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Access to Medication-Assisted Treatment for Opioid Use Disorder: Is Rhode Island Different, and Why?

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Abstract:

This paper assesses the prevalence of medication-assisted treatment (MAT) among treatment episodes for opioid use disorder (OUD) in Rhode Island, as compared with the remaining New England states and the United States as a whole. Based on the Treatment Episode Data Set (TEDS-A), a national census of admissions into publicly funded treatment facilities for substance use disorders, we find that during the period beginning in 2000 through 2017, Rhode Island exhibited a greater tendency to use MAT as part of OUD treatment compared with the average state in the United States and compared with the average combined tendency among the five other New England states. Logistic regression analysis reveals that the higher incidence of MAT among OUD treatment episodes in Rhode Island compared with the US average can be partly accounted for by Rhode Island's having (1) a higher share of patients with government-sponsored health insurance plans, (2) an older age profile of patients, (3) a higher share of married patients, and (4) a higher percentage of intravenous drug users. However, well over half of the difference in the MAT rate between Rhode Island and rest of the United States is due to differences in factors not observed in the TEDS-A but which are known to prevail in the state, such as Rhode Island's high number of methadone clinics per capita, its high federal funding rate per capital to combat substance abuse, and state policies promoting the use of MAT.

Keywords: opioid use disorder, medication-assisted treatment, Rhode Island, treatment episode data set

JEL Codes: I12, I13, I18

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I. Introduction

The opioid epidemic is a national public health emergency that has hit Rhode Island especially hard. As of 2017, the state's opioid-related overdose death rate was the 10th highest in the United States (among the 36 states that were ranked.)[1] Since 1999, over 2,600 Rhode Islanders have died of opioid-involved overdoses, and 277 of those deaths occurred in 2017.[2] In August of 2015, Governor Gina Raimondo signed an executive order establishing the Governor's Overdose and Prevention Task Force to combat Rhode Island's "alarming rate of deaths caused by opioid drug overdose." Among its other responsibilities, the task force was directed to provide "recommendations for increasing…access to appropriate treatment." Consistent with this executive order, the Raimondo administration has prioritized the expansion of access to medication-assisted treatment (MAT) as part of a comprehensive approach to treating opioid use disorder (OUD). In 2016, Rhode Island passed legislation that formally advanced this agenda by instituting substance use disorder treatment standards and expanding health insurance coverage mandates regarding the medications used to treat OUD.[3]

MAT refers to a class of treatments for OUD involving three FDA-approved medications used either alone or in combination: methadone, buprenorphine, and naltrexone. The World Health Organization and the US Department of Health and Human Services both strongly endorse the use of MAT for combating opioid dependence, based on the method's proven effectiveness in reducing opioid abuse, the risk of fatal overdose, and all-cause mortality (World Health Organization 2009). Nonetheless, the vast majority of OUD patients in the United States do not receive MAT;[4] it is estimated that between 2004 and 2013, only 20 percent of individuals suffering from OUD received treatment of any kind, with or without MAT (Saloner and Karthikeyan 2015).

Under Governor Raimondo, in 2016 Rhode Island became the first state in the nation to offer MAT to prison inmates. Since this program began, the state has seen a steep decline in

[1] These statistics about the opioid crisis come from the Centers for Disease Control and Prevention, CDC WONDER. See https://www.drugabuse.gov/drugs-abuse/opioids/opioid-summaries-by-state. Among the 50 US states, 14 states could not be ranked due to their lacking adequate data concerning the specific drug or drugs involved in overdose deaths. The ranking of a given state is based on its age-adjusted rate of opioid-related overdose deaths per 100,000 persons. Opioid-related overdose deaths include those coded as either unintentional, suicide, homicide, or of undetermined intent. See Scholl et al. 2019 and Centers for Disease Control and Prevention 2019.

[2] Source, Centers for Disease Control and Prevention, https://www.drugabuse.gov/opioid-summaries-by-state/rhode-island-opioid-summary.

[3] See National Academy for State Health Policy blog: https://nashp.org/rhode-island-becomes-the-sixth-state-to-pass-opioid-legislation-in-2016/.

[4] See, for example, the National Academies of Sciences, Engineering, and Medicine (2018).

overdose deaths among former inmates (see Green et al. 2018). Rhode Island has also established 13 "Centers of Excellence" that offer a high standard of care for OUD, including the use of MAT in conjunction with other evidence-based interventions.[5] As of 2018, Rhode Island is among the top seven states in the country in terms of methadone clinics per capita.[6] As of 2012, the state already possessed a relatively high capacity to treat OUD with buprenorphine, as it had more than twice the national average number of doctors per capita who were qualified to prescribe the drug (Jones et al. 2015). As one of the 10 states with the highest opioid-related death rates in the nation, in fiscal year 2018 Rhode Island received a large boost in federal funding to fight the opioid crisis. The state has dedicated an above-average share of these grants to funding treatment and recovery programs.[7]

Rhode Island is not the only New England state in which policymakers have undertaken concerted measures to address the opioid crisis. Vermont has attracted national attention for its innovative policies to expand access to high-quality treatment for OUD, including MAT, and the state is a pioneer in the use of the "hub-and-spoke" treatment system. Massachusetts has also taken strong actions in recent years to promote access to MAT. In contrast, until recently New Hampshire devoted few public resources to the treatment of OUD (Manchester and Sullivan 2019), and according to some reports the state now faces an uphill battle in attempting to expand its treatment capacity rapidly enough to meet the growing demand fueled by this public health emergency.[8]

This paper assesses the prevalence of MAT among treatment episodes for OUD in Rhode Island during the period from 2000 through 2017 as compared with the five remaining New England states and with the United States as a whole. This assessment is made using the Treatment Episode Data Set (TEDS-A), which is a national census of admissions into publicly funded treatment facilities for substance use disorders. The paper also identifies potential barriers and facilitators to the use of MAT, both in Rhode Island and elsewhere, based on multivariate logistic regression analysis using the TEDS-A. Rather than placing an equal emphasis on all the New England states, this paper focuses on Rhode Island as a means of preparing for a larger project that

[5] For more information on Centers for Excellence, see http://www.bhddh.ri.gov/sections/opioid_use_disorders.php
[6] See https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2018/10/31/long-stigmatized-methadone-clinics-multiply-in-some-states.
[7] See Bipartisan Policy Center (2019): https://bipartisanpolicy.org/wp-content/uploads/2019/03/Tracking-Federal-Funding-to-Combat-the-Opioid-Crisis.pdf.
[8] See, for example, https://www.nhpr.org/post/nhs-new-program-addiction-treatment-shows-promise-and-major-gaps.

will use the Rhode Island All-Payer Claims Database in order to gain deeper insights into the barriers to offering appropriate interventions for treating OUD in the state.

The paper's main findings are as follows:

1. Between 2000 and 2017, Rhode Island exhibited a consistently greater tendency to use MAT as part of OUD treatment when compared with the average tendency among all US states or the average tendency among the five other New England states.
2. Between 2006 and 2017, Rhode Island had fewer *total* treatment episodes for OUD relative to its population size (not conditioning on MAT) compared with the US average, and also compared with the average among the other New England states.
3. Compared with the rest of the United States, the factors that contributed to the higher incidence of MAT among OUD treatment episodes in Rhode Island include the state's having (1) a higher share of patients with government-sponsored health insurance plans, (2) patients with an older age profile, (3) a higher share of married patients, and (4) a higher percentage of intravenous drug users.
4. Well over half of the difference in the MAT rate between Rhode Island and the rest of the United States is due to differences in factors not observed in the TEDS. These factors might include Rhode Island's high number of methadone clinics per capita, its high federal funding rate per capita to combat substance abuse, and concerted state policies that promote the use of MAT.

II. The Opioid Epidemic in New England, 1999 to 2017

Rhode Island is not the only New England state to have suffered disproportionately from opioid abuse. As of 2017, five of the six New England states ranked among the top 10 states in the nation for opioid-related overdose death rates.[9] Within New England, New Hampshire suffered the highest opioid overdose death rate—34 per 100,000 persons—followed by Maine, Massachusetts, Connecticut, and Rhode Island, with death rates of 29.9, 28.2, 27.7, and 26.9 per 100,000 persons, respectively. In Vermont, the 2017 death rate of 20 per 100,000 persons was considerably lower

[9] Source: The Centers for Disease Control and Prevention, CDC WONDER. The rankings are only based on data from 36 states. Due to incomplete data, 14 states could not be ranked—see Scholl et al. 2019.

than in any of the other New England states, but still above the national median (among the 36 ranked states) of about 16 opioid-related death rates per 100,000 persons.

Figure 1 shows the opioid-related overdose death rates per 100,000 persons for the United States as a whole, for Rhode Island alone, and for the combined population of Connecticut, Maine, Massachusetts, New Hampshire, and Vermont, from 1999 through 2017 (the latter is the most recent year for which official statistics are available). In the early 2000s, opioid-related overdose death rates were only slightly or modestly elevated in Rhode Island compared with these death rates for the United States as a whole, or when compared with the combined rate for the other five New England states. Beginning in 2008 and going through 2013, however, the death rate in Rhode Island appeared to diverge from the US average and from the New England average: by 2013, Rhode Island's opioid-related death rate of 23 individuals per 100,000 persons was 64 percent higher than the US average of 14 individuals per 100,000 persons, and was 43 percent greater than the New England rate of 16 individuals per 100,000 persons. Between 2013 and 2017, opioid-related death rates increased further in Rhode Island, but also in the remaining New England states, such that by 2016 or 2017, the opioid-related death rate in the rest of New England was virtually indistinguishable from the death rate in Rhode Island. In 2017, the state's opioid-related death rate still exceeded the national average, but by a more moderate 36 percent (30 individuals per 100,000 persons versus 22 individuals per 100,000 persons).

III. Medication-Assisted Treatment

Medication-assisted treatment, or MAT, refers to a group of approaches for treating opioid dependence that involve the use of any one of three FDA-approved medications: methadone, buprenorphine, and/or naltrexone. Such medications are typically used in conjunction with other interventions, such as psychological counseling and social support programs. Both methadone and buprenorphine are opioid agonist drugs—like heroin, OxyContin, and other abused opioids—which means that they activate the brain's opioid receptors. Thus, these medications are capable of alleviating symptoms of withdrawal from the commonly abused opioids and reducing the patient's desire for such drugs.[10] However, unlike most opioids, methadone and buprenorphine do not induce euphoria when administered orally to OUD patients at the appropriate dosages, and are

[10] See, for example Choo (2009) and Diaper, Law, and Melichar (2014).

therefore less prone to abuse. The World Health Organization considers "agonist maintenance treatment"—consisting of the daily use of methadone or buprenorphine after an initial detoxification period from the patient's opioid of abuse—to be the most effective protocol for achieving long-term abstinence from the abused substance.[11] Both methadone and buprenorphine are typically administered orally, which reduces the health risks associated with injection.

Naltrexone also reduces cravings for opioids and alleviates withdrawal symptoms. However, naltrexone works by blocking the brain's opioid receptors rather than by activating them, and patients must achieve full withdrawal from opioid use —including any reliance on methadone or buprenorphine—before taking naltrexone.[12] The injectable form of naltrexone (brand name Vivitrol) has been found to reduce opioid abuse, while the pill form of naltrexone has not been found to consistently improve patient outcomes.[13] The appropriate choice of medication for MAT may depend on the strength of the patient's physical dependence on opioids, among other factors. For example, buprenorphine will be inferior to methadone for reducing some patients' cravings, as methadone fully occupies the brain's opioid receptors, while buprenorphine only does so partially (National Academies of Sciences, Engineering, and Medicine 2018).

