Medicaid expansion reduces the likelihood of treatment delay.

CHAPTER 3

METHODOLOGY

Methods

To investigate and analyze the hypothesis presented in the previous chapter, the researcher uses an econometric research design. This approach was appropriate because it involves the analysis of data over time in a natural experimental study. Leatherdale (2018) stated, “There is a general consensus that a natural experiment occurs when a particular intervention has been implemented, but circumstances surrounding the implementation are not under the control of the researchers” (p. 1). In this study, the intervention was the ACA-Medicaid expansion. The goal was to determine whether there were delays in treatment over time in the states that adopted the Medicaid expansion versus the non-adopters.

The change in the law made this a natural experiment. A difference-in-difference (DID) approach was an appropriate application for this study because the researcher plans to use the enactment of an optional law (i.e., the ACA’s optional Medicaid expansion by the states) as a natural experiment to test whether the Medicaid expansion led to treatment delays (i.e., capacity restraints for the states that adopted the Medicaid Expansion). A DID indicates an interaction between time and the treatment group.

Description of Data

The data for this research study came from the Substance Abuse and Mental Health Services Administration’s Treatment Episode Data Sets (TEDS). TEDS is a federally mandated administrative database for all providers accepting public funding. Both the Department of Health and Human Services and the SAMHSA are funded and responsible for maintaining TEDS. The data collected are standardized across all states, and contain two sections: (a) the

admissions dataset, which is known as TEDS-A, and (b) the discharges dataset, which is known as TEDS-D.

TEDS-A data contain (a) a minimum dataset, which is collected by all states, and (b) a supplemental dataset, which is collected by some states. The TEDS-A data are beneficial to this research because it includes the following information:

- “Demographic information;
- primary, secondary, and tertiary substances used by the subject, and their route of administration, frequency of use, and age at first use;
- source of referral to treatment;
- number of prior treatment;
- service type, including planned use of medication-assisted (i.e., methadone, buprenorphine, or naltrexone) opioid therapy” (SAMHSA, 2020, p. 4).

These variables are critical because they enabled the researcher to identify the population of opioid patients experiencing delays and the specific treatment that the delay may be occurring in for admissions. The data found in TEDS-D include the discharge records and the same variables listed for TEDS-A, including (a) type of service at discharge, (b) length of stay, and (c) reason for discharge or discontinuation of service.

The TEDS data have some limitations; however, it is the best source to receive public data where states can be compared before and after the Medicaid expansion. The SAMHSA (2020) has stated that the data limitations fall into two categories: “(a) those related to the scope of the data collection system, and (b) those related to the difficulties of aggregating data from highly diverse state data collection systems” (p. 4). The limitations of the TEDS data are as follows:

- Some states report facility data different due to licensure, certification, accreditation, and disbursement of public funds (some states may report state, prisons, and local jails while others do not);
- Most states can report all admissions to all eligible facilities, but some states only report admissions financed by public funds; and
- TEDS does not include early intervention programs (e.g., emergency departments, crisis intervention facilities, or sobering stations).

The TEDS-A and TEDS-D datasets will be from the timeframe of 2010–2014. This period covers both before and after the Medicaid expansion regarding opioid treatment for all states that adopted the Medicaid expansion in 2014.

In addition to the TEDS data, a list of the states that have adopted the Medicaid expansion was used to complete the natural experiment and test the hypothesis. The list of states that have adopted the Medicaid expansion versus those that have not adopted the Medicaid expansion was obtained from the Henry J. Kaiser Family Foundation (KFF, 2020). The KFF is a nonprofit organization that focuses on global and national health policy. The timeframe for this data was the same time as the TEDS data looking from 2010 to the Medicaid expansion effective date of 2014.

To estimate the association of the Medicaid expansion with opioid-related treatment admissions and discharges, the DID statistical technique was utilized. Card and Krueger (2000) used the DID technique to analyze the impact of the minimum wage increase in the state of New Jersey and compare it to neighboring Pennsylvania, which did not change its law. The goal of their study was to determine whether there was a change in unemployment in both states. In this study, the researcher uses the DID technique to analyze the impact of the Medicaid expansion on

states that adopted the optional expansion versus the states that did not. The DID technique is explicitly used for estimating the effect of an intervention (e.g., the passage of law or policy) by examining the outcome of the intervention over time with the population of the “treated group” and the “not treated” group (i.e., control group). Wing et al. (2018) stated that the causal effects of policies and programs are difficult to measure; however, the DID design is well established in public health research because it compares two outcomes of groups exposed to different policies at different times.

The DID technique has been used in several research studies related to the Medicaid expansion. Gertner et al. (2020) used it to determine the heterogeneous effect of Medicaid expansion on opioid agonist treatment and the capacity constraints on the role of a provider. These scholars examined the supply and demand of methadone and buprenorphine dispensed in states between 2006 and 2017. The results of their study showed “the estimated effects of Medicaid expansion on buprenorphine and methadone dispensed were positive but imprecise meaning we could not rule out negative or null effects of expansion” (Gertner et al., 2020, p. 1). The DID technique in the Gertner et al. study provided an example of comparing two groups in health policy research. The current research study differs from that of Gertner et al. because it the researcher examines the Medicaid expansion regarding access to treatment services from utilizing patient encounters/episodes (including/excluding MATs).

Furthermore, the DID technique was employed to determine whether there were delays in opioid treatment events (admissions or discharges) associated in all states. The DID was the most appropriate technique for this study because it enables the researcher to measure differences in the treatment group (states who have adopted the Medicaid expansion) and control group (non-adopters) to display changes in the outcome variable (opioid treatment admissions

and discharges). Wing et al. (2018) described that

in a DID design, researchers cannot rely on random assignment to avoid bias from unmeasured confounders and instead impose assumptions that restrict the scope of the possible confounders. Specifically, DID designs assume that confounders varying across the groups are time-invariant, and time-varying confounders are group invariant. Researchers refer to these twin claims as a common trend assumption. (p. 3)

Therefore, the researcher needs to make sure that the following occurred: (a) the treatment and control group are both exposed to the law or condition in the first period, and (b) the statistical model that is created shows the treatment in Group 2, and not in the first group. Designing this model appropriately ensures the maintenance of the integrity of the treated and untreated groups, including the time trend.

Sample

The dataset used for this study consisted of patient episodes or encounters with providers who accept public funding to treat for substance abuse in the United States. The data used in this study were the 2010–2018 TEDS-A dataset. The states included those that adopted the Medicaid expansion in 2014 and those states that did not adopt in 2014 or never adopted the Medicaid expansion. The data did not include the District of Columbia or Puerto Rico. The number and characteristics of institutions that do not accept public funding were not reflected in this dataset. The variables in this analysis were as follows:

- Year of admissions (ADMYR)
- Admitted within 1 day (DAYONE)
- Planned medication-assisted opioid therapy (METHUSE)
- Service setting at admissions (SERVICES)

- Census state FIPS code (STFIPS)
- Primary substance use at admissions (SUB1)
- Biologic sex (GENDER)
- Race (RACE)
- Ambulatory services / does not require hospitalization (OUTPATIENT)
- Staying overnight in a treatment center (INPATIENT)
- Age at admission (AGE)
- Health insurance at admission (HLTHINS)

The sample size for this analysis can be displayed visibly via a table illustrating the sample's age, race, and health insurance characteristics.

Figure 1 illustrates the percentage of the age range for the observations in the analysis. A majority of the patients in this analysis were 25–29 years old (17.3%). Patients aged 12–14 years old and 65 years and older were represented at .9% in this analysis.

Figure 1: Age

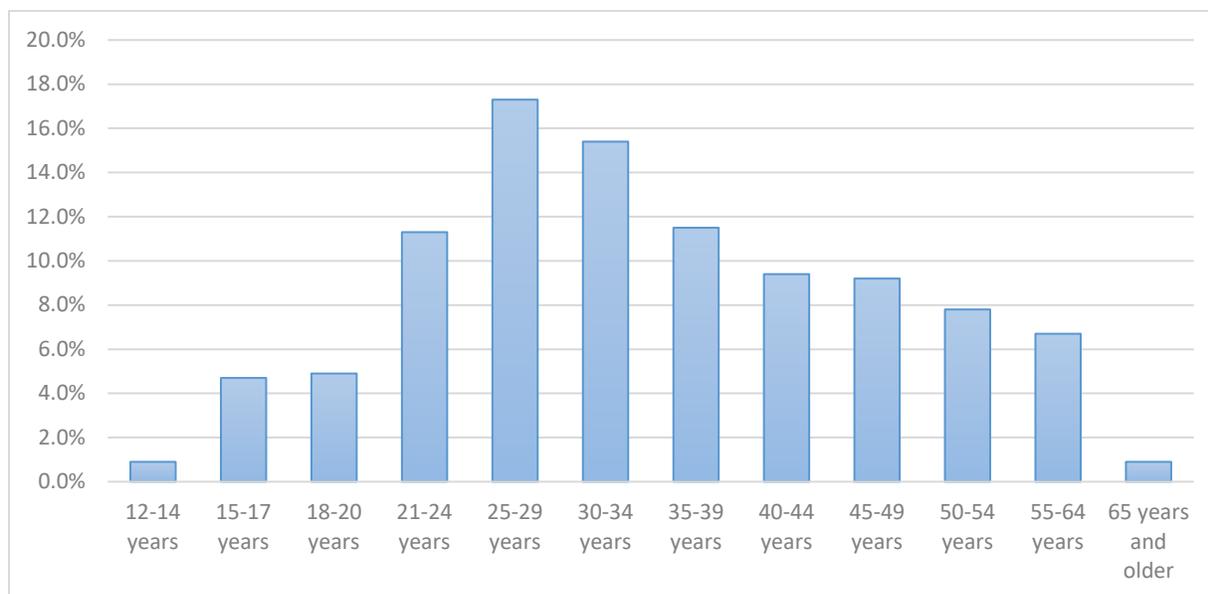


Figure 2 represents the breakdown of the race for the observations in the analysis. A

majority of the patients in the analysis were White (70.8%), and African American/Black patients represented 20.2% of the sample size. Alaska Native (Aleut, Eskimo, Indian) and Asian participants were the least represented at 0.5%.

