

Can Treatment with Medications for Opioid Use Disorder Improve Employment Prospects? Evidence from Rhode Island Medicaid Enrollees

By Mary A. Burke and Riley Sullivan

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Staff

- Hope Bodenschatz
- Mary A. Burke
- Nicholas Chiumentì
- Eli Inkelas
- Osborne Jackson
- Matthew Sexton
- Riley Sullivan
- Tanner Thering
- Jeffrey Thompson
- Pinghui Wu
- Bo Zhao

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EXECUTIVE SUMMARY

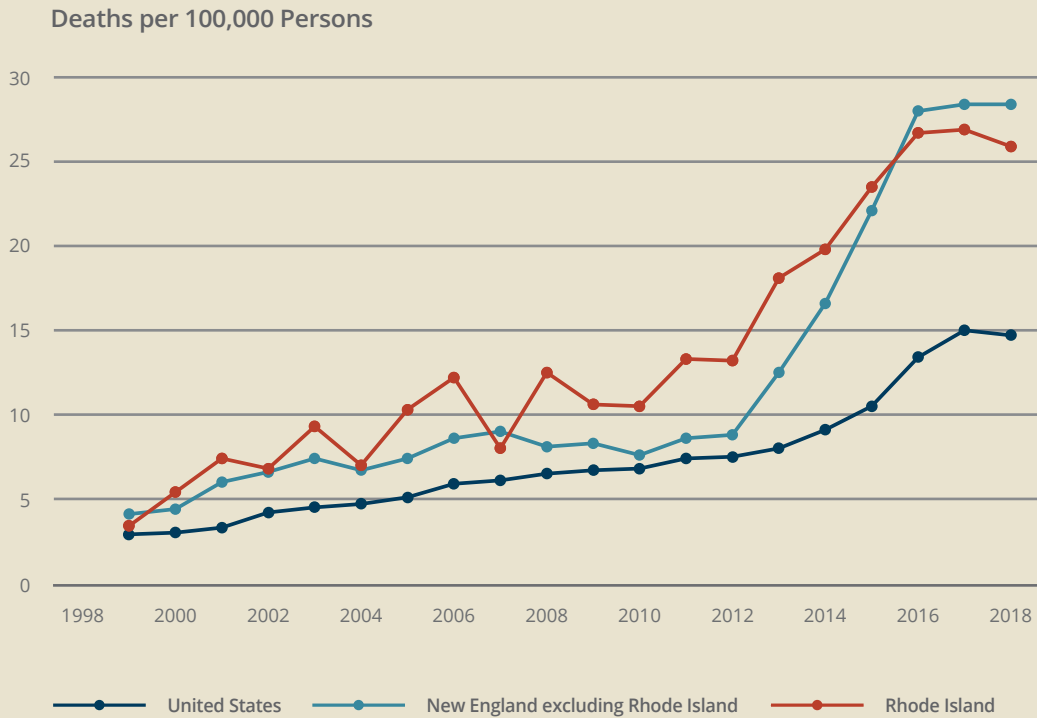
The nation's long-standing crisis of opioid abuse intensified during the COVID-19 pandemic, with opioid-related deaths rising to nearly 81,000 in 2021, an increase of more than 60 percent from just two years earlier. Also during the pandemic, the labor force participation rate in the United States fell precipitously, and as of September 2022 it remained depressed by more than a full percentage point relative to its February 2020 level despite record numbers of job openings in 2021 and 2022. The unfortunate confluence of labor shortages and record-setting opioid mortality highlights the need to better understand the relationship between opioid use and employment and prompts the question of whether effective medications for opioid use disorder (OUD), which have been shown to save lives, might also help to bolster the employment prospects of OUD patients and reduce the economic burden of OUD on society.

This report, focused on Medicaid enrollees in the state of Rhode Island, seeks to answer that question. It presents two primary findings. First, the results show that individuals diagnosed with OUD are less likely to be employed compared with other Medicaid enrollees and that their employment tends to be more intermittent; further analysis shows that these differences do not merely reflect other fixed factors affecting employment that might be common among individuals with OUD. Second, the report finds that OUD patients treated with the medication buprenorphine experience increased job-finding rates, especially in the period shortly after they first start taking the medication. These results, while modest in magnitude, suggest that the same treatment protocol already shown to prevent overdoses and save lives also holds promise for helping OUD patients return to work. On the other hand, treatment with methadone (another medication approved for OUD by the US Food and Drug Administration) is not associated with any significant increase in the job-finding rate among OUD patients. The contrasting results for buprenorphine versus methadone point to the fact that patients treated with methadone tend to have more severe opioid use disorders and may face additional barriers to employment compared with those treated with buprenorphine.

This report uses a unique data set that links payroll employment records with information on medical diagnoses and health-care utilization among Medicaid enrollees in Rhode Island. The state of Rhode Island represents an appropriate context for studying the relationships between opioid use, employment, and treatment. In 2020, the state's age-adjusted opioid-related mortality rate was the 10th highest in the United States, according to data from the Centers for Disease Control and Prevention, and Medicaid enrollees accounted for a disproportionate share of those deaths. Rhode Island has been a pioneer in tackling the opioid crisis, and it recently became the first state in the nation to deploy a mobile methadone van to serve neighborhoods lacking a specialty treatment facility.