According to Saloner and Karthikeyan (2015), between 2004 and 2013 only about one-fifth of individuals suffering from OUD in the United States received treatment of any kind, and during this period the treatment rate was effectively unchanged over time despite significant national increases in opioid abuse rates. (The data used in this study did not include information about whether treatment involved MAT). A variety of potential barriers to an increased uptake of MAT have been identified, but further research is needed regarding the relative importance of the different factors and how the barriers differ across geographic areas in the United States. In particular, very little research has examined barriers to MAT using patient-level data.

Because both methadone and buprenorphine, as opioid agonists, carry some potential for abuse, there are strict federal and state regulations governing the use of these drugs in medical applications (Institute of Medicine 1995). Methadone must be administered daily for an extended period of time, or even indefinitely, in a specialized opioid-treatment program (OTP), commonly known as a "methadone clinic." Federal and state laws permit some patients to take home limited

[11] See, for example, World Health Organization (2009) and Krantz and Mehler (2004).
[12] See, for example, https://www.samhsa.gov/medication-assisted-treatment/treatment/naltrexone.
[13] See, for example, https://www.drugabuse.gov/publications/research-reports/medications-to-treat-opioid-addiction/efficacy-medications-opioid-use-disorder.

supplies of methadone for convenience, but take-home doses are not offered on an indefinite basis (Department of Health and Human Services 2001; Walley et al. 2012). OTPs that dispense MAT face greater regulatory oversight and more stringent (and expensive) staffing requirements than those that only offer detoxification and/or counseling services, and the higher associated costs are cited as major barriers to the adoption of MAT by some OTP administrators (Knudsen Roman, and Oser 2011). Some states impose caps on the number of facilities that can be certified to dispense methadone, though even without such caps, few communities are willing to house methadone clinics. For all of these reasons many patients, especially those living in rural areas, face geographic barriers to accessing specialized opioid treatment facilities that dispense methadone and other forms of MAT (Pullen and Oser 2014; Johnson, Mund, and Joudrey 2018).

In 2002 the FDA approved buprenorphine for clinical use in treating opioid dependency, and the Drug Addiction Treatment Act (DATA) of 2000 allowed primary care physicians and some mid-level medical practitioners to earn a qualification that would then permit them to prescribe buprenorphine directly to a limited number of patients. (Buprenorphine can also be administered in OTPs.) These policy changes were intended to greatly expand access to MAT by offering patients the convenience of taking an oral dose daily at home rather than having to visit an OTP. However, physicians and other practitioners who are not already board-certified in addiction psychiatry must undergo at least eight hours of training to become qualified ("waivered") to dispense buprenorphine, and there are limits on the number of buprenorphine-prescribed patients that a qualified doctor can have under his or her care at any given time. Although these patient limits were increased in 2007 and again in 2016,[14] such limits may not be the most important constraint on patients' access to buprenorphine. Some medical practices simply do not want to accept patients who are opioid abusers, and other practices are deterred by the fact that prescribing buprenorphine requires ongoing regulatory oversight and additional office support.[15] Indeed, the evidence suggests that most primary-care physicians in the United States are not qualified to prescribe buprenorphine, and most of the qualified physicians do not prescribe to the upper limit of their patient capacity (Jones et al. 2015).

[14] For details, see https://www.federalregister.gov/documents/2016/07/08/2016-16120/medication-assisted-treatment-for-opioid-use-disorders.

[15] See, for example, Jones et al. (2015) and https://psychnews.psychiatryonline.org/doi/full/10.1176/appi.pn.2016.PP3a2.

Naltrexone, in contrast, has two advantages over either methadone or buprenorphine: any medical prescriber can administer it, and the injectable form is typically administered just once per month. However, before being treated with naltrexone, patients must go through a full detoxification from opioids. Another drawback is that there is less evidence on the effectiveness of naltrexone (as compared with either buprenorphine or methadone) in reducing overdose deaths and promoting long-run abstinence from illicit opioids (see, for example, Choo 2009; Substance Abuse and Mental Health Services Administration (SAMHSA), 2019).

A variety of factors may constrain the effective patient demand for MAT. For one, patients undergoing MAT continue to suffer from the social stigma that this therapy "substitutes one addiction for another." For instance, the credo of the 12 step community contends that methadone and buprenorphine users are not "truly sober."[16] Cost is another potential deterrent, as not all health insurance plans cover MAT, despite the fact that the Affordable Care Act (ACA) expanded the set of plans that were required to offer such coverage. In states that opted in to the Medicaid expansion—including Rhode Island—the ACA required that Medicaid reimburse patients for methadone prescriptions. However, of the 14 states that rejected the Medicaid expansion, 13 still do not offer reimbursements for methadone.[17,18] The retail price of Suboxone, a popular formulation of buprenorphine, runs from $6 to $24 per day, depending on the dosage and the dispensing pharmacy.[19] Regardless of their level of insurance coverage, all patients seeking treatment for OUD must bear the costs of traveling to an OTP or to the office of a doctor who is qualified to prescribe buprenorphine. Although most OTPs that dispense MAT offer treatment on an outpatient basis, programs that offer a comprehensive approach to drug treatment and recovery, including initial detoxification services, may require an inpatient stay of weeks or months.

[16] See https://newrepublic.com/article/149398/rejected-aa.

[17] See https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2018/10/31/long-stigmatized-methadone-clinics-multiply-in-some-states.

[18] Grooms and Ortega (2019) find that the Medicaid expansion under the ACA resulted in increased admissions to treatment for substance abuse disorders, but did not specify whether treatments including MAT increased disproportionately. Maclean and Saloner (2017) find that Medicaid-reimbursed prescriptions for some forms of MAT (including buprenorphine and naltrexone) increased significantly in Medicaid-expansion states following the ACA.

[19] See, for example, https://www.opioidtreatment.net/insurance-coverage/suboxone/. Suboxone also includes the opioid antagonist Naloxone to prevent abuse. Although methadone alone is inexpensive, the out-of-pocket cost of comprehensive treatment in an OTP, including methadone administration and related treatment services, may run as high as $125 per week. See, for example, http://atforum.com/2016/04/treatment-otp-paid-costs-more-than-price-medication/.

IV. Data and Methods

This paper's main objective is to compare OUD treatment patterns in Rhode Island to patterns in the rest of the United States, as this paper is the precursor to a larger study of this same issue and related questions using the Rhode Island All-Payer Claims Database. Much of this preliminary analysis pertains to either a national sample of OUD treatment episodes or to a sample of such episodes that only use data from Rhode Island. In order to place Rhode Island's opioid treatment patterns in the context of its regional neighbors, descriptions of combined treatment patterns and episode characteristics in the five other New England states are also provided. For reasons of parsimony, the data from the rest of the states in New England are combined rather than shown separately. All the tables and figures referring to New England exclude the data from Rhode Island, so that the Rhode Island numbers do not influence the results for the rest of the region.

The Treatment Episode Data Set (TEDS) consists of data pertaining to individual treatment episodes for substance abuse, where an episode is defined as the period between a patient's initial admission into treatment and their subsequent discharge from treatment. Treatments may occur on an inpatient or an outpatient basis, depending on the type of facility.[20] The data are collected by the individual state administrative data systems to monitor their substance abuse treatment systems.

The analysis in this paper uses the concatenated TEDS-A dataset containing all available data for 2000–2017. The TEDS-A contains information collected upon a patient's admission into treatment. (A separate dataset, the TEDS-D, contains related information that is collected when the patient is discharged from treatment.) Observations are dated based on the year of the admission date, and are assigned to the state where the treatment facility is located. Therefore, for example, the Rhode Island treatment episodes may include patients from Massachusetts or Connecticut, but the data do not provide such information. The unit of analysis is the treatment episode (as of the admissions event) rather than the patient. As patients cannot be tracked across separate treatment episodes, patients experiencing multiple admissions into treatment in the same year may contribute multiple observations to the dataset.[21]

[20] For outpatient treatment, the treatment episode may still span an extended period of time.

[21] Therefore, the number of treatment episodes per year will exceed the number of unique individuals admitted into treatment in the year.

In most of the country, the treatment facilities that contribute to the TEDS by reporting to their state substance abuse agency (SSA) are those that receive public funds and/or are licensed or certified by the SSA to provide substance abuse treatment.[22] However, the specific reporting requirements differ across the various states, which means that the data are not always fully comparable from one state to the next.[23] These differences should be kept in mind when interpreting the results. TEDS collects data from the District of Columbia and Puerto Rico as well as from all 50 states. Data are missing for some states in some years due to insufficient data collection. The list of states excluded by year is included in the appendix, Table A1. In the remainder of the paper, "all states" or "the United States" is used as shorthand for the unrestricted sample of states included in the TEDS.

Episodes in the TEDS-A include treatments for many types of abused substances, including alcohol as well as an extensive list of other substances. The set of treatment episodes in the TEDS-A does not reflect the total demand for substance abuse treatment, because not all US treatment centers or providers operate in qualifying facilities that must report to the TEDS-A. The TEDS-A also does not fully reflect the use of MAT for treatment of OUD, as the data do not observe prescriptions for buprenorphine obtained through a physician's office. In addition, the TEDS-A cannot be used to determine what share of individuals suffering from substance abuse disorders receive treatment, as many individuals go without treatment and hence never enter the database.

Each observation lists up to three abused substances that led to the patient's seeking treatment—a primary, a secondary, and a tertiary substance. We define an episode as entailing treatment for OUD if an opioid is listed among the three substances. Opioids include heroin, non-prescription methadone, and "other opiates and synthetics," such as the prescription painkillers oxycodone (the active ingredient in OxyContin and Percocet) and hydrocodone (the active ingredient in Vicodin).[24] An episode is defined as including MAT based on an indicator variable

[22] For more information on the TEDS, see https://www.samhsa.gov/data/sites/default/files/2013_Treatment_Episode_Data_Set_National/2013_Treatment_Episode_Data_Set_National.pdf.

[23] For example, correctional facilities and general hospitals in Connecticut that receive state funding for substance abuse treatment must provide the relevant data to the SSA, whereas in Rhode Island neither correctional facilities nor general hospitals are required to report to the SSA, though the Veterans Administration (VA) hospital voluntarily reports its data.

[24] One can also define an OUD treatment episode more narrowly, based only on the primary substance of abuse being an opioid. These resulting sample sizes are smaller, but the results are qualitatively robust in terms of the various explanatory factors associated with the probability of receiving MAT for OUD. The results obtained using this more narrow definition of OUD are provided in appendix Tables A2 and A3.

in the TEDS-A for "whether the use of opioid medications such as methadone, buprenorphine, or naltrexone will be part of the patient's treatment plan."[25, 26]

We employ logistic regression analysis to identify those factors—such as individual patient characteristics and other aspects of the treatment episode—that are associated with either a higher or lower probability that a treatment episode for OUD includes MAT. Regressions are conducted on each of two samples: (1) the set of all OUD treatment episodes in the United States that occurred between 2000 and 2017, and (2) the set of OUD treatment episodes between 2000 and 2017 that occurred in Rhode Island. We use most of the available variables in the TEDS-A as potential predictors of receiving MAT. We omit the type of treatment facility because patients (or their referring providers or entities) may exert some control over the type of facility they enter, and that choice may be tantamount to a choice of whether or not to receive MAT. Some variables are recoded to reduce the number of categories, [27] and the health insurance variable used in the analysis combines information from two separate variables.[28] For a complete description of the TEDS-A, see the TEDS-A codebook.[29] In the regressions using the US sample, year dummies and state dummies are included, and the standard errors are clustered by state. In the regressions conducted solely on observations from Rhode Island, year dummies are included and the standard errors are robust.