Figure 2: Race

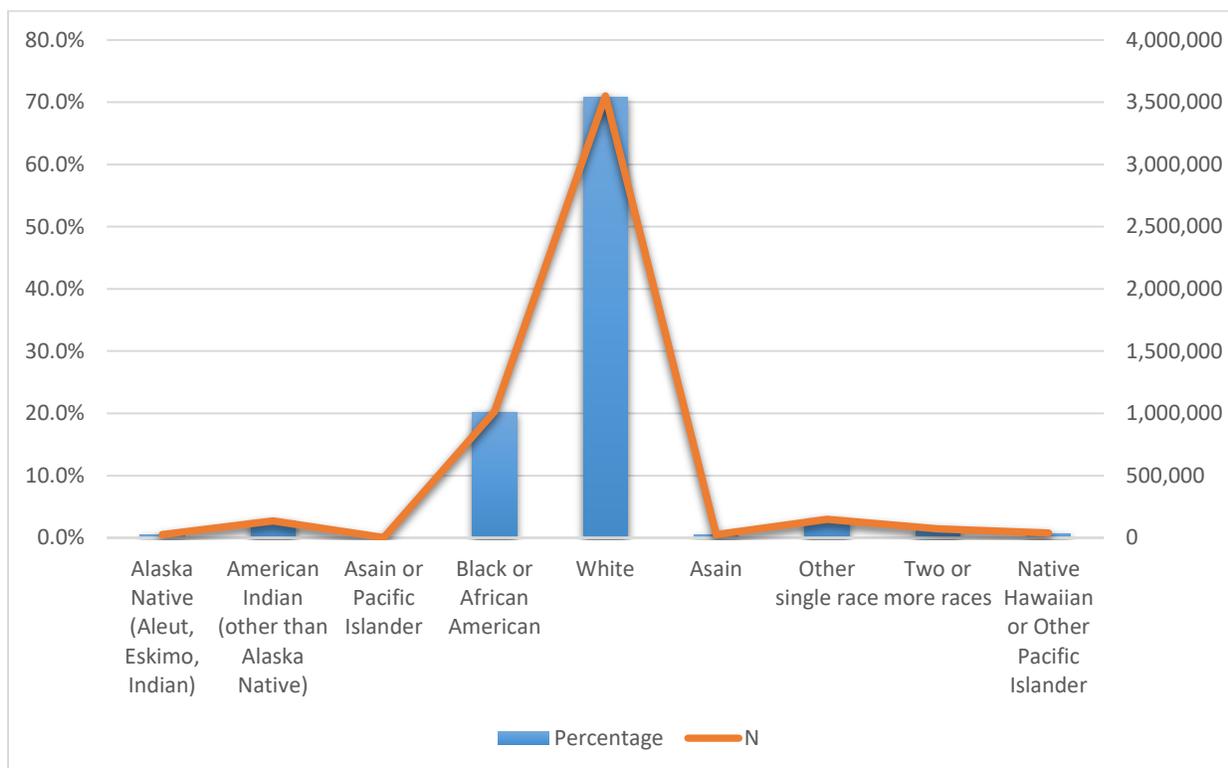
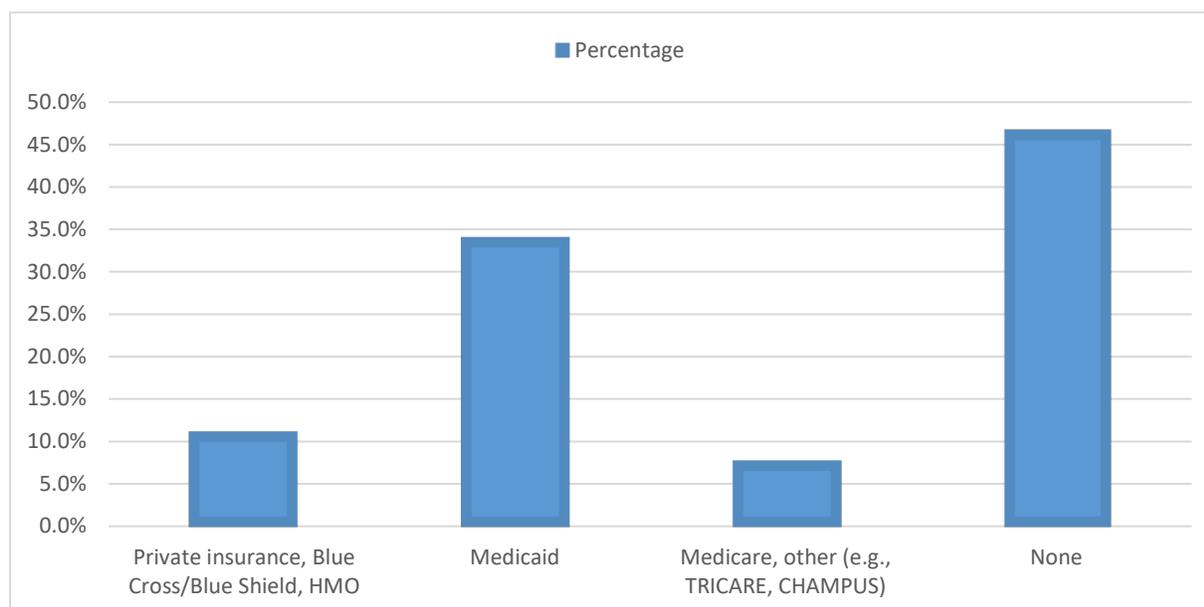


Figure 3 represents the sample size for the insurance of each patient encounter. A majority of the patients in the analysis did not have insurance (46.7%), and those with Medicaid represented 34.1% of the sample size.

Figure 3: Health Insurance



The two variables, (a) outpatient and (b) inpatient, were created using the TEDS-A dataset to distinguish the inpatient admissions from outpatient admissions when doing the analysis. The researcher compares the states that did not adopt the Medicaid expansion to the states that adopted the Medicaid expansion in 2014. The researcher then examines whether states adopting the expansion performed better after the expansion in an outpatient or inpatient capacity. In addition, DAYWAIT is used to create the dependent variable. The researcher uses the information about whether the person is treated on the first day as getting a person into treatment would likely reduce treatment costs. The ONEDAY variable was calculated from DAYWAIT (binned variable) to indicate the number of patients who waited 1 day or less from the request from service until they were admitted into a treatment program, including the first clinical service rendered to the patient. Therefore, ONEDAY was the dependent variable in the linear probability regression model. The DID reveals how the variables differ in the change after ACA Medicaid expansion. The dataset admissions from 38 states who reported the treatment observations. The data were calculated to the applicable observations for each research model in

this study. The encounters that included missing variables were removed from the dataset.

CHAPTER 4

ANALYSIS

Table 1 is a baseline estimate that does not consider anything except the likelihood of being seen on the first day of seeking treatment. For example, it is known that the number of people seeking treatment increased over this time period. It is difficult to determine, however, whether the ACA caused the increase or the general increase in the addiction problem caused the increase. By using the DID method, which controls for time and treatment, the researcher can identify the effect of the ACA Medicaid expansion on the probability of being treated on the first day. What is essential to look at in this table is that the percentage of people being treated on the first day before and after Medicaid expansion decreased from 66% to 35% for inpatient admissions and from 71.8% to 70.8 percent for outpatient admissions.

Table 1: Percentage of Patients Seeking Treatment for Opioid Use Disorder in the Nontreated States and the ACA Expansion States Who Were Admitted on the First Day of Seeking Treatment

	Not Treated			Treated		
Group	Count	Mean	St. Dev.	Count	Mean	St. Dev.
Outpatient	20,690	0.661	0.473	73,079	0.351	0.477
Inpatient	69,460	0.661	0.45	421,734	0.708	0.454

In the first part of this study, the researcher analyzes patient observations for opioid addiction treatments administered in outpatient or inpatient facilities. Then, the researcher estimates the outpatient model as a Linear Probability Model (LPM) for the category of DAYONE. The outpatient model constructed was as follows:

$$DAYONE_{it} = \alpha + \beta_1 * treated + \beta_2 * time + \beta_3 * DID + e$$

where DAYONE is the level of days waiting (1 day or less), treated is the dummy variable for an

ACA state (opted into the Medicaid expansion), time is the year (binary variable that indicates whether the patient began treatment before the Medicaid expansion in 2014), and DID is the interaction between time*treat (difference between the changes in the treatment and control groups before and after the introduction of the Medicaid expansion).

The hypothesis test is based upon the sign of β_3 . For DAYONE, the probability of being treated on the first day was reduced by 14.9 percentage points. The average probability was 72.1% (constant), and treated states were reduced by 14.9, so the probability of receiving opioid treatment is $72.1\% - 14.9\% = 57.2\%$ versus 72.1% for those states without expansion. This evidence is consistent with a capacity constraint.

Table 2: Outpatient & Inpatient Model

ONEDAY	Treated	Time	DID: Treated*Time	Constant
Outpatient Model	-0.004*** (0.002)	-0.026*** (0.005)	-0.149*** (0.006)	0.721*** (0.002)
Inpatient Model	-0.310*** (0.004)	0.011*** (0.009)	0.015*** (0.659)	0.659*** (0.004)

For the inpatient model, the researcher also uses an LPM to estimate the effects on inpatient treatment. The inpatient model was as follows:

$$DAYONE_{it} = \alpha + \beta_1 * treated + \beta_2 * time + \beta_3 * DID + e$$

where DAYONE is the level of days waiting (1 day or less), treated is the dummy variable for an ACA state (opted into the Medicaid expansion), time is the year (binary variable that indicates whether the patient began treatment before the Medicaid expansion in 2014), and DID is the interaction between time*treat (difference between the changes in the treatment and control groups before and after the introduction of the Medicaid expansion).

The hypothesis test was based on the sign of β_3 . For DAYONE, the probability of being

treated on the first day was improved by 1.5 percentage points for inpatient OUD treatment. The average probability was 65.9% (constant), and treated states were increased by 1.5, so the probability of receiving treatment is $65.9\% + 1.5\% = 67.4\%$. Unlike the last model, this could mean that patients seeking inpatient treatment received admissions into inpatient OUD treatment slightly faster after the Medicaid expansion, but the difference, while statistically significant, is relatively small.

Comparing the outpatient and inpatient models suggests the capacity constraint is on outpatient treatment rather than inpatient treatment after the Medicaid expansion. In addition, while the outpatient model demonstrated a decrease in the probability of receiving treatment, the model crucially does not mean that fewer people received care due to Medicaid expansion. As mentioned earlier, one cause of the decrease in the probability could have been a capacity constraint likely caused by an increase in people seeking treatment. The ACA required insurance companies to cover opioid addiction therapy. The Medicaid expansion increased the number of people covered by health insurance, meaning that more people were now eligible than previously to receive treatment covered by insurance. This likely caused the supply constraints, which likely caused the decrease in the probability of people receiving treatment. As Grooms and Ortega (2019) stated in their research study,

In previous decades substance use disorders were not considered a disease which needed extensive treatment; rather, they were considered a choice intertwined with an individual's moral fabric. As we continue to understand better how drug use influences brain chemistry, we must investigate the role adequate access to quality care can play in the long-term treatment of the disease, comorbidities, and social externalities. (p. 190)

To further evaluate OUD treatment, it is best to examine the various method and

locations where patients can be admitted to a program. Most treatment programs for OUD that are outpatient or inpatient use methadone in the treatment counseling for patients to help relieve withdrawal and address cravings. As mentioned earlier in this research study, methadone treatment can include the following medications: buprenorphine, naltrexone, and naloxone.

Patients seeking treatment can enter a program through four possible routes:

1. Inpatient facility with methadone as a form of treatment;
2. Outpatient facility with methadone as a form of treatment;
3. Inpatient facility without methadone as a form of treatment; and
4. Outpatient facility without methadone as a form of treatment.

Table 2 reflects data about the above four forms of treatment and demographic variables such as gender, race, and age on the probability of being treated after expansion. Table 2 represents the impact of a patient waiting to be treated one day or less in both an inpatient model with or without methadone and an outpatient model with or without methadone. In each model below, treated is the dummy variable for a state that opted into the Medicaid expansion. The variable of time is a binary variable, and it specifies whether the patient began treatment before or after the Medicaid expansion in 2014. The difference-in-difference is the difference calculated between the changes in the treatment and control groups before and after introducing the Medicaid expansion.

For Table 3, the DID coefficients in Models 2, 3, and 4 were significant; however, Model 4 showed a decrease of 10.7%, which means that Medicaid expansion could be the cause of capacity constraints regarding patients receiving treatment on Day 1 in outpatient programs with no methadone used in the treatment. Model 3 showed a 16.9 percentage points increase in the probability of being admitted to an inpatient non-methadone treatment program (significant at

the 95% confidence level), and Model 2 showed a 12.1 percentage points increase in the probability of being a treatment for outpatient with methadone being used for treatment (significant at the 95% confidence level). For methadone use treatments with inpatient facilities, expansion had no significant effect, but the DID coefficient was negative, which is also consistent with a possible capacity constraint.

Table 3: Admissions for Day 1 in an Outpatient/Inpatient Facility With or Without Methadone-Based Treatments

	1	2	3	4
	Methadone (Yes), Inpatient	Methadone (Yes), Outpatient	Methadone (No), Inpatient	Methadone (No), Outpatient
Treated	-0.292*** (0.004)	-0.121*** (0.002)	-0.167*** (0.001)	-0.150*** (0.001)
Time	-0.003*** (0.009)	-0.021*** (0.005)	0.053*** (0.002)	0.016*** (0.001)
DID	-0.630 (0.476)	0.121*** (0.036)	0.169*** (0.031)	-0.107*** (0.012)
Observations	93,769	491,194	1,791,972	2,635,766

The next series of tables present data on gender, race, age, insurance, and treatment/service setting. This includes details regarding the impact of the Medicaid expansion on the current sample population. The linear regressions to follow in this analysis were also estimated using the Linear Probability Model.

Table 4 represents the impact Medicaid expansion had on the probability of treatment due to gender differences for both inpatient and outpatient models (with or without methadone). In Model 1, women compared to men were 6.5 percentage points higher (95 percent confidence level) likely to be admitted on Day 1 for treatment. In Models 2, 3, and 4, women were less likely to be seen on Day 1 than men after the enactment of the Medicaid expansion.

Table 4: Admissions (Women) for Day 1

	1	2	3	4
	Methadone (Yes), Inpatient	Methadone (Yes), Outpatient	Methadone (No), Inpatient	Methadone (No), Outpatient
Women	0.065*** (0.014)	-0.005 (0.006)	-0.015*** (0.003)	-0.005* (0.003)

Table 5 represents the impact that the Medicaid expansion had on race regarding for the probability of being treated on Day 1 in a similar set of models. In this table, eight races are represented in each model. This table displays some racial differences, particularly in Model 1; however, there was not much difference in the size of coefficients for Models 1, 2, and 3. The way to interpret the coefficients is to think that this change is relative to the category of White people. Thus, for Model 1, Black or African American individuals were 19.7 percentage points more likely to obtain admission on the first day than White individuals. This should be interpreted carefully, as the underlying population of people seeking treatment is unknown.

Table 5: Probability of Day 1 Admission Change Due Expansion by Race

	1	2	3	4
	Methadone (Yes), Inpatient	Methadone (Yes), Outpatient	Methadone (No), Inpatient	Methadone (No), Outpatient
Alaska Native (Aeut, Eskimo, Indian)	-0.007 (0.235)	-0.178 (0.125)	-0.092*** 0.014	0.064*** (0.014)
American Indian (other than Alaska Native)	0.200 (0.132)	0.179*** (0.048)	0.145*** (0.007)	-0.048*** (0.010)
Asian or Pacific Islander		0.096 (0.148)	-0.034 (0.075)	0.207*** (0.039)
Black or African American	0.197*** (0.020)	0.042*** (0.007)	-0.017*** (0.004)	-0.010*** (0.003)
Asian	-0.062 (0.118)	-0.059 (0.061)	0.010 (0.017)	0.101*** (0.014)
Other single race	0.062 (0.038)	0.141*** (0.018)	-0.021*** (0.007)	0.031*** (0.007)
Two or more races	-0.032 (0.038)	0.050 (0.035)	0.028*** (0.009)	0.093*** (0.010)
Native Hawaiian or Other Pacific Islander	0.047 (0.181)	0.160*** (0.050)	-0.083*** (0.014)	0.092*** (0.011)

Table 6 represents the impact that the Medicaid expansion had on age regarding being treated on Day 1. Table 6 illustrates the significant variability within each model for different ages. For Models 1, the Medicaid expansion had no significant effect for the majority of all age

groups. Model 2, however, shows a significant increase to access in the majority of all the age groups in their likelihood of being admitted for treatment on Day 1 compared to the base (12–14 years of age). Conversely, Model 4 shows a significant decrease in access for the states that adopted the Medicaid expansion. A deeper analysis is needed to explain policy implications for different ages who were impacted by the Medicaid expansion.

Table 6: Probability of Day 1 Admission Change Due Expansion by Age Category

Age	1	2	3	4
	Methadone (Yes) Inpatient	Methadone (Yes) Outpatient	Methadone (No) Inpatient	Methadone (No) Outpatient
15–17	-0.093	-0.155**	0.118***	-0.202***
18–20	-0.084	0.255**	0.021*	-0.057***
21–24	-0.048	0.317***	-0.008	-0.049***
25–29	-0.057	0.311***	-0.007	-0.045***
30–34	-0.073	0.313***	-0.007	-0.045***
35–39	-0.075	0.319***	-0.001	-0.049***
40–44	-0.073	0.319***	0.035***	-0.055***
45–49	-0.107	0.318***	0.049***	-0.039***
50–54	-0.115	0.318***	0.081***	-0.034***
55–64	-0.157	0.306***	0.096***	-0.032***
65 and older	-0.183	0.286***	0.165***	0.003

Table 7 represents the impact that the Medicaid expansion had on health insurance regarding being treated on Day 1 in both an inpatient model with or without methadone and an outpatient model with or without methadone. In Table 7, Medicaid patients were likely to be admitted on Day 1 in Model 1, Medicaid patients would likely be admitted on Day 1 in Model 4, and the uninsured would likely be admitted in Model 4 (compared to the base “private insurance” due to their positive coefficients). In addition, Models 2, 3, and 4, showed significance in the coefficients; however, the negative numbers showed that there could have been some capacity restraints with insurance carriers for the states that adopted the Medicaid expansion.

Table 7: Probability of Day 1 Admission Change Due Expansion by Type of Insurance

	1	2	3	4
	Methadone (Yes), Inpatient	Methadone (Yes), Outpatient	Methadone (No), Inpatient	Methadone (No), Outpatient
Medicaid	0.046** (0.022)	-0.279*** (0.009)	-0.134*** (0.004)	-0.143*** (0.004)
Medicare (Tricare, Champus)	-0.007 (0.030)	-0.227*** (0.013)	-0.280*** (0.005)	0.010* (0.005)
Uninsured	-0.210*** (0.025)	-0.032*** (0.009)	-0.096*** (0.004)	0.103*** (0.004)

In Table 8, the researcher examines the type of service provided before and after ACA Medicaid expansion. The coefficients in Rehab/residential, hospital non-detox in Model 3, ambulatory, nonintensive outpatient in Model 3, and ambulatory, detox in Model 2 all showed that patients are most likely to be admitted at 1 day or less compared to the base (Detox, 24 hours, hospital inpatient). Model 1 and 2 showed significance; however, the coefficient was negative, consistent with a possible capacity constraint.

Table 8: Probability of Day 1 Admission Change Due Expansion by Type of Service Provided

	1	2	3	4
	Methadone (Yes), Inpatient	Methadone (Yes), Outpatient	Methadone (No), Inpatient	Methadone (No), Outpatient
Detox, 24-hour, free standing residential	-0.807*** (0.105)		-0.236*** (0.011)	
Rehab/residential, hospital non detox	-0.210*** (0.299)		0.179*** (0.042)	
Rehab/residential, short term (30 days or fewer)	-0.584*** (0.105)		-0.355*** (0.011)	
Rehab/residential, long term (more than 30 days)	-0.734*** (0.106)		-0.382*** (0.011)	
Ambulatory, non intensive outpatient		-0.183*** (0.012)		0.001*** (0.003)
Ambulatory, detoxification		0.075*** (0.023)		-0.081*** (0.025)

Discussion

The aim of this study is to determine (a) whether the likelihood of delay in obtaining treatment (if there is a delay) for opioid-related treatment in states that adopted Medicaid Expansion different than from states that did not and (b) whether the likelihood of delay different for the inpatient than for outpatient patients seeking opioid treatment. Several themes emerged from the results based on this chapter. That is, the ACA significantly and statistically affects the probability of an individual receiving treatment. Moreover, the probability of getting treatment

on DAYONE decreased after the Medicaid expansion. This finding is primarily consistent throughout the outpatient and inpatient models, indicating that patients seeking inpatient care with methadone used for treatment for waiting times up to one day or less were faced with a significant supply of treatment constraints after Medicaid expansion. One observation to consider is that there are substantial capacity constraints placed on outpatient treatment compared to inpatient treatment after the Medicaid expansion. Further research is needed to confirm this finding. In the remainder of this chapter, the researcher summarizes the study and discusses theoretical and practical implications based on this study's results. The researcher also provides the study limitations and recommendations for future research, followed by a series of conclusions.