The regression results are not intended to yield causal estimates, only partial correlations, because any of the observed characteristics may be correlated with unobserved factors that predict the specific treatment protocol, such as the severity of the illness, individual attitudes towards

[25] This description is taken directly from the TEDS-A Concatenated (2000–2017) Codebook, published by the Center for Behavioral Health Statistics and Quality and the Substance Abuse and Mental Health Services Administration (2019).

[26] In a small number of treatment episodes, MAT is used to treat substance abuse involving non-opioids. Such episodes are not included in the counts of MAT, as these are restricted to MAT among treatment episodes for OUD.

[27] For example, the referral source variable is reduced from seven categories to three groups—court-referred (an original category), individual referral (an original category), and a combined "provider/other" category that includes referrals by a healthcare provider, a school, an employer, or another community agency. The frequency of the drug use variable (referring to use of the primary abused substance in the previous month) is reduced from three categories (no use, some use, or daily use) to two—either daily use or less-than-daily use.

[28] Our recoded health insurance variable combines information from two TEDS variables, "health insurance at admission" and "primary source of payment for treatment." Information from the latter variable was used to infer the appropriate health insurance type in order to mitigate the fact that the health insurance variable was missing in 58 percent of cases in the TEDS-A for the 2000–2017 period. The recoding details are available on request from the author.

[29] TEDS-A Concatenated (2000–2017) Codebook. Center for Behavioral Health Statistics and Quality and Substance Abuse and Mental Health Services Administration (2019).

MAT, the cost of treatment to the patient, and the distance to the nearest OTP that provides MAT. However, the severity of a patient's illness may be captured in part by at least three of the included variables: the indicator of whether the treatment episode was the patient's first, the indicator of intravenous drug use, and the indicator of daily drug use in the past month.

Regressions were also conducted separately over three shorter time periods—2000 through 2006, 2007 through 2013, and 2014 through 2017—for each geographic unit of analysis (the United States and Rhode Island). Most of the coefficient estimates do not differ in sign across the different time periods, and most do not differ significantly in magnitude. The results for 2014 through 2017 are shown in appendix Table A4.

Population data from the US Census Bureau are employed in order to calculate the number of treatment episodes per 100,000 persons 12 years of age and older (shown in the descriptive analysis below).

V. Patterns in Substance Abuse Treatment, Treatments for Opioid Use Disorder, and Medication-Assisted Treatment, 2000–2017

In order to provide some initial context, it is useful to document the frequency (by geography and year) of *all* treatment episodes for any type of substance abuse, and the frequency of OUD treatment episodes not conditioning on MAT. Figure 2a shows, separately by year from 2000 through 2017, the number of all substance abuse treatment episodes per 100,000 persons (ages 12 and over) for Rhode Island, for all states combined, and for New England excluding Rhode Island. The data suggest that Rhode Island exhibits a higher number of treatment episodes for substance abuse disorders relative to its population size, as do the other five New England states combined, compared to the United States as a whole. On average, the treatment frequency in Rhode Island is fairly close to the combined frequency in the remaining New England states over the period. Within any geographic area, the trends over time are relatively flat on net.

Figure 2b is analogous to Figure 2a, but it is restricted to treatment episodes for OUD. Throughout the time period, the number of OUD treatment episodes in Rhode Island (relative to its population) exceeds the corresponding number for the United States. Beginning in 2006 and through 2017, however, the OUD treatment numbers in Rhode Island fall short of the numbers for the rest of New England, even though the OUD treatment rate increased more rapidly in Rhode

Island than in the rest of New England between 2009 and 2017. As stated above, given the limitations of the TEDS, these numbers cannot be taken to indicate the overall demand for OUD treatment or the incidence of OUD in the population.

Figure 2c shows the annual number of treatment episodes for OUD that included MAT, again scaled to the relevant civilian population, from 2000 through 2017. Rhode Island shows a consistently higher frequency of MAT treatments for OUD compared with the remaining New England states and also when compared with the United States as a whole. However, between 2000 and 2005, the MAT treatment rates for the combined New England states are subject to some uncertainty, which is related to the fact that the reported numbers of treatment episodes involving MAT in New Hampshire and Vermont are quite low—either zero or in the single digits.

In addition to Rhode Island having an above-average *number* of OUD treatment episodes relative to its population as compared with the United States as a whole throughout the 2000–2017 period (as seen in Figure 2b), Rhode Island also exceeds the US average in terms of the *share* of all substance abuse treatment episodes that pertain to treatment for OUD, as seen in Figure 3a. Beginning in 2002 and going through 2017, however, the remaining New England states combined show an even higher share of substance abuse treatment episodes that involved OUD patients than does Rhode Island. As of 2017, the aforementioned share stood at 40 percent in the United States, 50 percent in Rhode Island, and 60 percent in the remaining New England states.

Among the observed treatment episodes for OUD between 2000 and 2017, the share of episodes that included the use of MAT (the "MAT share") was consistently higher on average in Rhode Island than (a) on average in all states and (b) on average in the other five New England states, as seen in Figure 3b. The MAT share in Rhode Island increased from a low of about 35 percent in 2000 to a high of just under 50 percent in 2017, although in most years the state's MAT share was close to 40 percent. In the remaining New England states, the MAT share more than doubled over this 17-year period, ending at 28 percent by 2017—although, as noted above, both New Hampshire and Vermont report what appear to be implausibly low numbers of MAT episodes in the early 2000s. Over most of the period between 2000 and 2017, the annual MAT share in New England lagged that of the United States as a whole by at least a small margin. In recent years, the MAT share in the United States has increased at a faster pace than in New England, such that as of the end of 2017, the MAT share in New England (outside of Rhode Island) was about 5 percentage points lower than the corresponding share in the United States as a whole.

VI. Why Does Rhode Island Have a Higher MAT Rate for OUD Episodes?

So far, the data suggest that although Rhode Island appears to have fewer OUD treatment episodes relative to its population size than the other New England states, it is more likely that MAT will be used to treat OUD in Rhode Island than in an OUD treatment episode occurring elsewhere in New England. The remainder of the paper examines possible reasons for the higher incidence of MAT among OUD treatment episodes in Rhode Island. The separate question of why Rhode Island has fewer actual treatment episodes for OUD cannot be addressed directly using the TEDS, but this issue will be considered in the concluding discussion.

Table 1 shows descriptive statistics by geographic area—the United States as a whole, the New England region excluding Rhode Island, and Rhode Island—either pertaining to (1) all the OUD treatment episodes observed from 2000 through 2017, or (2) all treatment episodes for OUD, including MAT, observed from 2000 through 2017.[30] A particular statistic indicates the fraction of all relevant treatment episodes in which the given characteristic (of the individual or of the treatment) is observed. For example, the table indicates that among all OUD treatment episodes occurring in the United States between 2000 and 2017, roughly 27 percent included MAT, whereas the corresponding figure for Rhode Island is 40 percent, and for the remaining New England states the average MAT share of all OUD treatment episodes is 22 percent.

Comparing OUD treatment episodes in Rhode Island to all US treatment episodes for OUD, on average the patients in Rhode Island are older; more likely to be male, white, married, and employed; to have either private or government-sponsored health insurance;[31] and to have been referred to treatment by an individual (possibly they are self-referred). Compared to the United States as a whole, patients treated for OUD in Rhode Island are also much more likely to have psychiatric problems, somewhat more likely to use drugs intravenously, more likely to report having used drugs daily in the previous month, and somewhat more likely to be homeless. These patients in Rhode Island are less likely to be Hispanic or a veteran, less likely to have been referred to treatment by the court[32] or by a healthcare provider, and are less likely to be receiving treatment

[30] The descriptive statistics for all substance abuse treatment episodes in the TEDS, regardless of the actual substance, are shown in Table A5 in the appendix.

[31] For the United States as a whole, more than 50 percent of treatment episodes have missing insurance information. Therefore this comparison must be qualified by the fact that the overall insurance numbers for the United States could look different if this information had been supplied.

[32] Court-referred treatments may reflect a variety of circumstances that may vary both within and between states, although the TEDS-A does not provide detailed information surrounding such referrals. In some jurisdictions, drug

for the first time. Concerning educational attainment, the composition of the patients undergoing OUD treatment in Rhode Island is similar, if not identical, to those undergoing such treatment elsewhere in the United States—Rhode Island has a slightly higher share of patients with at least some college attainment and a lower share with just a high school diploma, but the respective shares of patients with less than a high school diploma are close to equal between Rhode Island and the United States.

When comparing the characteristics of treatment episodes in Rhode Island against those combined traits found in the remaining New England states, many of the comparisons immediately noted above continue to apply. Some exceptions apply, however. For example, a higher share of OUD treatment episodes in Rhode Island (against the rest of New England) involve patients with no high school diploma, and fewer episodes involve patients with a high school diploma. In Rhode Island, OUD treatment episodes are more likely to have been initiated by a court-based referral than treatments occurring elsewhere in New England, are less likely to involve homeless individuals, and are somewhat more likely to be a first treatment episode. The share of treatment episodes involving patients who are intravenous drug users is a notch lower in Rhode Island than in the rest of New England, while the share of patients coming from dependent living situations (such as halfway houses or group homes) is significantly higher in Rhode Island.

After setting forth these descriptive statistics based on geographic area, the next step is to examine whether any of the differences just described between treatment episodes in Rhode Island and those occurring elsewhere in the United States can account for Rhode Island's higher tendency to use MAT for OUD treatment, at least in a proximate if not a causal sense. For this purpose, multivariate logistic regression analysis is employed, and is conducted over the complete US sample and separately on just the Rhode Island sample. In each regression, the dependent variable is the indicator for whether MAT was included as part of the planned treatment program for OUD. The additional details of the regression methods are described above. The results are shown in Table 2.

In Table 2, if the coefficient associated with a given variable is positive it means that a treatment episode for OUD involving that factor has a higher chance of including MAT than

courts have the power to mandate substance abuse treatment for some drug offenders. In other jurisdictions, offenders may receive the option to enter substance abuse treatment in lieu of a jail sentence. See, for example, https://www.psychiatryadvisor.com/home/topics/addiction/court-mandated-substance-abuse-treatment-exploring-the-ethics-and-efficacy/.

episodes lacking that factor, and vice versa if the coefficient on a given factor is negative. When a coefficient estimate is statistically significant it means that the given association, whether positive or negative, is not likely to represent a statistical fluke. Based on the results in Table 2, the following patient characteristics are associated with a higher probability that a treatment episode for OUD will include MAT, regardless of the geographic sample under consideration: being female, being Hispanic, being married, having no high school diploma (compared with having a high school diploma), being employed, being a veteran, and being an intravenous drug user. All of these associations are at least marginally statistically significant and most of them are highly statistically significant.

The factors that lower the chance of receiving MAT both in the United States and in Rhode Island include being in any age group that is less than 40 years old (and the negative effect is stronger as the age group gets younger), being homeless, and being in a dependent living situation. Treatment episodes referred by the court are less likely to entail MAT than are treatment episodes initiated by an individual, such as the patient or a family member of the patient, while episodes referred by a healthcare provider or other source are also less likely to include MAT than those stemming from referrals made by individuals. All of the effects just mentioned are highly statistically significant.