Theoretical and Practical Implications of the Results

This study suggests that Medicaid expansion did cause a statistically significant change in the overall probability of receiving treatment; however, the findings are not sufficient to conclude that fewer people received care due to the Medicaid expansion. This is because other mechanisms, such as a capacity constraint, may be present due to an increase in people seeking treatment or other supply limitations. In addition, the Medicaid expansion increased the number of people who were covered by health insurance.

According to the literature, those with opioid abuse disorder who enroll in Medicaid are mostly low-income individuals with limited access to credit (Wen et al., 2020). Further, non-Medicaid expansion states may find this study's findings beneficial, providing additional information concerning the difficulties in expanding Medicaid (Wen et al., 2020). Providing necessary treatment for OUD patients through healthcare policies and increased funding could help increase the quality of life of these patients and decrease the increasing number of opioid overdose deaths in the United States (CDC, 2018).

Recommendations

One policy implication that could have an immediate impact if implemented in reducing treatment delays for OUD patients is eliminating prior authorization for medications to treat OUD (i.e., Medicaid insurance regulation) for outpatient and inpatient opioid use disorder treatment facilities. Some states still require OUD patients covered by Medicaid to receive a prior authorization on MAT medications. Ferries et al. (2021) stated that

more than 30% of Medicare beneficiaries and 40% of patients dually eligible for Medicare and Medicaid use opioids. With an estimated 8–12% of patients developing an opioid use disorder after initiating opioids, opioid misuse is a significant public health challenge, especially among high-risk Medicare populations. (p. 1)

In many instances, prior authorization can take several days for a patient to receive approval for treatment or medication. The Centers for Medicare & Medicaid Services (n.d.) stated that “a prior authorization requires a provider or supplier to submit a prior authorization request (p. 1). The supplier or the supplier must receive the decision of approval before services are rendered. In addition, “the provider or the supplier must submit the prior authorization request with all support medical documentation for provisional affirmation of coverage for the item or service to their Medicare Administrator Contractor” (Centers for Medicare & Medicaid Services, n.d., p. 1). In the final phase of the request, the support medical documentation and the request for services are reviewed, and CMS provides the provider or supplier with the affirmed or nonaffirmed decision. The purpose of the prior authorization is to control cost management, avoid duplication of services, and monitor a patient’s treatment effectiveness. By removing the Medicaid requirement for prior authorization, referring physicians can send patients to MATs without the delays of receiving approval.

On December 23, 2021, The State of New York Governor Kathy Hochul signed a bill

that eliminated prior authorizations for MAT. Senator Pete Harckham of New York stated, “Governor Hochul’s signing of this bill is a major step forward to saving lives and a huge step forward towards addressing inequities in our healthcare system that Substance Use Disorder patients on Medicaid face” (Harckham, 2021, p. 1). In addition, Assemblymember Linda B. Rosenthal, who introduced the bill, stated,

New York State experienced the deadliest year on record for preventable overdose deaths in 2020.... Stemming the tide on the overdose crisis will require bold measures that increase access to medication-assisted treatment, such as this legislation to end prior authorizations on MAT drugs for people covered by Medicaid. (Harckham, 2021, p. 2)

A study published in 2019 by RTI International found that “New York will save nearly 600 lives and over \$50 million a year in hospitalization and treatment by removing prior authorization on MAT for residents with Medicaid” (Harckham, 2021, p. 3). By eliminating prior authorization for Medicaid patients who needs OUD treatment, it is possible to reduce MAT delays throughout the United States and provide easy access to timely treatment.

In addition, a targeted approach with continuing with the emergency order to reimburse telehealth opioid use disorder services will help with outpatient and inpatient capacity. Due the 2019 pandemic, The Centers for Medicare and Medicaid Services has extended the SUPPORT Act which supports reimbursement for opioid use disorder via telehealth services. Prior to the 2019 pandemic, restrictions on geographic locations were placed on telehealth services which did not allow medical providers to bill for treatment services. The new rule for telehealth services should continue until the opioid epidemic is no located a national health emergency.

Study Limitations

This study has several limitations to consider. First, the Treatment Episode Data Sets (TEDS) data are reported differently by each state. The reporting variances among states are

licensure, certification, accreditation, and disbursement of public funds. For example, state prisons and local jails may be reported by some states while others do not. It was also impossible to determine which states and subpopulation groups are most impacted by the Medicaid expansion and isolate the probability of receiving treatment per subpopulation group.

Furthermore, an internal validity threat to this research can be the regression effects. Although DID was the most favorable technique for this study, it is essential to consider the opportunity for user error when programming.

A potential threat to this study's research design is related to the varying history and impact of the opioid crisis from state to state. For example, if a state experienced a historical event related to a natural or manufactured disaster, the state's population could affect access to opioid treatment. Unfortunately, the researcher cannot rule out that another change in local policy or the local environment could coincide with the Medicaid expansion, influencing a state having a worse opioid crisis versus another.

Conclusions

In this study, the researcher explores Medicaid expansion under the ACA to determine whether treatment delays were associated with the opioid treatments for the states adopting Medicaid expansions versus the non-adopters. The TEDS admissions dataset from 2010 to 2014 was used. The significant findings suggest the existence of a capacity constraint in Opioid treatments in adopting states. Specifically, there was a reduction in the probability of admission on the first day for those adopting states relative to non-adopters after the Medicaid expansion. Overall, it takes longer for patients to get into opioid treatment centers as the demand for treatment increases.

This study represents only the beginning of investigation regarding the ACA's Medicaid expansion and the probability of patients receiving treatment after the Medicaid expansion.

There is much more to investigate other states before and after the Medicaid expansion regarding opioid treatment beyond the 2010 to 2014 timeframe. Nonetheless, this study resulted in conclusive empirical evidence that the ACA has affected the probability of an individual receiving inpatient treatment. Furthermore, given that the Medicaid expansion aims to expand the number of people with insurance, the demand for services related to substance abuse treatment may continue to increase (Kuhn, 2017). Dr. Ian Wittman, Chief of Service and Clinical Associate Professor at an academic medical center in Brooklyn, New York, stated the following:

Every day in every emergency department around the country, we continue to see the same story. People have become addicted to opioids and have no lack of ability to procure drugs, but there is a severe lack of infrastructure to meet their drug treatment needs. We have made strides over the last decade in addressing this crisis. Still, many emergency departments don't have the resources to enact these strategies, and many communities fully have woefully underfunded outpatient resources to continue care. Until we, as a society, better address the drivers of addiction (poverty, mental health, overprescribing of opioids, among others) and invest in a comprehensive strategy to combat the epidemic, we will continue to see our citizens die avoidable deaths and watch as their losses ripple through our society as no one dies of opioid use alone. Every loss leaves a hole we cannot fill. How long will we allow this to go on? (Dr. Ian Wittman, personal communication, March 26, 2022)

During the peak of the coronavirus pandemic in the United States, many barriers to care were moveable to combat the health crisis. It may be possible to do the same thing for the opioid crisis. In the United States, during the early surges of the coronavirus, field hospitals were built out of convention centers and hotels were turned into a "safe haven" for people who did not have

anywhere to stay. In addition, various regulations in healthcare were relaxed to address a public health crisis, such as telehealth or other components of care. Many states can use the lessons learned from their coronavirus response to reduce OUD treatment delays.

CHAPTER 5

INTRODUCTION TO STUDY 2

Introduction

The ACA was signed into law in 2010 (Blumenthal et al., 2015), providing millions of previously uninsured Americans with access to medical insurance coverage. By 2015, an additional 30 million Americans had medical insurance due to the provisions of the ACA (Blumenthal et al., 2015). In addition, Medicaid expansions were offered to all U.S. states in 2014, with 38 states adopting the expansions (Centers for Medicare & Medicaid Services, n.d.). Following the launch of the ACA and the introduction of Medicaid expansions, larger numbers of people with healthcare coverage and people seeking help for SUD led to increased costs for insurance providers and healthcare providers and increased demand for medications used in the treatment of SUD, specifically OUD.

In the first part of this two-part study, the researcher focuses on examining the delivery system of access to care for treatment of OUD after the launch of the ACA and the expansion of Medicaid, comparing access in U.S. states that chose to adopt Medicaid expansions to those states that did not adopt the expansions. This exploration was aligned with the assertion of Blumenthal et al. (2015) that the effectiveness of the ACA is based on three elements of healthcare: (a) access to care, (b) cost of care, and (c) quality of care. This second part of the study focused on the quality of care in terms of lengths of stays by patients in medical rehabilitation facilities or outpatient programs to treat OUD. Dr. Melanie Raffoul, Chief of Service for Emergency Medical Observation at an academic hospital in New York City, stated, "Society creates a stigma among patients who receive OUD treatment. This can negatively affect a patient receiving OUD treatment length of stay in a program, create communication barriers

between physician and patient, and lead to poor health outcomes” (Dr. Melanie Raffoul, personal communication, March 2, 2022).

Background

In the second part of this study, the researcher examines the possible impacts of lengths of stay by OUD patients in hospitals and treatment programs and length of stay variables in U.S. states that adopted the Medicaid expansions versus states that did not. The researcher considers changes to the U.S. healthcare system brought about by the ACA and Medicaid expansion. Increased access to OUD treatment programs was made available to patients under the ACA (Kennedy-Stewart, 2016), and under the ACA, the costs of OUD treatments are covered by private and public insurance plans. After the Medicaid expansions, treatments were available to low-income individuals who had previously been excluded from such programs due to their lack of medical insurance and inability to pay out-of-pocket. One of the specific aims of the Medicaid expansion under the ACA was to expand the coverage available to significant numbers of low-income citizens (Wen et al., 2020). There are two primary benefits of the ACA and Medicaid expansion in terms of OUD treatment. One is an increase in Medicaid spending among the states hardest hit by the opioid crisis. The other is increased access to medications used for opioid agonist therapy (OAT) by rehabilitation facilities and treatment centers.

In the late 1990s, the healthcare industry saw a significant increase in opioids prescribed for pain management based on claims by pharmaceutical companies that patients would not become addicted (U.S. Department of Health and Human Services, 2019). By 2017, the misuse of prescription opioid drugs was declared a public health emergency by the U.S. Department of Health and Human Services. The growth of use and misuse of opioids correlated with growth in the numbers of overdoses and deaths from opioid misuse (CDC, 2018). In 2017, approximately 130 Americans died from opioid overdoses each day. The costs to individuals and families have

not been sufficiently studied, but the economic impact on organizations has been significant, with costs to companies that have addicted employees rising to approximately \$10 billion annually (Kuhn, 2017). Over the past 20 years, fatalities from opioid overdoses have amounted to roughly 400,000 deaths and annual hospital costs of \$11 billion nationally (Wen et al., 2020). Future research should focus on the costs of opioid addiction to individuals and families.

The launch of the ACA and the expansion of Medicaid added millions to the number of Americans with medical insurance, including an estimated 1.6 million persons with SUD who are now receiving health benefits under the Medicaid expansion (Grogan et al., 2016). Medicaid offers coverage for a variety of SUD treatment programs, including inpatient and outpatient plans with or without pharmacological intervention in the form of OAT. The three substances primarily used in OAT programs are methadone, buprenorphine, and naltrexone (Wen et al., 2020). The use of these prescribed substances in OAT programs has led to fewer opioid overdoses and higher survival rates (SAMHSA, 2015). In addition, Medicaid expansions were associated with increased prescriptions for these OAT substances, including a 70% increase in the use of prescribed buprenorphine in 2014 (Wen et al., 2020). While it can be deduced that higher numbers of new Medicaid enrollees treated with OAT substances correlate with significant increases in Medicaid spending on medications and on healthcare professionals who provide OAT treatments, there has been little research on the impact upon patients' lengths of stay in inpatient or outpatient programs in states that adopted the Medicaid expansions versus states that did not.

The problem that the researcher addresses here is whether the length of stay for OUD treatment is significantly different in states that adopted Medicaid expansion versus states that did not. The costs of OUD treatment programs taken on by governments, organizations, and

individuals were also examined. The researcher compares lengths of stay in states that did and did not adopt the ACAE Medicaid Expansion.

CHAPTER 6

LITERATURE REVIEW AND OBJECTIVE

Literature Review

In conducting the literature review for this second part of the current study, the researcher focuses on Medicaid expansion under the ACA, OUD, OUD treatments, OUD treatment costs, estimated costs of not treating OUD, and degrees of successful completion outcomes in OUD treatment programs. These elements of the study were examined regarding costs and successes in U.S. states that adopted Medicaid expansions versus states that did not adopt the expansions. The results of this second part of the study added to the body of knowledge regarding the costs and efficiencies of OUD treatment programs under the ACA and Medicaid expansions. In addition, the researcher specifically attempts to provide new information regarding the impact of lengths of stay on OUD treatment programs in different states.

The Medicaid expansions that were started in 2014 have led to an overall increase in the number of OUD treatment programs. The data from some states have shown that Medicaid enrollees with OUD had increased access to healthcare services, prescription medications used in OAT programs, and mental healthcare services (Ohio Department of Medicaid, 2017). The significant growth in numbers of OUD patients has been traced back to the mid-1990s and Purdue Pharmaceutical's promotion of its opioid OxyContin pharmaceutical product for the management of pain, along with the company's claims that the product was not addictive (Kolodny et al., 2015). Furthermore, Purdue funded over 20,000 educational programs promoting opioid use as a treatment for chronic pain (Kolodny et al., 2015). Multiple researchers reported that this promotion and use of prescription OxyContin was a primary factor in the current epidemic of opioid misuse (Barnett et al., 2017; Kolodny et al., 2015; Rosner et al.,

2019). While the costs of treatment for OUD were significant, making them unavailable to most uninsured individuals, the launch of the ACA and the optional Medicaid expansions appear to have added to the numbers of OUD patients through increases in access to care and to medication (Saloner et al., 2018).

Beletsky (2018) reported that the current opioid misuse and overdose epidemic could be reversed through OUD treatment. OAT programs involving the use of methadone, buprenorphine, or naloxone are seen as the most effective OUD treatment practice. These prescription medications are used to control cravings and withdrawal symptoms and to stabilize the patient undergoing treatment (Beletsky, 2018), and all three drugs were found to be effective during clinical trials (Sharma et al., 2017). The positive impact of the use of these OAT medications is based on a long-term commitment to treatment, meaning that OUD patients who leave programs early or are discharged early may experience lower levels of program effectiveness and be more likely to relapse into opioid misuse and possible overdose.

There has been little research on the impacts of lengths of stay in treatment programs among states that adopted Medicaid expansions versus those that did not, but scholars have reported that following the Medicaid expansions, the number of OAT programs for OUD patients increased more in states that adopted the expansions than in non-adopting states (Mojtabai et al., 2019). In those states that adopted Medicaid expansions, there has been a higher likelihood that OUD patients will receive OAT treatment (Andrews & Humphreys, 2019), but the increased numbers could lead to treatment gaps when all treatment facilities are occupied to capacity (Sharma et al., 2017). This could impact the number of patients encouraged to leave treatment programs early. It could also lead to increased costs when facilities are stretched too thin and OAT medication supplies are limited; nevertheless, the offering of programs to manage

OUD is clearly beneficial. The opioid crisis claimed approximately 47,000 lives in 2017 from overdose (Santos et al., 2021) and has strained treatment systems (Morgan et al., 2020). In addition, the increased numbers of insured patients following the launch of the ACA and the introduction of Medicaid expansions have further strained an already-burdened system. Higher levels of hospital discharges documenting OUD were reported after introducing the ACA and its Medicaid expansion with the discharge rate for any type of hospital-based opioid overdose treatment over three times higher in 2016 than in 1993 (Peterson, Xu et al., 2019).

A 36% increase in OUD patients seeking treatment was seen under the ACA and Medicaid expansions (Saloner et al., 2019), including significant growth in the numbers of patients in intensive outpatient treatment programs for OUD. The number of these patients covered by Medicaid increased dramatically with the expansions, and states that adopted Medicaid expansions saw an increase in coverage of 23% compared to non-adopting states. Prices for buprenorphine initially rose with the increased demand (Roberts et al., 2018), but the use of generic alternative OAT medications decreased costs. In 2015, the out-of-pocket costs for a private patient's 30-day supply of generic OAT medications was \$10 per tablet (Roberts et al., 2018).

Other costs associated with the increase in OAT programs following the Medicaid expansions include the expense of required training for practitioners in the administration of OAT medications (Sharma et al., 2017). The costs to government Medicaid providers and private healthcare practitioners are minor, however, when compared to the public and private costs of non-treatment. The National Institute on Drug Abuse reports that the nation's costs for untreated OUD can reach \$78 billion, including "criminal justice, medical costs associated with babies born dependent on opioids, medical treatment for overdoses, injuries associated with

intoxication, increased risk of infectious diseases, and lost productivity" (National Institute on Drug Abuse, 2018, p. 21). There have been multiple studies of the expenses associated with OUD and its treatment, but few of those studies have touched on variables in effectiveness based on lengths of stay, nor have they sufficiently compared the impacts of lengths of stay in U.S. states that adopted Medicaid expansions versus states that did not.

In existing literature regarding the treatment of OUD patients, researchers warned that traditional outcome metrics such as treatment completion might overlook the benefits of reduction in use to the patient's overall health (Pro et al., 2020). Comparing the impact of program completion and lengths of stay can provide beneficial information. The completion of OUD treatment programs correlates with the improved effectiveness of the programs, especially in programs that include OAT medications. Improved treatment benefits for OUD patients in methadone treatment programs have also been associated with longer lengths of stay (Flynn et al., 2002). Significantly better outcomes were reported by OUD patients with longer retention in long-term residential programs and in outpatient methadone treatment than OUD patients with shorter lengths of stay (Simpson et al., 1997). There are multiple reasons why some OUD patients have experienced shorter stays or have not completed treatment programs. From January to September of 2016, more than 63% of OUD patients receiving inpatient treatment were routinely discharged upon completion of the treatment program, while 16% were transferred to another medical institution, 9% were discharged to home health care, 8% were discharged against medical advice, and 4% died in the hospital (Peterson, Liu et al., 2019).

The number of OUD discharges against medical advice is higher in groups of OUD patients who did not receive OAT or who received lower doses of OAT medications (Santos et al., 2021). OUD patients in treatment programs who are prematurely discharged from a hospital

or treatment center against medical advice have a higher risk of mortality and an increased likelihood of being readmitted (Santos et al., 2021). OUD patients who undergo short-term inpatient treatment demonstrate a high relapse rate, primarily when OAT medications are not provided following the inpatient treatment (Nunes et al., 2017). OUD patients in outpatient settings who received OAT medications had more than four times higher odds of decreasing opioid use than those who did not receive OAT (Pro et al., 2020), with variables accounted for by factors such as ethnicity and gender.

Previous studies have found that for people with OUD, the co-use of substances such as alcohol, benzodiazepines, cocaine, or methamphetamines negatively impacts their completion of OUD treatment in a residential or inpatient setting (Ware et al., 2021). For example, over 51% of OUD patients co-using alcohol, benzodiazepines, cocaine, or methamphetamines were prematurely discharged from treatment, with adults who co-use opioids and methamphetamines having the lowest odds of completing treatment (Ware et al., 2021). While these co-users of opioids and methamphetamines have the highest proportion of not completing treatment, they also have the longest number of days in treatment (Ware et al., 2021).