In the regression that is restricted to Rhode Island treatment episodes, having psychiatric problems predicts that a patient has a significantly lower chance of receiving MAT, while in the entire US sample, the coefficient on psychiatric problems is positive but statistically insignificant. In the Rhode Island sample, being non-white is associated with a significantly higher chance of receiving MAT, whereas in the US sample this same association is also positive but is not statistically significant. Similarly, in the Rhode Island sample the indicator for daily drug use is associated with a highly significant positive effect on the chance of receiving MAT, whereas the corresponding association in the US sample is positive yet statistically insignificant. In both the US sample and the Rhode Island sample, having some college education (as opposed to having just a high school diploma) is negatively associated with the chance of receiving MAT, but that association is statistically significant only in the case of the US sample. Based on the analysis of either the US sample or the Rhode Island sample, first treatment episodes (as opposed to a repeat episode for the same patient) do not differ significantly in terms of the probability that the patient gets MAT.

In both geographic samples, having private health insurance (as opposed to government-sponsored health insurance) predicts that a patient has a lower chance of getting MAT, and this effect is especially pronounced in Rhode Island. Paying out-of-pocket predicts a much higher chance of receiving MAT in Rhode Island, whereas in the US sample the corresponding effect is small, negative, and statistically insignificant. A caveat to these results, however, is that in the US sample more than 50 percent of the observations have missing health insurance information, whereas only 8 percent of the Rhode Island observations are missing information about health insurance.[33] If missing insurance information did not occur at such high rates outside of Rhode Island, the relationship between a patient's out-of-pocket costs and the probability of receiving MAT might not differ so dramatically between the United States and Rhode Island.

These results suggest that the higher incidence of MAT among OUD treatment episodes in Rhode Island can to some extent be accounted for—at least in a proximate sense—by differences in the observed characteristics of these treatment episodes in Rhode Island when compared to the average characteristics among OUD treatment episodes occurring elsewhere in the United States. For example, the factors that may predict a higher MAT incidence in Rhode Island compared with the United States as a whole (based on the national regression model) include Rhode Island's having (1) a smaller share of patients under 21 years of age, as well as a smaller share in 21–29 age group; (2) a larger percentage of married patients; (3) relatively more employed patients; (4) a larger share with government-sponsored health insurance; (5) smaller shares of court-referred treatments and other-referred treatments; (6) a larger share of cases involving intravenous drug use; and (7) a larger percentage of patients reporting daily drug use in the previous month.

However, other aspects of Rhode Island's treatment episodes would tend to predict a lower incidence of MAT, such as the state having (1) a higher share of patients who are 30–39 years old, and a lower share 40 years of age and older; (2) a larger percentage of male patients; (3) fewer Hispanic patients; and (4) a slightly larger percentage of homeless patients.

Each of the two regression models can be used to predict the probability that a treatment episode for OUD will include MAT, conditional on a particular set of patient or episode characteristics. Based on the US regression model, a hypothetical treatment episode that exhibits

[33] These statements about the share with missing health insurance information apply to the recoded health insurance variable described above. The share of observations with missing information on health insurance is even greater in the original health insurance variable in the TEDS-A.

the sample-wide average value for each patient characteristic, and that takes place in the average state in the average year, is predicted to have a roughly 18 percent chance of including MAT—see Figure 4.[34] Based on the same model, an episode involving the same characteristics but taking place in Rhode Island (in the average year) has a roughly 33 percent chance of including MAT. This 15 percentage-point difference in the expected probability of receiving MAT reflects just the contribution of unobserved factors in Rhode Island relative to the unobserved factors in the average state.[35] Still, based on the same regression model, a treatment episode that exhibits the average characteristics observed *among the Rhode Island episodes* and that takes place in Rhode Island (in the average year) has a 37 percent chance of including MAT. The difference between these latter two estimates—the increase from a 33 percent chance to a 37 percent chance of MAT—owes to the difference between the average observed characteristics among treatment episodes for OUD in Rhode Island as opposed to the average observed characteristics among treatment episodes for OUD in the United States as a whole. This illustrative exercise shows that most of the gap between the predicted usage rate of MAT in Rhode Island compared with rest of the United States is likely to be attributable in large part to factors not included in the regression model.

For the Rhode Island sample, the actual share of treatment episodes for OUD that included MAT is 40 percent, whereas the national model would predict a MAT rate for Rhode Island of just 37 percent. This 3 percentage-point difference reflects the fact that the coefficients on the various factors differ when estimated using only the Rhode Island sample. Note also that the predicted 18 percent likelihood that the "average patient" in the United States receives MAT for OUD is a considerably lower probability than the *average predicted chance* of receiving MAT across patients in the United States, which is 26 percent. These last two results differ because the regression model is nonlinear and most of the characteristics are discrete, such that no individual patient exhibits the average characteristics.

Figure 5 illustrates the impact of various factors on the predicted chance that a patient being treated for OUD receives MAT, based on either the model estimated over the entire United States or the model estimated only using treatment episodes from Rhode Island. A given point on the vertical axis in each panel shows the predicted probability that a patient with the given

[34] This episode is hypothetical in the sense that no individual patient exhibits average characteristics, because most characteristics are discrete factors such as gender or insurance type.

[35] The effect of unobserved factors in Rhode Island is highly statistically significant, based on the standard error of the coefficient on the dummy variable for Rhode Island in the regression.

characteristic will receive MAT, holding all other characteristics at their respective sample means (based on either the US sample or the Rhode Island sample, accordingly). Panel A shows that, in the United States, a woman with otherwise average patient characteristics has a roughly 21 percent chance of receiving MAT, whereas a comparable male patient has a 17 percent chance of getting MAT. The gender gap in the predicted MAT probability is even greater in Rhode Island—44 percent for women versus 31 percent for men—although this gender disparity is consistent with the previous results which showed that in Rhode Island, both men and women have a greater chance of receiving MAT on average than persons living elsewhere in the United States.

Similarly to Panel A, Panel B of Figure 5 shows that the positive gap between Hispanics and non-Hispanics in the expected probability of receiving MAT is somewhat greater in Rhode Island than in the United States as a whole. Panel C shows that intravenous drug use predicts a modestly higher chance of receiving MAT, by about 5 percentage points in the United States and by 3 percentage points in Rhode Island. Panel D shows the contrasts in the predicted probability of receiving MAT by the type of health insurance, revealing a very large gap in Rhode Island between patients paying out-of-pocket and others, as well as a considerable gap between those with public insurance as opposed to private insurance. For the US sample, having public insurance still predicts a significantly higher chance of a patient getting MAT than if the patient has private insurance, but the gap between public and private health insurance and the probability of receiving MAT is much smaller in the United States than it is in Rhode Island.

VII. Discussion

The TEDS data analyzed in this paper indicate that Rhode Island has higher share of MAT among treatment episodes for OUD, both before and after adjusting for differences in the observed characteristics of the treatment episodes. Based on the regression analysis performed using data from all 50 states (plus the District of Columbia and Puerto Rico), less than half of this difference in treatment is accounted for in proximate terms by differences in observed characteristics, such as the type of health insurance and demographic variables. The rest of the discrepancy is attributed to unobserved factors and differences in the relationship between observed factors and the chance of receiving MAT in Rhode Island compared to other places.

Unobserved patient-level factors, such as illness severity or preferences regarding treatment options, may contribute to the higher MAT rate in Rhode Island. The state's higher

opioid overdose rate suggests that the average illness severity among its OUD patients may in fact be above the national average. The TEDS-A offers some corroboration of this hypothesis, as treatment episodes in Rhode Island were more likely to involve patients who used drugs intravenously and patients who reported having used drugs on a daily basis in the previous month, although these factors are imperfect indicators of illness severity. However, the TEDS-A offers no information on individual patient preferences or beliefs concerning MAT. Aspects of the policy environment in Rhode Island are likely to contribute to the state's higher tendency to use MAT, such as the high per-capita number of OTPs that dispense methadone in the state, the high level of federal funding per capita that the state has received recently to combat the opioid epidemic, and policies instituted by the Raimondo administration to promote greater access to MAT. However, since these latter two factors are quite recent developments, neither one can explain the persistently higher MAT rate among OUD treatments in Rhode Island since 1999, but they may have contributed to the sharp increase in the state's MAT rate observed in 2017—see Figure 3b.

Differences across the individual states in the rules governing which facilities must report to the TEDS might also contribute to the fact that Rhode Island shows a higher incidence of MAT among OUD treatment episodes. In particular, Rhode Island is the only state in which a Veterans Administration hospital voluntarily reports to the TEDS. However, even though regression results indicate that veterans in Rhode Island are significantly more likely to receive MAT than are non-veterans, only 1 percent of the OUD treatment episodes in the state involved veterans, which means that this subset of patients cannot really account for why Rhode Island has a higher tendency to apply MAT for OUD than other states.

The fact that some factors take on different signs in the regression model solely estimated on Rhode Island suggests that some explanatory factors may mean something different in Rhode Island compared with the rest of the country. For example, the fact that patients treated for OUD in Rhode Island who pay for treatment out-of-pocket are more likely to get MAT than are patients with government-provided health insurance, while elsewhere in the United States the opposite relationship prevails, indicates that out-of-pocket treatment costs may be lower in Rhode Island than elsewhere in the country. This hypothesis would be consistent with a policy environment that seeks to promote MAT, but without data on patients' actual costs, it is hard to verify this possible connection.

Based on the evidence presented above, Rhode Island exhibits both a high MAT rate among OUD treatment episodes and a higher opioid-related death rate compared to the respective US averages. These facts do not necessarily imply that MAT is ineffective in Rhode Island. Instead, these two outcomes may indicate that the state has a large number of OUD sufferers who do not receive any treatment for this illness. Recall from Figure 2b that since 2006, on average, Rhode Island has had fewer OUD treatment episodes relative to its population than the rest of New England. A separate report using other national data sources on drug addiction and treatment indicates that among all the New England states during 2015 and 2016, Rhode Island had the lowest observed treatment rate among OUD sufferers. Specifically, for every 10 patients observed with OUD in Rhode Island in 2015, only 1.5 patients received OUD treatment (with or without MAT) at a specialty facility in Rhode Island in 2016. Within New England, Vermont had the region's highest treatment rate, with six patients in treatment in 2016 for every 14 patients observed with OUD in 2015.[36]

Although this finding is suggestive of a large gap in Rhode Island between rates of OUD and rates of treatment for this illness, the SAMHSA data are not definitive because (like the TEDS) treatments for OUD rendered by primary-care providers, such as buprenorphine prescriptions, are not observed. Furthermore, in the TEDS the episode location refers to the treatment facility rather than the patient's residence, so Rhode Island residents who receive treatment out-of-state (such as nearby in Massachusetts or Connecticut) would not contribute to the observed set of Rhode Island treatment episodes. Nonetheless, the results presented in this paper suggest that policymakers and researchers need to learn more about the barriers to OUD treatment in general, besides engaging in further efforts to understand and alleviate the barriers to receiving MAT.

These findings offer some potential policy implications that should be relevant at the national level as well within New England, since the opioid crisis has affected all regions of the United States. The fact that, within any geographic unit of analysis, women are more likely to receive MAT than men, even though men represent the majority of OUD sufferers, suggests that targeting men presents an opportunity to increase the MAT rate. The positive association between MAT and Hispanic ethnicity could occur if Hispanics tend to live closer to an OTP that dispenses

[36]The data source for these values is Substance Abuse and Mental Health Services Administration (SAMHSA), Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015–2016.

methadone than do non-Hispanics, suggesting that proximity to a treatment facility matters, but other mechanisms might be driving this association. The negative probability of receiving MAT if the patient was referred to OUD treatment by the court may reflect the fact that, in some states, the use of either methadone or buprenorphine constitutes a parole violation. Or it could be that those patients referred or ordered into treatment by the court are less motivated to seek effective treatments for opioid abuse than those who enter treatment more voluntarily. Similarly, some dependent living facilities may choose not admit residents who are known to be taking any opioid agonists, including methadone and buprenorphine. The finding that employed patients are more likely to receive MAT deserves further investigation concerning which mechanisms underlie this association—it could be that employers help their employees find effective treatment programs, or rather that employed individuals may simply have greater economic resources and other support services that facilitate their receiving MAT. The negative association between educational attainment and MAT is somewhat surprising, as it suggests that more educated patients are not more knowledgeable about what constitutes effective treatment for OUD. However, other unobserved factors may differ systematically with educational attainment, such as the severity of the patient's illness, in a way that would render these associations less puzzling.

The finding that having private health insurance, as compared with government-sponsored insurance, predicts that a patient has a lower chance of receiving MAT aligns with the fact that private insurance plans, especially prior to the ACA, tended to offer weaker coverage for substance abuse treatment. And even though the ACA greatly expanded the set of health insurance plans that were required to cover "evidence-based treatment" for substance abuse disorders, the negative effect of having private insurance holds even in regressions restricted to the years spanning 2014 through 2017—after the ACA was implemented. This finding suggests that adequate coverage for substance abuse treatment may still be lacking in many US health plans, due to a combination of the incomplete reach of the ACA's requirements and possibly also due to an imperfect adherence to those requirements. If Rhode Island's favorable policy and funding environment for MAT played any role in its higher tendency to treat OUD with MAT, these results suggest that other states that have not already done so could adopt similar strategies—and seek additional federal funding—to help increase access to MAT.

References

Bipartisan Policy Center. 2019. "Tracking Federal Funding to Combat the Opioid Crisis." Bipartisan Policy Center. March 2019. https://bipartisanpolicy.org/wp-content/uploads/2019/03/Tracking-Federal-Funding-to-Combat-the-Opioid-Crisis.pdf.

Choo, Christie. 2009. "Medications Used in Opioid Maintenance Treatment." *US Pharmacist* 34(11): 40–53.

Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. 2019. *Treatment Episode Data Set-Admissions (TEDS-A), Concatenated 2000–2017*. Rockville, MD: Substance Abuse and Mental Health Services Administration.

Centers for Disease Control and Prevention. 2019. CDC WONDER Database. Last modified September 26, 2019. https://wonder.cdc.gov/.

Department of Health and Human Services. 2001. "Opioid Drugs in Maintenance and Detoxification Treatment of Opiate Addiction." *Federal Register* 66: 2076-4102. Accessed October 18, 2019. http://www.gpo.gov/kdsys/pkg/FR-2001-01-17/html/01-723.htm.

Diaper A. M., F. D. Law, and J. K. Melichar. 2014. "Pharmacological Strategies for Detoxification." *British Journal of Clinical Pharmacology* 77: 302–314.

Green, Traci C., Jennifer Clarke, Lauren Brinkley-Rubinstein, Brandon D. L. Marshall, Nicole Alexander-Scott, Rebecca Boss, and Josiah D. Rich. 2018. "Postincarceration Fatal Overdoses After Implementing Medications for Addiction Treatment in a Statewide Correctional System." *JAMA Psychiatry* 75, No. 4 (April): 405–407.

Grooms, Jevay, and Alberto Ortega. 2019. "Examining Medicaid Expansion and the Treatment of Substance Use Disorders." *AEA Papers and Proceedings* 109: 187–191. https://doi.org/10.1257/pandp.20191090.

Institute of Medicine. 1995. *Federal Regulation of Methadone Treatment*. Washington, DC: The National Academies Press. https://doi.org/10.17226/4899.

Johnson, Quentin, Brian Mund, and Paul J. Joudrey. 2018. "Improving Rural Access to Opioid Treatment Programs." *Journal of Law, Medicine & Ethics* 46(2): 437–439. https://doi.org/10.1177/1073110518782951.

Jones, Christopher M., Melinda Campopiano, Grant Baldwin, and Elinore McCance-Katz. 2015. "National and State Treatment Need and Capacity for Opioid Agonist Medication-Assisted Treatment." *American Journal of Public Health* 105, No. 8 (August): 55–63. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4504312/pdf/AJPH.2015.302664.pdf.

Knudsen, Hannah K., Paul M. Roman, and Carrie B. Oser. 2011. "Facilitating Factors and Barriers to the Use of Medications in Publicly Funded Addiction Treatment Organizations," *Journal of Addiction Medicine* 4(2): 99–107. https://doi.org/10.1097/ADM.0b013e3181b41a32.

Krantz, Mori J., and Philip S. Mehler. 2004. "Treating Opioid Dependence. Growing Implications for Primary Care*." Archives of Internal Medicine* 164(3): 277–288. https://doi.org/10.1001/archinte.164.3.277.

Maclean, Johanna Catherine, and Brendan Saloner. 2017. "The Effect of Public Insurance Expansions on Substance Use Disorder Treatment: Evidence from the Affordable Care Act." Working Paper No. 23342. Cambridge, MA: National Bureau of Economic Research.

Manchester, Joyce, and Riley Sullivan. 2019. "Exploring Causes of and Responses to the Opioid Epidemic in New England." New England Public Policy Center Report 19-2. Boston: Federal Reserve Bank of Boston. https://www.bostonfed.org/publications/new-england-public-policy-center-policy-report/2019/exploring-causes-of-and-responses-to-the-opioid-epidemic-in-new-england.aspx.

National Academies of Sciences, Engineering, and Medicine. 2018. *Medication-Assisted Treatment for Opioid Use Disorder: Proceedings of a Workshop—in Brief.* Washington, DC: The National Academies Press. https://doi.org/10.17226/25322.

Pullen, Ellen, and Carrie Oser. 2014. "Barriers to Substance Abuse Treatment in Rural and Urban Communities: A Counselor Perspective," *Substance Use & Misuse* 49(7): 891–901. https://dx.doi.org/10.3109/10826084.2014.891615.

Saloner, Brendan, and Shankar Karthikeyan. 2015. "Changes in Substance Abuse Treatment Use Among Individuals with Opioid Use Disorders in the United States, 2004–2013." *Journal of the American Medical Association* 314: 1515–1517. https://doi.org/10.1001/jama.2015.10345.

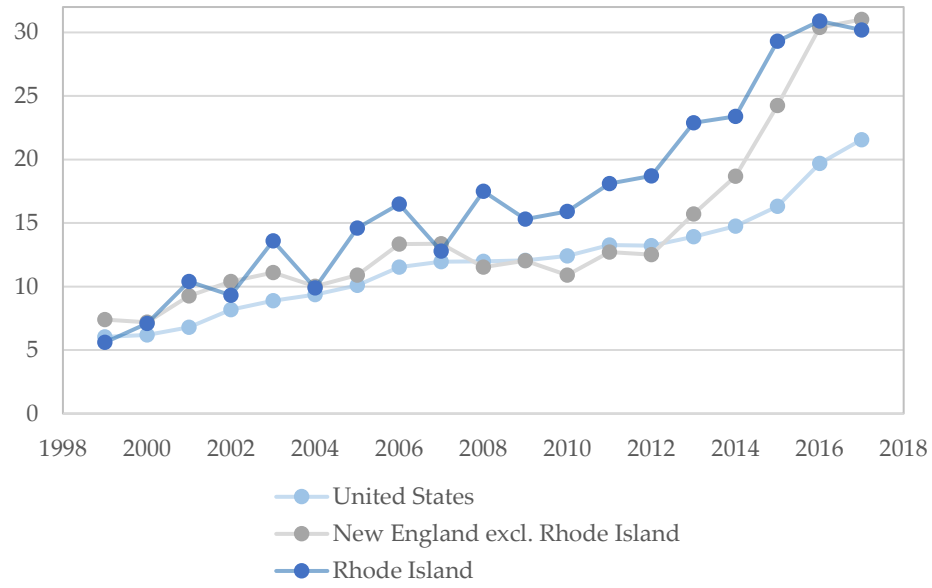
Scholl, Lawrence, Puja Seth, Mbabazi Kariisa, Nana Wilson, and Grant Baldwin. 2019. "Drug and Opioid-Involved Overdose Deaths – United States, 2013-2017." *Morbidity and Mortality Weekly Report* 67 (51 & 52): 1419–1427.

Substance Abuse and Mental Health Services Administration (SAMHSA). 2019. "Medications for Opioid Use Disorder." Treatment Improvement Protocol (TIP) Series 63. US Department Health & Human Services Publication No. (SMA) 18-5063FULLDOC. Washington, DC: US Department of Health and Human Services.

Walley, Alexander Y., Debbie Cheng, C.E. Pierce, Clara Chen, T. Filippell, Jeffrey H. Samet, and D.P. Alford. 2012. "Methadone Dose, Take Home Status, and Hospital Admission among Methadone Maintenance Patients." *Journal of Addiction Medicine* 6: 186–190.

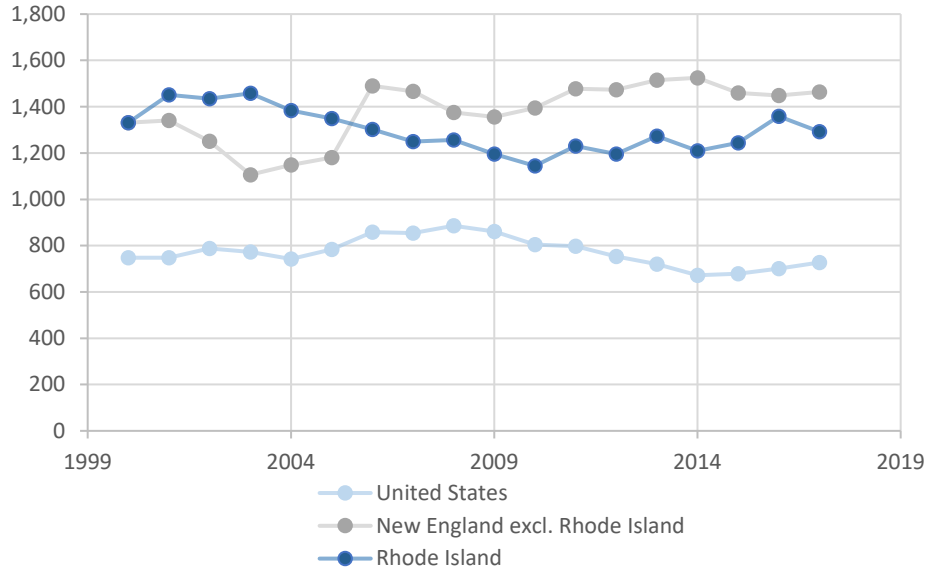
World Health Organization. 2009. "Guidelines for the Psychosocially Assisted Pharmacological Treatment of Opioid Dependence." https://apps.who.int/iris/handle/10665/43948.