There is evidence that the notion that the costs of providing OUD treatment and OAT medications outweigh the costs of declining to do so, and the treatments are seen as being more effective when lengths of stay are longer. Outpatient SUD detoxification and rehabilitation is seen to have a higher benefit-cost ratio than inpatient options (Peterson, Xu et al., 2019), and longer-term methadone treatments for OUD patients have resulted in positive monetary returns (Flynn et al., 2002). The estimated costs for OUD and fatal opioid overdose reached over \$1 trillion in 2017 (Florence et al., 2017). For individual OUD patients, the results of OAT, including medications such as methadone, buprenorphine, or naltrexone, compared with no such

treatment, yielded savings of \$25,000 to \$105,000 in lifetime costs per person when medical costs and job loss costs were combined with criminal justice costs (Fairley et al., 2021). These costs should be assessed alongside the cost of human life in economic terms. While difficult to quantify, many scholars have attempted to do so, resulting in a basic sense of a monetary value of a statistical life (VSL). In the systematic review by Keller et al. (2021), the authors sampled 120 studies considered to be of sufficiently high quality. Their analysis revealed a median VSL of \$5.7 million in 2019 U.S. dollars. These authors noted wide variance in VSLs calculated by individual studies, resulting largely from the context to which VSL was applied. Regardless, the costs of declining to provide OUD treatment and OAT medications are staggering, in both individual and organizational terms.

Objective

The objective of this study is to explore the Medicaid expansion under the ACA to determine whether patients receiving opioid-related treatment are staying longer in the U.S. states that adopted the Medicaid expansions versus the states that did not. The following general research question is posed:

RQ2: Is the likelihood of patients staying longer for opioid-related treatment in states that adopted Medicaid Expansion different from non-adopters?

Hypothesis

Given the purpose of the study and insights gained from existing literature, the following hypothesis was formulated:

H2: The Medicaid expansion has no effect on the length of stay (LOS).

CHAPTER 7

METHODOLOGY

Methods

To investigate and analyze the hypothesis presented in the previous chapter, the researcher uses an econometric research design to test the hypothesis utilizing the DID technique, as in Study 1. This is a natural experiment because the intervention was the optional Medicaid expansion under the ACA. The goal is to determine whether the ACA impacted patients staying in treatment longer for the states that adopted the Medicaid expansion versus the non-adopters. In addition, several logistic regression models were used with the difference and difference technique to determine the length of stay for the treatment episodes.

Description of Data

In the first part of the current study, the researcher explores information about access found in the dataset TEDS-A for U.S. states that accepted Medicaid expansion versus states that did not expand Medicaid. In the second part of the study, the researcher uses information about discharges found in the dataset TEDS-D for U.S. states that accepted Medicaid expansion versus those that did not. The TEDS-D dataset focuses on discharges from treatment programs or lengths of stay, as opposed to the TEDS-A dataset, which focuses on patient access to care. Both datasets are the SAMHSA and a National Survey of Substance Abuse Treatment Services conducted by the SAMHSA.

The TEDS-D dataset used in this second part of the study consists of patient encounters with applicable providers. For the purposes of this second part of the study, Puerto Rico was excluded from the dataset, as were medical providers or treatment centers that do not accept public funding. The timeframe for the records of the TEDS discharges in this dataset covers the

period from 2010 to 2017. The TEDS-D dataset also provided the information needed to take a deeper dive regarding the reasons for discharge (e.g., completed treatment, left against medical/professional advice, terminated by facility).

Sample

The TEDS-D dataset reflects patient episodes or encounters with providers who accept public funding for treatment for substance abuse in the United States. The data used in this study were from the 2010–2017 TEDS-D dataset. The states include those that adopted the Medicaid expansion in 2014, and those states that did not adopt in 2014 or never adopted the Medicaid expansion up to 2017. The data did not include District of Columbia or Puerto Rico. Similar to Study 1, the number and characteristics of institutions that do not accept public funding were not included in this dataset. The variables in this analysis were as follows:

- Length of stay for a patient's treatment (NewLOS)
- Planned medication-assisted opioid therapy (NewMETHUSE)
- Service setting at discharge (NewSERVSETD)
- Biologic sex (NewGENDER)
- Race (NewRACE)
- Ambulatory services / doesn't require hospitalization (OUTPATIENT)
- Staying overnight in a treatment center (INPATIENT)
- Age at admission (NewAGE)
- Health insurance at admission (NewHLTHINS)

Figure 4 illustrates the percentage of the age range for the observations in the analysis. Similar to the sample in Study 1, most of the patients in this analysis were 25–29 years old (17.6%). Patients aged 12–14 years old and 65 years and older were represented at .9% in this

analysis.

Figure 4: Age (TEDS-D)

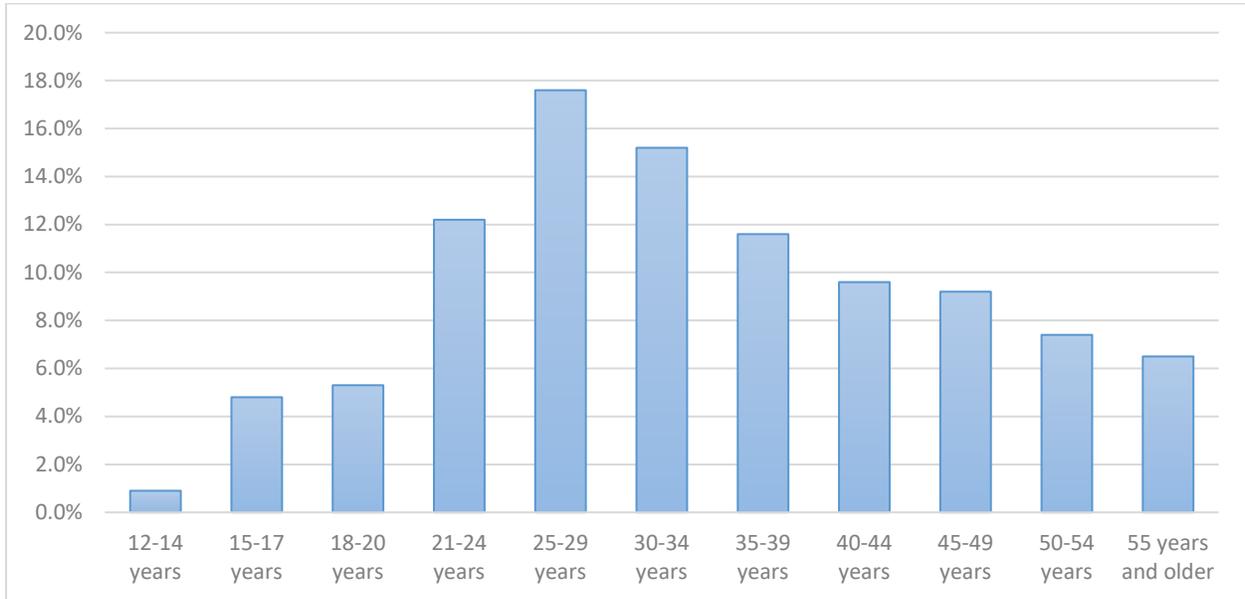


Figure 5 represents the breakdown of the race for the observations in the analysis. Similar to Study 1, a majority of the patients in the analysis were White (74.5%), while African American/Black patients were 16.3% of the sample size. Alaska Native (Aleut, Eskimo, Indian) and Asian patients were least represented at 0.4%.

Figure 5: Race (TEDS-D)

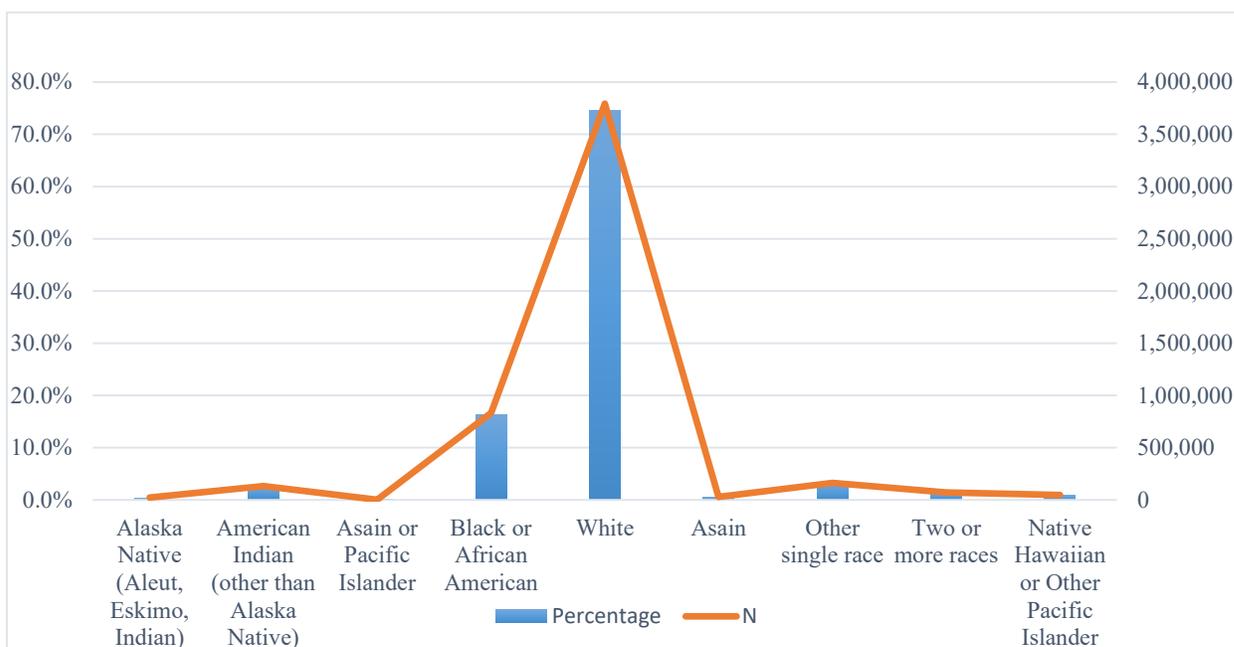
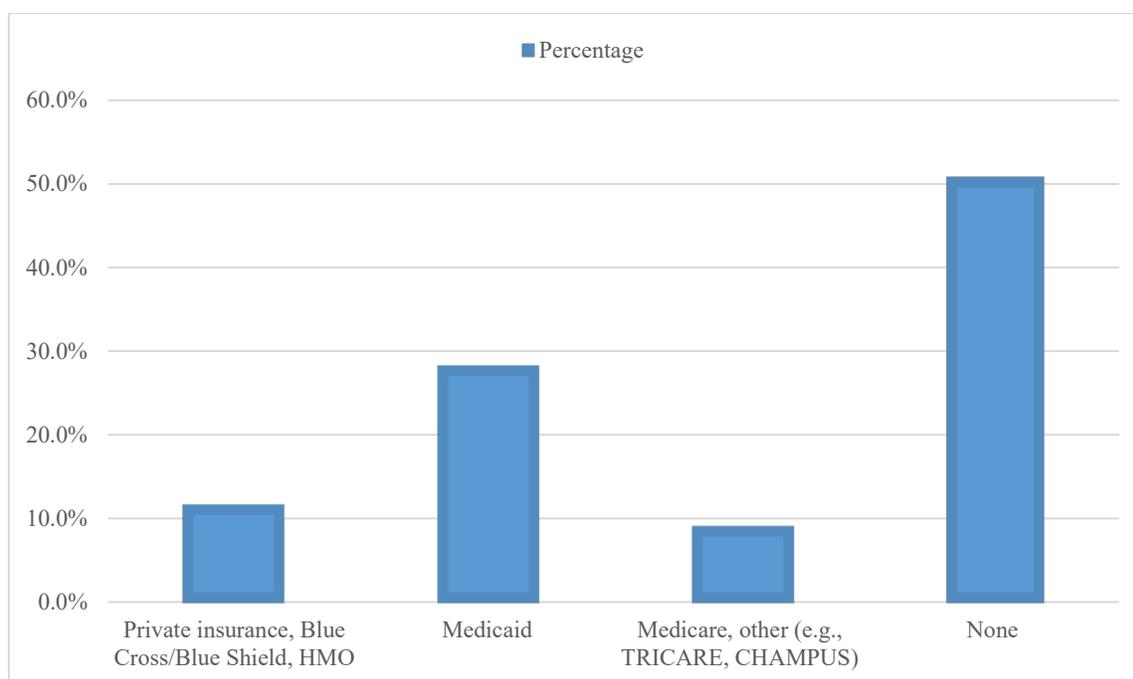


Figure 6 represents the sample size for the insurance of each patient encounter. Also similar to Study 1, most of the patients in the analysis did not have insurance (50.7%). Those on Medicaid represented 28.3% of the sample.

Figure 6: Health Insurance (TEDS-D)



CHAPTER 8

ANALYSIS

Table 9 shows the baseline length of stay from admission to discharge. The baseline suggests that the length of stay is lower in treated states by about one day for inpatients but higher by about 10 days for outpatients. Again, the researcher does not control for any other effect.

Table 9: Length of Stay in Days of Patients Seeking Treatment for Opioid Use Disorder in the Non-treated States and the ACA Medicaid Expansion States

Group	Not Treated			Treated		
	Count	Mean	St. Dev.	Count	Mean	St. Dev.
Outpatient	11,782	17.6	39.6	39,108	16.5	41
Inpatient	28,133	155	134	114,051	165	146

In the first analysis, patient discharges for opioid addiction treatments administered in an outpatient or an inpatient facility is examined. The researcher estimates the outpatient model as a Duration Model for the treatment time (LOS category). The outpatient model formula was:

$$\text{Log}(LOS)_{it} = \alpha + \beta_1 * \text{treated} + \beta_2 * \text{time} + \beta_3 * \text{DID} + e$$

where Log LOS (the log of the number of days) is the number of days (1 day to 365 days or more), treated is the dummy variable for an ACA state (opted into the Medicaid expansion), time is the year (the binary variable that indicates whether the patient began treatment before the Medicaid expansion in 2014), and DID is the interaction between time*treat (difference between the changes in the treatment and control groups before and after the introduction of the Medicaid expansion in 2014).

Table 10: Outpatient & Inpatient Model for Length of Stay

Length of Stay	Treated	Time	DID = Treated*Time	Constant
Outpatient Model	-1.188*** (0.014)	-0.184*** (0.023)	0.630*** (0.028)	1.951*** (0.013)
Inpatient Model	-0.142*** (0.014)	0.036 (0.027)	0.614*** (0.030)	4.376*** (0.013)

This hypothesis test is based upon the size and sign of β_3 . The length of stay for outpatient treatment centers increased after expansion adoption by 63% which equates to approximately 7 days. This means that patients were more likely to stay longer in outpatient treatment after the Medicaid expansion. A possible explanation for this is that patients were financially able to stay in treatment longer because they had Medicaid.

For the inpatient model, the researcher estimates model similar to the inpatient except for the length of stay is for outpatient facilities. The hypothesis test is based upon the size and sign of β_3 . Inpatient treatment center LOS increases due to the ACA Medicaid expansion by 61.4% which is about to 80 days. This means that patients were more likely to stay longer in inpatient treatment after the Medicaid expansion.

Next, the researcher examines the four forms of treatment (inpatient facility with methadone, inpatient facility without methadone, outpatient facility with methadone, and outpatient facility without methadone) and the duration of time in treatment before and after Medicaid expansion. Table 11 represents the impact of length of stay in treatment for inpatient models with or without methadone and for outpatient models with or without methadone. In each model below, treated is the dummy variable for a state that opted into the Medicaid expansion. The variable of time is a binary variable describing whether the patient began treatment before or after the Medicaid expansion in 2014. The DID is the difference calculated between the changes

in the treatment and control groups before and after introducing the Medicaid expansion.

For Table 11, the DID coefficients in Models 2 and 4 were significant. Model 2 showed an increase of 39.6%, and Model 4 showed an increase of 28.6%, meaning that Medicaid expansion is the cause of the increased length of stay in outpatient treatment centers, whether methadone is used as a treatment or not. However, Medicaid expansion did not significantly affect the length of stay in inpatient treatment facilities, irrespective of the use of methadone as a treatment.

Table 11: Admissions for LOS in an Outpatient/Inpatient Facility With or Without Methadone-Based Treatments

	1	2	3	4
	Methadone (Yes), Inpatient	Methadone (Yes), Outpatient	Methadone (No), Inpatient	Methadone (No), Outpatient
Treated	0.105*** (0.011)	-0.370*** (0.015)	-0.038*** (0.002)	-0.571*** (0.003)
Time	0.039** (0.017)	0.064** (0.026)	-0.001 (0.004)	0.087*** (0.004)
DID	1.139 (0.904)	0.396*** (0.082)	0.093 (0.068)	0.286*** (0.033)
Observations	50,890	142,184	1,271,774	1,946,314

The next series of tables illustrate the relationships between LOS and demographic variables such as gender, race, age, insurance, and treatment/service setting. The tables include details regarding the impact of the Medicaid expansion on the sample population. All of the regressions in this analysis were estimated using the model described in Table 11.

Table 12 represents the Medicaid expansion's impact on gender regarding the length of stay in both an inpatient model with or without methadone and an outpatient model with or without methadone. Again, Models 1, 2, and 4 were significant. In Model 1, women were 14.9% more likely to stay longer in inpatient treatment centers that use methadone than men. In Model

2, women were 11.7% more likely to stay longer in outpatient treatment facilities that offer methadone than men after the enactment of the Medicaid expansion. Finally, women were 20% less likely to stay longer than men in outpatient treatment facilities that do not offer methadone.

Table 12: DID Coefficient for Discharges (Women) for Length of Stay

	1	2	3	4
	Methadone (Yes), Inpatient	Methadone (Yes), Outpatient	Methadone (No), Inpatient	Methadone (No), Outpatient
Women	0.149*** (0.032)	0.117*** (0.027)	0.006 (0.009)	-0.200*** (0.008)

Table 13 represents the Medicaid expansion's impact on race regarding the length of stay in both inpatient models with or without methadone and outpatient models with or without methadone. In this table, there are eight race categories represented in each model. According to the results of the analysis, each model reveals some racial differences. Therefore, each coefficient for race categories should be interpreted as more (denoted by a positive number) or less (denoted by a negative number) likely to stay in treatment longer compared to White patients. For instance, for inpatient treatment with methadone, Black people are 63.5% more likely to stay in treatment longer compared to White people. Only coefficients with asterisks are significant.

Table 13: DID Coefficient for LOS for Discharges by Race

	1	2	3	4
	Methadone (Yes), Inpatient	Methadone (Yes), Outpatient	Methadone (No), Inpatient	Methadone (No), Outpatient
Alaska Native (Aeut, Eskimo, Indian)	1.592*** (0.573)	-0.396 (0.416)	-0.192*** (0.048)	0.241*** (0.046)
American Indian (other than Alaska Native)	0.314 (0.360)	0.553*** (0.152)	-0.813*** (0.027)	1.570*** (0.031)
Asian or Pacific Islander		-0.581 (0.721)	0.010 (0.213)	0.078 (0.122)
Black or African American	0.635*** (0.049)	0.227*** (0.033)	0.121*** (0.012)	0.073*** (0.010)
Asian	-0.320 (0.381)	0.010 (0.266)	-0.014 (0.052)	0.288*** (0.038)
Other single race	-0.312*** (0.095)	0.678*** (0.081)	-0.111*** (0.020)	0.199*** (0.020)
Two or more races	0.118 (0.144)	-0.187*** (0.189)	-0.185*** (0.030)	0.195*** (0.033)
Native Hawaiian or Other Pacific Islander	-0.848*** (0.396)	-0.081 (0.013)	0.835*** (0.043)	0.129*** (0.030)

Table 14 represents the impact that the Medicaid expansion had on age regarding the length of stay in treatment for an inpatient model with or without methadone and an outpatient model with or without methadone. None of the age categories for Model 1 or Model 3 were significant. This means that when Medicaid expansion does not affect the relationship between LOS and age. This coincides with earlier findings that revealed the Medicaid expansion did not have a significant effect on the length of stay in inpatient treatment facilities. Each of the age groups for Model 2 and Model 4 were significant, however, and all age groups showed that

patients stayed in outpatient treatment for less time than the 12-14 year olds (the base group) after ACA Medicaid expansion. This seems to suggest that the relatively young (12-14 years old) are the ones staying longer in outpatient treatment after Medicaid expansion.