Figure 1: Age-Adjusted Opioid Overdose Mortality Rates
per 100,000 Persons, 1999 through 2017



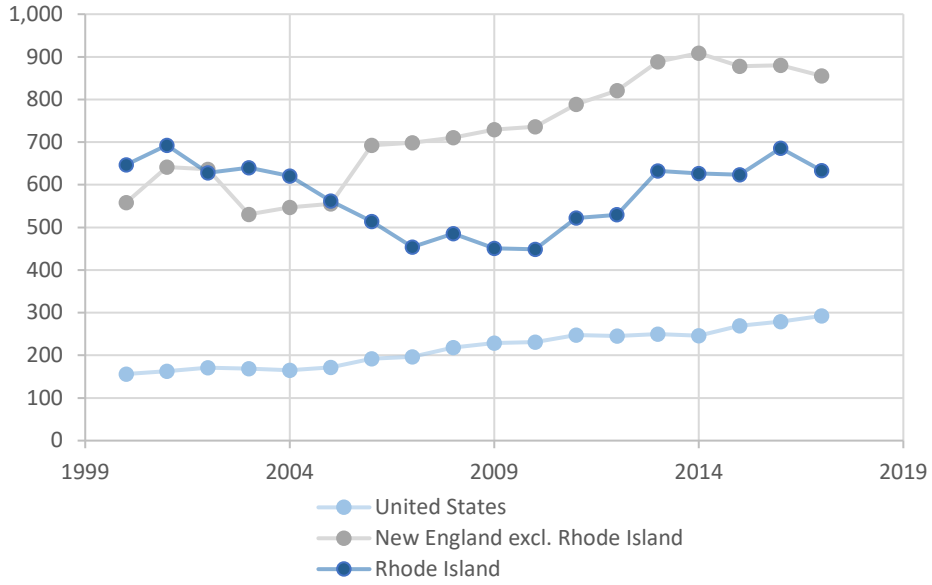
Source: United States Centers for Disease Control. The base population includes all residents in the given geographic area.

Figure 2a: Substance Abuse Treatment Episodes, per 100,000 Persons, 1999 through 2017



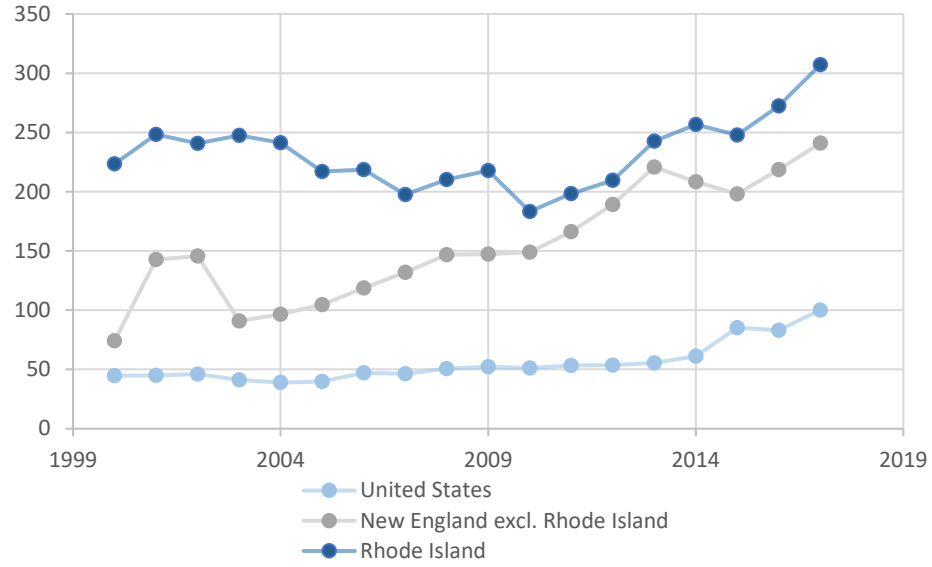
Source: Author's calculations using Treatment Episode Data Set—Admissions (TEDS-A) and the US Census Bureau. The base population includes civilians 12 years of age and older.

Figure 2b: Treatment Episodes for Opioid Use Disorder, per 100,000 Persons, 2000 through 2017



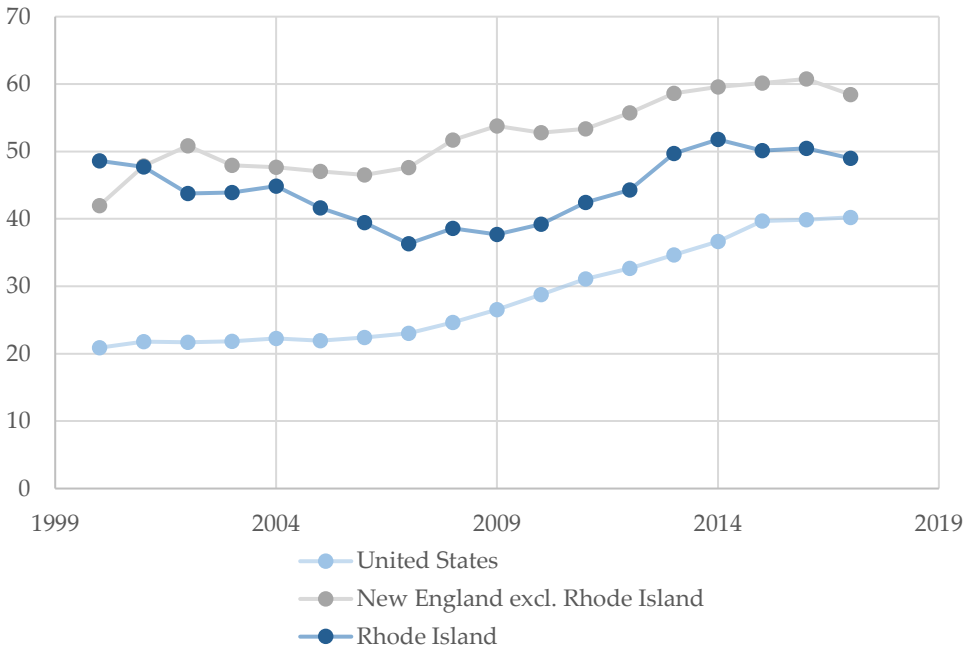
Source: Author's calculations using Treatment Episode Data Set—Admissions (TEDS-A) and the US Census Bureau. The base population includes civilians 12 years of age and older.

Figure 2c: Treatment Episodes for Opioid Use Disorder including Medication-Assisted Treatment, per 100,000 Persons, 2000 through 2017



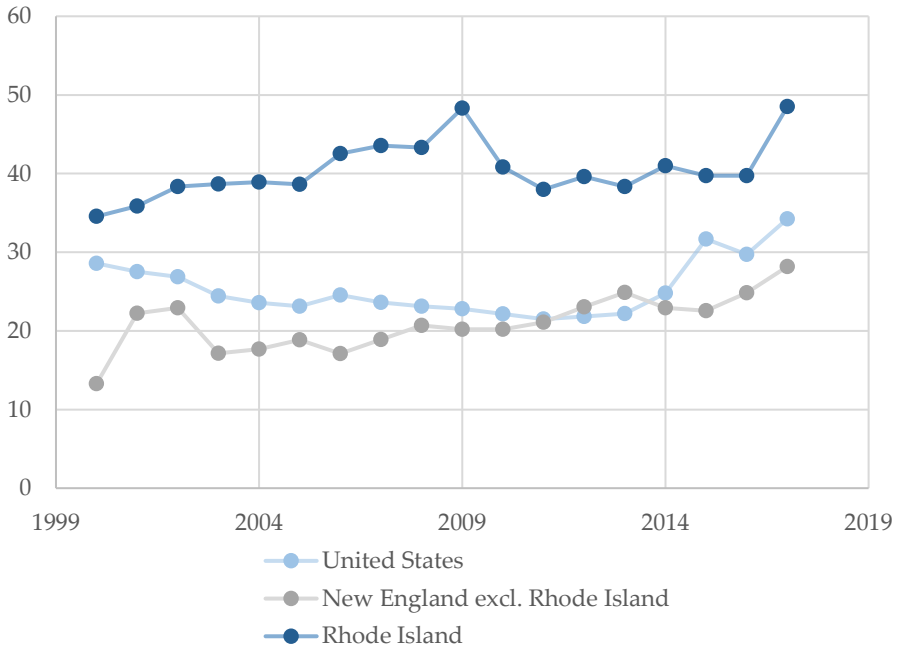
Source: Author's calculations using Treatment Episode Data Set—Admissions (TEDS-A) and the US Census Bureau. The base population includes civilians 12 years of age and older.

Figure 3a: Treatment Episodes for Opioid Use Disorder as a Percentage of all of Treatment Episodes, 2000 through 2017



Source: Author's calculations using Treatment Episode Data Set—Admissions (TEDS-A).

Figure 3b: Treatment Episodes for OUD including MAT, as a Percentage of all Treatment Episodes for OUD, 2000 through 2017



Source: Author's calculations using Treatment Episode Data Set—Admissions (TEDS-A).

Table 1: Sample Proportions with Selected Characteristics: Treatment Episodes for Opioid Use Disorder (OUD) and Treatment Episodes for OUD including Medication-Assisted Treatment (MAT), by Geographic Location within the United States from 2000 through 2017

	Share of Treatment Episodes with the Given Patient Characteristic					
	United States		New England*		Rhode Island	
Variable	OUD	MAT	OUD	MAT	OUD	MAT
Treatment includes MAT	0.266	1.000	0.215	1.000	0.402	1.000
Under 21 Years of Age	0.061	0.026	0.059	0.031	0.035	0.021
21–29 Years of Age	0.324	0.260	0.378	0.347	0.317	0.293
30–39 Years of Age	0.287	0.284	0.314	0.335	0.350	0.341
Over 40 Years of Age	0.328	0.430	0.249	0.288	0.297	0.345
Male	0.633	0.609	0.673	0.587	0.676	0.653
Female	0.367	0.391	0.327	0.413	0.324	0.347
White	0.707	0.647	0.783	0.812	0.908	0.917
Non-White	0.293	0.353	0.217	0.188	0.092	0.083
Hispanic	0.154	0.199	0.158	0.147	0.090	0.096
Non-Hispanic	0.846	0.801	0.842	0.853	0.910	0.904
Married	0.103	0.112	0.095	0.137	0.166	0.237
Unmarried	0.897	0.888	0.905	0.863	0.834	0.763
No High School Diploma	0.330	0.339	0.299	0.304	0.332	0.331
High School Diploma	0.448	0.456	0.495	0.484	0.421	0.414
Some College or More	0.222	0.205	0.205	0.212	0.246	0.254
Employed	0.182	0.243	0.168	0.258	0.255	0.347
Nonemployed	0.823	0.763	0.836	0.749	0.750	0.659
Private Insurance	0.034	0.022	0.050	0.041	0.107	0.027
Government Insurance	0.282	0.274	0.496	0.560	0.626	0.541
Out-of-Pocket Payment	0.164	0.131	0.151	0.089	0.188	0.403
Missing Insurance Info.	0.520	0.573	0.303	0.309	0.079	0.028
Court-Referred	0.170	0.039	0.089	0.032	0.104	0.019
Individual-Referred	0.529	0.761	0.624	0.716	0.684	0.859
Provider/Other Referred	0.300	0.200	0.287	0.252	0.212	0.122
Homeless	0.132	0.071	0.176	0.084	0.149	0.045
Dependent Living	0.167	0.148	0.081	0.067	0.156	0.083
Independent Living	0.701	0.782	0.742	0.849	0.695	0.872
First Treatment Episode	0.245	0.242	0.122	0.128	0.149	0.164
One or More Prior Episodes	0.755	0.758	0.878	0.872	0.851	0.836
Veteran	0.023	0.025	0.015	0.024	0.011	0.014
Psychiatric Problems	0.238	0.233	0.300	0.416	0.426	0.381
Intravenous Drug Use	0.500	0.567	0.581	0.537	0.568	0.556
Daily Use in Past Month	0.620	0.707	0.691	0.661	0.699	0.779
Observations	9,973,666	2,574,874	1,500,763	321,901	94,564	38,050

Note: The New England values exclude data from Rhode Island.
Source: Author's calculations using Treatment Episode Data Set—Admissions (TEDS-A).