Table 14: DID Coefficient for LOS for Discharges by Age

	1	2	3	4
Age (Years)	Methadone (Yes), Inpatient	Methadone (Yes), Outpatient	Methadone (No), Inpatient	Methadone (No), Outpatient
15–17	-0.014 (1.222)	-0.182*** (0.037)	0.114 (0.091)	-0.134*** (0.035)
18–20	0.878 (1.205)	-0.313*** (0.036)	0.136 (0.088)	-0.214*** (0.035)
21–24	0.988 (1.203)	-0.334*** (0.035)	0.130 (0.087)	-0.262*** (0.033)
25–29	0.972 (1.203)	-0.402*** (0.034)	0.081 (0.087)	-0.312*** (0.033)
30–34	1.051 (1.203)	-0.400*** (0.034)	0.052 (0.087)	-0.351*** (0.033)
35–39	1.138 (1.203)	-0.384*** (0.035)	0.048 (0.087)	-0.397*** (0.034)
40–44	1.239 (1.204)	-0.263*** (0.035)	0.101 (0.087)	-0.265*** (0.034)
45–49	1.418 (1.204)	-0.278*** (0.035)	0.056 (0.087)	-0.159*** (0.034)
50–54	1.549 (1.205)	-0.309*** (0.035)	0.025 (0.087)	-0.222*** (0.035)
55 and over	1.507 (0.347)	-0.304*** (0.010)	0.019 (0.087)	-0.081** (0.035)

Table 15 represents the impact that the Medicaid expansion had on health insurance regarding the length of stay in treatment for an inpatient model with or without methadone and an outpatient model with or without methadone. The analysis revealed that Medicaid patients were less likely to stay longer than the base (private insurance) in both outpatient clinics and inpatient methadone clinics and more likely to stay longer in non-methadone inpatient clinics. In addition, Medicare patients were less likely to stay longer in methadone inpatient clinics and

more likely to stay longer in both outpatient clinics and the non-methadone inpatient clinic. Finally, the uninsured are more likely than the base to stay longer in all types of treatment centers.

Table 15: DID Coefficient for LOS for Discharges by Insurance Payments

	1	2	3	4
Health Insurance	Methadone (Yes), Inpatient	Methadone (Yes), Outpatient	Methadone (No), Inpatient	Methadone (No), Outpatient
Medicaid	-0.296*** (0.054)	-0.200*** (0.043)	0.157*** (0.012)	-0.401*** (0.011)
Medicare (Tricare, Champus)	-0.143** (0.070)	0.946*** (0.050)	0.174*** (0.016)	0.164*** (0.013)
Uninsured	0.137** (0.058)	0.440*** (0.043)	0.379*** (0.012)	0.362*** (0.010)

Table 16 represents the Medicaid expansion's impact on the type of service provided regarding the length of stay in treatment for an inpatient model with or without methadone and an outpatient model with or without methadone. Model 1 shows that patients who received rehab/residential, hospital non-detox were less likely to stay in treatment than the base (detox, 24 hours, hospital inpatient). For Model 2, patients who received ambulatory, non-intensive outpatient treatment, and ambulatory detoxification treatment were more likely than the base to stay in treatment longer. For Model 3, patients who received detox, 24-hour, free-standing residential treatment; rehab/residential, hospital non-detox treatment; and rehab/residential, short term (30 days or fewer) treatment were less likely to stay in treatment longer, and patients who received rehab/residential, long term (more than 30 days) treatment were more likely to stay longer. Finally, for Model 4, patients who received ambulatory, non-intensive outpatient treatment and ambulatory detoxification treatment were more likely than the base to stay in

treatment longer.

Table 16: DID Coefficient for LOS for Discharges by Type of Service Provided

Type of Service	1 Methadone (Yes), Inpatient	2 Methadone (Yes), Outpatient	3 Methadone (No), Inpatient	4 Methadone (No), Outpatient
Detox, 24-hour, free standing residential	0.149 (0.209)		-0.070*** (0.027)	
Rehab/residential, hospital non-detox	-2.651*** (0.209)		-0.554*** (0.075)	
Rehab/residential, short term (30 days or fewer)	0.108 (0.210)		-0.217*** (0.027)	
Rehab/residential, long term (more than 30 days)	0.140 (0.211)		0.205*** (0.027)	
Ambulatory, non- intensive outpatient		0.334*** (0.049)		0.113*** (0.008)
Ambulatory, detoxification		0.058*** (0.093)		3.704*** (0.106)

Discussion

In Study 2, the problem is whether patients stay longer for opioid-related treatment in states that adopted Medicaid Expansion compared to the non-adopters. Study 2 uses the TEDS-D dataset. In particular, the researcher examines the outcomes using a dataset that comprised only

patient episodes or encounters with the applicable public providers.

The overall results of Study 2 regarding these key aspects of the problem were as follows. First, regarding the length of stay for treatment, patients being treated for outpatient care in states with Medicaid expansion were 63% more likely to have a longer stay than in non-expansion states. For inpatient treatment, the number of days stayed was around 61% higher after ACA Medicaid expansion.

Concerning demographics, results depend on the presence of methadone as a treatment modality in a way that the results for overall analysis did not. In particular, women were significantly more likely to stay in treatment longer in inpatient and outpatient settings after the Medicaid expansion if methadone was offered and significantly likely to stay less time after the ACA implementation in centers where methadone was not offered. These results are promising because longer stays in methadone treatment programs have been associated with significant benefits. The benefits of longer stays are less readily apparent, although the length of stay can serve as a proxy for the likelihood of positive outcomes (Pro et al., 2020).

Regarding race, there was a multitude of results along different racial lines. In terms of understanding ACA benefits, the most significant of these is that Medicaid expansion significantly increased the average length of stays across all treatment types (inpatient/outpatient and methadone/non-methadone) for Black patients. The second greatest benefits were afforded to Native Americans, who benefitted in all contexts except methadone inpatient. Age did not prove significant as a demographic variable except for the youngest patients in outpatient treatments. Finally, the results concerning insurance were interesting in that actual Medicaid patients were likely to stay less time than those with private insurance across all modalities except no methadone inpatient. This is likely to due to differences in reimbursement between private and

public insurance. Surprisingly, the uninsured had the greatest likelihood of a long length of stay overall.

The final problem analyzed was the Medicaid expansion's impact on the type of service provided regarding the length of stay. Services included detox, rehab/residential (hospital), rehab/residential (short term), rehab/residential (long term), ambulatory non-severe, and ambulatory detox. Medicaid expansion had the most substantial effect on outpatient care, as both categories of outpatient care saw increases in stay length with and without methadone. Interestingly, inpatient care length was either unchanged or decreased for all categories except long-term residential without methadone. These results can potentially indicate that the care was more successful, so the patient did not need to stay as long. Still, they could also be interpreted as inpatients being discharged sooner to help account for the increase in patient flow engendered by Medicaid expansion (Peterson, Liu et al., 2019). In outpatient care, where there is less crowding out to be concerned about, and the benefits of more extended stays are more well-evidenced with methadone (Flynn et al., 2002), the results are more clearly positive.

Theoretical and Practical Implications of the Results

In drawing conclusions based on the findings, it is valuable to adopt the framework of the National Institute on Drug Abuse's (2018b) principles of effective treatment. These principles can be applied in deriving both theoretical and practical conclusions. There are 12 principles laid out by the National Institute on Drug Abuse, but not all of these apply to the current study. Instead, the most relevant are the fifth and seventh principles, namely: "5. Remaining in treatment for an adequate period of time is critical. [...] 7. Medications are an important element of treatment for many patients" (2018b, p. 4). These two principles relate to this study's focus on the length of stays and discussion of methadone therapies, respectively.

In addressing the fifth principle, the National Institute on Drug Abuse (2018b)

emphasized the importance of patients staying in treatment adequately. The Institute argued that research unequivocally shows that good outcomes are contingent on treatment length. Indeed, in contrast with the literature, the National Institute on Drug Abuse argued that longer programs are not only almost always better but necessary. In this regard, the present study results demonstrate the potential benefits of Medicaid expansion. Those benefits, however, were manifest predominantly in outpatient care. The conflicting effects of Medicaid expansion on space-limited inpatient programs were such that it did not extend patients' stays in them. Indeed, the average for inpatient stays in the dataset for both expansion and non-expansion was 80–82 days, well below the National Institute on Drug Abuse's 90-day threshold for those programs to be helpful. Therefore, on the measure of length, the ACA can primarily be said to have benefitted outpatient treatment programs.

Regarding the seventh principle, the results of this study offers implications for methadone. For the outpatient benefits, methadone's presence did not help or harm the overall effect of the ACA. A more notable result regarding methadone was that Medicaid expansion made women significantly more likely to stay longer in methadone programs only. This supports the National Institute on Drug Abuse's (2018b) assertions that such medication-assisted treatments can benefit some patients. It also addresses the second principle, namely that the same treatments are ineffective for all patients. This result aligns with the findings of Pro et al. (2020), in the sense that they also showed that methadone had greater benefits for women and racial minorities (especially Black people) than for men or White people. With these previous findings, the current study results imply that Medicaid expansion offers highly significant benefits in when women and minority patients are more likely to stay longer in the beneficial methadone programs.

Study Limitations

The present study was not without its limitations. The first limitation was that the research was carried out using historical data. While these data are relevant and high volume, their contents are fixed and prevent any agency in terms of what was included. The study was also quantitative, meaning that while inferences can be drawn from the results, it is impossible to be certain that the results mean what they seem to. For example, there are two possible interpretations for the meaning of shorter inpatient stays under Medicaid expansion: that better care resulted in quicker program completion or that greater demand forced programs to cycle patients more quickly, driving down averages. These are not the only possible explanations, merely the most likely. A qualitative approach would offer deeper insight into these questions, but at the cost of data volume. Finally, the study was limited in that the primary result, length of care, is not a perfect proxy for quality of care, as it can be interpreted differently depending on the theoretical perspective.

Conclusions

Overall, the results of Study 2 support certain specific benefits of the ACA in essential areas with respect to the length of patient stays in drug treatment. Per the National Institute on Drug Abuse's (2018b) principles of effective care, these conclusions treat longer stays as being a purely positive outcome. With that assumption, Medicaid expansion increased the length of stay in outpatient treatment facilities that treated patients with or without methadone. The results of this study also suggest that methadone therapy plus Medicaid expansion offered significant stay time improvements for women and that the ACA expansion improved treatment lengths for Black people across all treatment modalities.

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