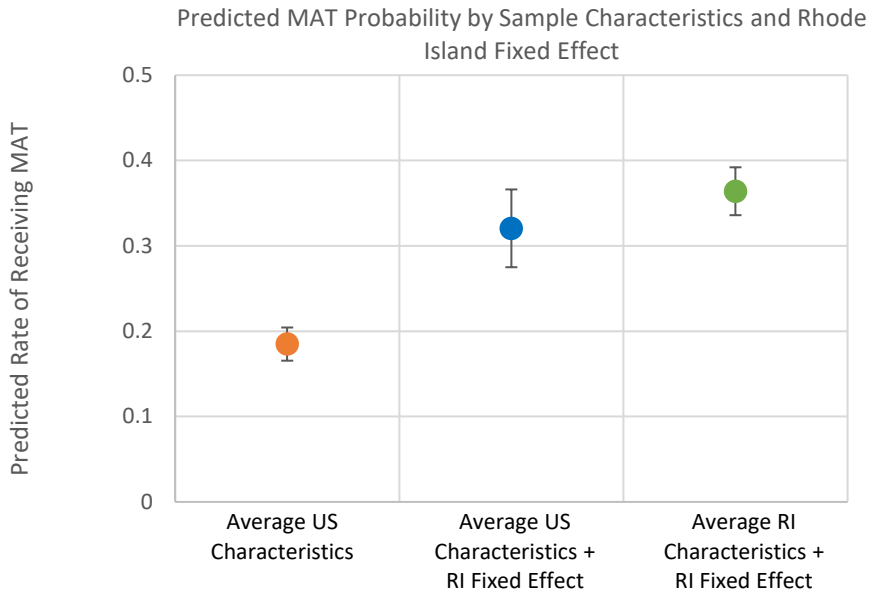
Table 2: Multivariate Logit Regression Results: Association of Selected Characteristics with Probability that a Treatment Episode for Opioid Use Disorder Includes Medication-Assisted Treatment, by Geography, 2000 to 2017

	(1) MAT | OUD United States	(2) MAT | OUD Rhode Island
Under 21 Years of Age	−1.192***	−0.968***
	(0.0522)	(0.0595)
21–29 Years of Age	−0.522***	−0.527***
	(0.0368)	(0.0228)
30–39 Years of Age	−0.299***	−0.403***
	(0.0338)	(0.0215)
Female	0.228***	0.556***
	(0.0471)	(0.0194)
Non-White	0.147	0.0844**
	(0.0878)	(0.0309)
Hispanic	0.221*	0.316***
	(0.101)	(0.0305)
Married	0.344*	0.689***
	(0.144)	(0.0241)
No High School Diploma	0.111***	0.218***
	(0.0207)	(0.0203)
Some College or More	−0.130***	−0.0028
	(0.0383)	(0.0230)
Employed	0.576***	0.332***
	(0.0872)	(0.0225)
Private Insurance	−0.911***	−2.049***
	(0.134)	(0.0401)
Out-of-Pocket Payment	−0.0818	2.518***
	(0.178)	(0.0296)
Missing Insurance Information	0.0883	−1.537***
	(0.170)	(0.0511)
Court-Referred Treatment	−2.310***	−2.818***
	(0.390)	(0.0533)
Provider/Other Referred	−0.838***	−1.098***
	(0.151)	(0.0239)
Homeless	−1.170***	−1.733***
	(0.169)	(0.0301)
Dependent Living	−0.298**	−0.952***
	(0.103)	(0.0270)
First Treatment Episode	−0.0542	0.00514
	(0.109)	(0.0283)
Veteran	0.171*	0.417***
	(0.0725)	(0.0838)
Psychiatric Problems	0.313	−0.211***
	(0.248)	(0.0212)
Intravenous Drug Use	0.302***	0.113***
	(0.0565)	(0.0185)

Daily Use in Past Month	0.409	0.388***
	(0.222)	(0.0225)
Constant	−1.778***	−0.215***
	(0.162)	(0.0528)
Year FE	Yes	Yes
State FE	Yes	No
N	9447426	92813
pseudo R^2	0.246	0.354

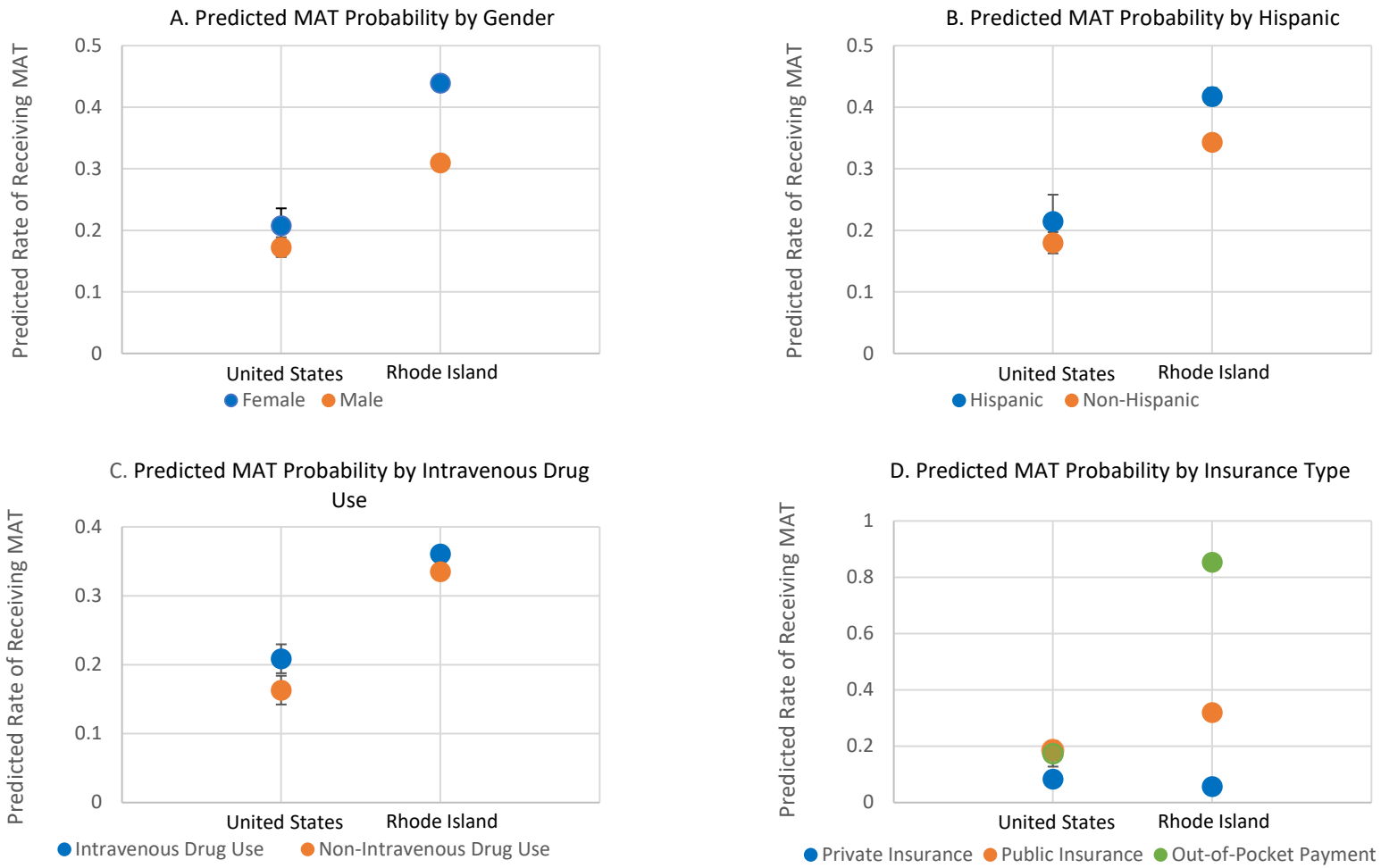
Source: Author's calculations using Treatment Episode Data Set—Admissions (TEDS-A).
Notes: For each geography the sample consists of the set of treatment episodes for opioid use disorder. Opioid use disorder is defined based on having an opioid among the three substances of abuse for which the patient is seeking treatment. The dependent variable is a binary indicator of whether the treatment episode included the use of medication-assisted treatment (MAT). Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The omitted groups of the various categorical variables, respectively, are: age over 40, male, white, non-Hispanic, non-married, non-employed, individual-referred, independent living, one or more prior treatment episodes, non-veteran, no psychiatric problems, no intravenous drug use, and intermittent or no drug use in the past month (as opposed to daily use). In the US regression, standard errors are clustered by state. In the regression for Rhode Island, standard errors are robust.

Figure 4: Predicted Probabilities of MAT for Average Characteristics, United States versus Rhode Island



Source: Author's calculations using Treatment Episode Data Set—Admissions (TEDS-A).
Note: The prediction on the left (orange dot) is based on the US regression, holding all characteristics at their sample means, including all state dummies. The middle prediction (blue dot) is based on the US regression, holding all characteristics at their sample means but setting the state dummy to Rhode Island. The prediction on the right (green dot) is also based on the US regression, but holding all characteristics at their average values within Rhode Island and setting the state dummy to Rhode Island. Brackets around each dot show the 95 percent confidence interval for each estimate.

Figure 5: Impact of Selected Characteristics on the Predicted Probability of MAT, United States versus Rhode Island



Source: Author's Calculations using Treatment Episode Data Set – Admissions (TEDS-A).
Notes: Each dot shows the predicted MAT probability evaluated at the given characteristic, holding all other characteristics at the relevant sample means. Values for the United States are based on the regression in column 1 of Table 2, and values for Rhode Island are based on the regression in column 2 of Table 2. Brackets around each dot show the 95 percent confidence interval for each estimate. Rhode Island estimates have confidence intervals that are too narrow to show up on the graph. The predicted MAT rates for the category "Missing Insurance Information" are suppressed from the graph.

Appendix

Table A1: List of States Excluded from the TEDS-A, by Year

Year	States Excluded
2000	West Virginia, Puerto Rico
2001	West Virginia, Puerto Rico
2002	West Virginia, Puerto Rico
2004	Alaska, Arkansas, District of Columbia
2005	Alaska, District of Columbia
2006	Alaska, District of Columbia
2007	Alabama
2009	District of Columbia, Mississippi
2014	South Carolina
2015	Oregon, South Carolina
2016	Georgia, Oregon
2017	Georgia, Oregon

Source: Treatment Episode Data Set – Admissions (TEDS-A).
Note: States are excluded from the given years due to insufficient data reporting.

Table A2: Sample Proportions with Selected Characteristics: Treatment Episodes for Opioid Use Disorder (OUD) and Treatment Episodes for OUD including MAT (MAT), by Geography, 2000-2017 (Alternative Definition of OUD)

	Share of Treatment Episodes with the Given Patient Characteristic					
	United States		New England*		Rhode Island	
Variable	OUD	MAT	OUD	MAT	OUD	MAT
Treatment includes MAT	0.315	1.000	0.236	1.000	0.463	1.000
Under 21 Years of Age	0.053	0.026	0.057	0.031	0.033	0.021
21–29 Years of Age	0.335	0.260	0.393	0.348	0.331	0.293
30–39 Years of Age	0.288	0.283	0.314	0.333	0.349	0.341
Over 40 Years of Age	0.324	0.431	0.237	0.288	0.288	0.345
Male	0.631	0.611	0.674	0.590	0.677	0.653
Female	0.369	0.389	0.326	0.410	0.323	0.347
White	0.703	0.643	0.781	0.808	0.910	0.917
Non-White	0.297	0.357	0.219	0.192	0.090	0.083
Hispanic	0.161	0.201	0.164	0.151	0.095	0.096
Non-Hispanic	0.839	0.799	0.836	0.849	0.905	0.904
Married	0.102	0.112	0.095	0.138	0.172	0.237
Unmarried	0.898	0.888	0.905	0.862	0.828	0.763
No High School Diploma	0.324	0.340	0.299	0.305	0.332	0.331
High School Diploma	0.455	0.456	0.498	0.484	0.423	0.415
Some College or More	0.221	0.204	0.204	0.211	0.246	0.254
Employed	0.185	0.244	0.167	0.262	0.264	0.348
Nonemployed	0.820	0.762	0.837	0.745	0.741	0.659
Missing Insurance Information	0.514	0.577	0.288	0.319	0.081	0.029
Private Insurance	0.034	0.021	0.050	0.041	0.100	0.027
Government Insurance	0.289	0.271	0.509	0.551	0.610	0.540
Out-of-Pocket Payment	0.163	0.131	0.153	0.089	0.208	0.404
Court-Referred Treatment	0.150	0.037	0.076	0.028	0.084	0.019
Individual-Referred Treatment	0.564	0.768	0.650	0.728	0.724	0.859
Provider/Other Referred Treatment	0.286	0.195	0.274	0.243	0.191	0.122
Homeless	0.126	0.069	0.175	0.080	0.137	0.045
Dependent Living	0.164	0.148	0.078	0.066	0.149	0.083
Independent Living	0.710	0.783	0.747	0.854	0.714	0.873
First Treatment Episode	0.245	0.243	0.120	0.130	0.150	0.165
One or More Prior Episodes	0.755	0.757	0.880	0.870	0.850	0.835
Veteran	0.021	0.025	0.014	0.025	0.011	0.014
Psychiatric Problems	0.226	0.228	0.293	0.408	0.409	0.380
Intravenous Drug Use	0.538	0.570	0.614	0.538	0.600	0.557
Daily Use in Past Month	0.654	0.712	0.719	0.666	0.731	0.781
Observations	8,191,957	2,514,761	1,302,900	307,452	81,826	37,851

Source: Author's calculations using Treatment Episode Data Set—Admissions (TEDS-A).
Note: New England values exclude data from Rhode Island. Opioid use disorder ("OUD") is defined based on a patient's primary substance use at admission being any of heroin, non-prescription methadone, or other opiates and synthetics.

Table A3: Multivariate Logit Regression Results: Association of Selected Characteristics with Probability that a Treatment Episode for Opioid Use Disorder Includes Medication-Assisted Treatment, by Geography, 2000 to 2017 (Alternative Definition of OUD)

	(1) MAT | OUD United States	(2) MAT | OUD Rhode Island
Under 21 Years of Age	−1.216***	−0.984***
	(0.005)	(0.063)
21–29 Years of Age	−0.625***	−0.709***
	(0.002)	(0.024)
30–39 Years of Age	−0.348***	0.496***
	(0.002)	(0.023)
Female	0.222***	0.576***
	(0.002)	(0.020)
Non-White	0.125***	0.110***
	(0.002)	(0.033)
Hispanic	0.189***	0.206***
	(0.003)	(0.032)
Married	0.328***	0.676***
	(0.003)	(0.026)
No High School Diploma	0.128***	0.217***
	(0.002)	(0.022)
Some College or More	−0.127***	0.0214
	(0.002)	(0.024)
Employed	0.573***	0.323***
	(0.002)	(0.024)
Private Insurance	−0.889***	−2.100***
	(0.006)	(0.040)
Out-of-Pocket Payment	−0.101***	2.589***
	(0.003)	(0.033)
Missing Insurance Info.	0.090***	−1.568***
	(0.007)	(0.046)
Court-Referred Treatment	−2.322***	−2.673***
	(0.004)	(0.049)
Provider/Other-Referred	−0.813***	−0.976***
	(0.002)	(0.025)
Homeless	−1.132***	−1.664***
	(0.003)	(0.032)
Dependent Living	−0.305***	−0.942***
	(0.003)	(0.028)
First Treatment Episode	−0.073***	−0.038
	(0.002)	(0.029)
Veteran	0.218***	0.408***
	(0.006)	(0.086)
Psychiatric Problems	0.390***	−0.126***
	(0.002)	(0.022)
Intravenous Drug Use	0.179***	−0.093***
	(0.002)	(0.020)
Daily Use in Past Month	0.315***	0.245***
	(0.002)	(0.022)

Constant	−1.305***	0.290***
	(0.020)	(0.057)
Year FE	Yes	Yes
State FE	Yes	No
N	7775690	80336
pseudo R^2	0.243	0.349

Source: Author's calculations using the Treatment Episode Data Set—Admissions (TEDS-A).

Notes: For each geography the sample consists of the set of treatment episodes for opioid use disorder within the given geographic area, where opioid use disorder is defined based on a patient's primary substance use at admission being any of heroin, non-prescription methadone, or other opiates and synthetics. The dependent variable is a binary indicator of whether the treatment episode included the use of medication-assisted treatment (MAT). Standard errors in parentheses. $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$. The omitted groups of the various categorical variables, respectively, are: age over 40, male, white, non-Hispanic, non-married, non-employed, individual-referred, independent living, one or more prior treatment episodes, non-veteran, no psychiatric problems, no intravenous drug use, and intermittent or no drug use in the past month (as opposed to daily use).

Table A4: US Logit Regression Results for MAT Conditional on OUD, 2014–2017 and 2000–2017

	United States 14-17	United States 00-17	Rhode Island 14-17	Rhode Island 00-17
Under 21 Years of Age	−1.264***	−1.192***	−.653***	−0.968***
	(0.103)	(0.052)	(0.109)	(0.060)
21 to 29 Years of Age	−0.561***	−0.522***	−0.352***	−0.527***
	(0.068)	(0.037)	(0.041)	(0.023)
30 to 39 Years of Age	−0.283***	−0.299***	−0.177***	−0.403***
	(0.052)	(0.034)	(0.039)	(0.022)
Female	0.229***	0.228***	0.516***	0.556***
	(0.058)	(0.047)	(0.034)	(0.019)
Non-White	−0.017	0.147	0.331***	0.084**
	(0.077)	(0.088)	(0.071)	(0.031)
Hispanic	0.144*	0.221*	0.567***	0.316***
	(0.066)	(0.101)	(0.057)	(0.031)
Married	0.326*	0.344*	0.696***	0.689***
	(0.136)	(0.144)	(0.045)	(0.024)
No High School Diploma	0.146**	0.111***	0.314***	0.218***
	(0.048)	(0.021)	(0.038)	(0.020)
Some College or More	−0.132*	−0.130***	0.066	−0.003
	(0.056)	(0.038)	(0.039)	(0.023)
Employed	0.364***	0.576***	0.383***	0.332***
	(0.060)	(0.087)	(0.038)	(0.026)
Private Insurance	−0.574**	−0.911***	−1.827***	−2.049***
	(0.181)	(0.134)	(0.055)	(0.040)
Out-of-Pocket Payment	-0.098	-0.082	1.371***	2.518***
	(0.173)	(0.178)	(0.067)	(0.030)
Missing Insurance Info.	1.304***	0.088	−0.402**	−1.537***
	(0.152)	(0.170)	(0.135)	(0.051)
Court-Referred Treatment	−1.964***	−2.310***	−2.371***	−2.818***
	(0.484)	(0.390)	(0.080)	(0.053)
Provider/Other-Referred	−0.651**	−0.838***	−1.453***	−1.098***
	(0.223)	(0.151)	(0.042)	(0.024)
Homeless	−1.053***	−1.170***	−1.336***	−1.733***
	(0.234)	(0.169)	(0.054)	(0.030)
Dependent Living	−0.362***	−0.298**	−0.043	−0.952***
	(0.100)	(0.103)	(0.061)	(0.027)
First Treatment Episode	0.117	−0.054	−0.161***	0.005
	(0.115)	(0.109)	(0.041)	(0.028)
Veteran	0.0417	0.171*	0.402***	0.417***
	(0.043)	(0.073)	(0.097)	(0.084)
Psychiatric Problems	0.348	0.313	−0.349***	−0.211***
	(0.356)	(0.248)	(0.035)	(0.021)
Intravenous Drug Use	0.246***	0.302***	0.271***	0.113***
	(0.044)	(0.057)	(0.033)	(0.019)
Daily Use in Past Month	0.278	0.409	−0.066	0.388***
	(0.295)	(0.222)	(0.034)	(0.023)
Constant	−1.586***	−1.778***	0.227***	−0.215***
	(0.254)	(0.162)	(0.063)	(0.053)
Year FE	Yes	Yes	Yes	Yes

State FE	Yes	Yes	No	No
N	2719920	9447426	23219	92813
pseudo R^2	0.229	0.246	0.226	0.354

Source: Author's calculations based on the Treatment Episode Data Set—Admissions (TEDS-A).
Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Dependent variable in all four columns is a TEDS treatment episode receiving MAT conditional on OUD in two time periods: 2014 to 2017 and 2000 to 2017. The omitted groups of the various categorical variables, respectively, are: age over 40, male, white, non-Hispanic, non-married, non-employed, individual-referred, independent living, one or more prior treatment episodes, non-veteran, no psychiatric problems, no intravenous drug use, and intermittent or no drug use in the past month (as opposed to daily use).

Table A5: Sample Proportions with Selected Characteristics: All Treatment Episodes by Geography, 2000-2017

	Share of Treatment Episodes with the Given Patient Characteristic		
Variable	United States	New England*	Rhode Island
Treatment includes MAT	0.076	0.110	0.179
Under 21 Years of Age	0.130	0.079	0.091
21–29 Years of Age	0.260	0.296	0.261
30–39 years of Age	0.261	0.286	0.300
Over 40 Years of Age	0.349	0.339	0.349
Male	0.673	0.693	0.686
Female	0.327	0.307	0.314
White	0.645	0.756	0.861
Non-White	0.355	0.244	0.139
Hispanic	0.146	0.139	0.086
Non-Hispanic	0.854	0.861	0.914
Married	0.112	0.109	0.164
Unmarried	0.888	0.891	0.836
No High School Diploma	0.378	0.299	0.349
High School Diploma	0.408	0.478	0.396
Some College or More	0.213	0.223	0.255
Employed	0.254	0.232	0.302
Nonemployed	0.754	0.776	0.705
Missing Insurance Info.	0.521	0.364	0.055
Private Insurance	0.040	0.076	0.193
Government Insurance	0.228	0.406	0.619
Out-of-Pocket Payment	0.211	0.154	0.132
Court-Referred	0.340	0.178	0.253
Individual-Referred	0.349	0.512	0.472
Provider/Other Referred	0.311	0.309	0.275
Homeless	0.123	0.154	0.130
Dependent Living	0.196	0.098	0.171
Independent Living	0.681	0.749	0.699
First Treatment Episode	0.369	0.190	0.233
One or More Episodes	0.631	0.810	0.767
Veteran	0.035	0.022	0.013
Psychiatric Problems	0.200	0.282	0.420
Intravenous Drug Use	0.166	0.313	0.257
Daily Use in Past Month	0.383	0.552	0.506
Observations	34,754,076	2,805,329	211,903

Source: Author's calculations using the Treatment Episode Data Set—Admissions (TEDS-A)
Note: New England values exclude the data from Rhode Island.