Figure 1

Age-adjusted Opioid Overdose Mortality Rates per 100,000 Persons, 1999–2020



Note(s): The base population in each geographic area includes all residents. Values for New England are population-weighted average mortality rates per year among the New England states excluding Rhode Island.
Source(s): Centers for Disease Control and Prevention

I. Introduction

The nation's long-standing crisis of opioid abuse intensified during the COVID-19 pandemic, with opioid-related deaths rising to nearly 81,000 in 2021, an increase of more than 60 percent from just two years earlier (see Figure 1).¹ Also during the pandemic, the labor force participation rate in the United States fell precipitously, and as of September 2022 it remained depressed by more than a full percentage point relative to its February 2020 level despite record numbers of job openings in 2021 and 2022.² Citing labor shortages, a growing number of companies have recently eliminated workplace drug testing.³ The unfortunate confluence of labor scarcity and record-setting opioid mortality highlights the need to better understand the relationship between opioid use and employment and prompts the question of whether effective medications for opioid use disorder (OUD), which have been shown to save lives, might also help to bolster the employment prospects of OUD patients and reduce the economic burden of OUD on society.

1 The 2021 figure for opioid-related deaths is a provisional estimate from the US Centers for Disease Control and Prevention. See National Center for Health Statistics (2022) and Kaiser Family Foundation (2022).

2 See "Job Openings and Quits Reach Record Highs in 2021, Layoffs and Discharges Fall to Record Lows," Bureau of Labor Statistics Monthly Labor Review, June 2022, <https://www.bls.gov/opub/mlr/2022/article/job-openings-and-quits-reach-record-highs-in-2021.htm>; and "Employment Situation Summary: The Employment Situation—September 2022," Bureau of Labor Statistics Economic News Release, October 7, 2022, <https://www.bls.gov/news.release/empsit.nr0.htm>.

3 See Megan McCluskey, "Amid a Labor Shortage, Companies Are Eliminating Drug Tests. It's a Trend that Could Create More Equitable Workplaces," *Time*, October 20, 2021, <https://time.com/6103798/workplace-drug-testing/>.

If increased rates of OUD are, in fact, holding back growth in labor force participation and/or employment,⁴ the consequences could include added fiscal burdens at both the state and federal levels in the form of lower payroll taxes and increased reliance on public assistance programs.⁵ This issue should be of particular concern in the New England region, which has experienced above-average rates of opioid-related mortality since 2000 (see Figure 1), and which already faces a growing drag on its labor participation rate owing to its rising share of older residents. Lost productivity from OUD is a related concern.⁶ The Centers for Disease Control and Prevention (CDC) estimated the total economic cost of the U.S. opioid epidemic in 2017 at \$1.02 trillion, of which productivity costs represented one of the largest three components (Luo, Li, and Florence 2021). In state-level estimates from that same report, four New England states (New Hampshire, Massachusetts, Maine, and Connecticut) registered in the top eight for costs (per case) of opioid-related morbidity and mortality in 2017.

This report has two main objectives: (1) to gain new insights into the association between OUD and employment status, and (2) to determine whether treatment with medications for OUD approved by the US Food and Drug Administration (FDA) might help individuals find a job faster following a spell of nonemployment. Using linked administrative records of Medicaid enrollees in Rhode Island, we find that individuals diagnosed with OUD are less likely to be employed compared with other Medicaid enrollees and that their employment tends to be more intermittent. Among those observed both before and after receiving an OUD diagnosis, the chances of being employed are significantly lower after the first diagnosis date, and the risk of job separation is significantly higher after diagnosis. These latter results suggest that OUD itself may play a role in reducing the chances of finding a job or staying employed.

Beginning treatment with buprenorphine is associated with an increased job-finding rate among nonemployed individuals with OUD.

Our analysis also suggests that beginning treatment with buprenorphine is associated with an increased job-finding rate among nonemployed individuals with OUD. The potential benefits of buprenorphine for job-finding rates appear to be concentrated in the period shortly after someone first starts taking the medication, perhaps because the improvement in functioning that follows the initial phase of treatment is more dramatic than the benefit of merely continuing medication at later dates. On average among all eventual methadone recipients, starting methadone treatment is not associated with any significant increase in the job-finding rate, but some subgroups of methadone recipients may experience an increase in job finding shortly after starting methadone.

Based on our data and methods, the estimated associations are not necessarily causal. For example, other adverse events may occur around the same time that someone receives an OUD diagnosis that might lower their chances of employment, and conversely someone's life

4 The economic evidence on this question is not conclusive to date. Both Krueger (2017) and Greenwood, Guner, and Kopecky (2022) find that labor force participation has been negatively associated with opioid use, but the association was not necessarily causal in either case. Currie et al. (2018) find that opioid prescribing exhibited a positive (if small) association with the employment rate for women and had no significant association among men.

5 One estimate, which uses assumptions about the impact of OUD on labor force participation from Krueger (2017), finds that from 2000 to 2016, such adverse labor market outcomes cost state governments \$11.8 billion and the federal government \$26.0 billion. Separately, Sullivan (2018) describes the substantial fiscal costs to New England states associated with OUD.

6 Henke et al. (2020) find that employees with OUD exhibited lower productivity on the job and imposed higher health-care costs on their employers compared with workers without OUD. The same study finds that employees taking medications to treat OUD imposed less of an economic burden on their employers compared with employees with OUD who were not receiving medications.

circumstances might be improving at the same time as they start taking medications to treat OUD. The contrasting results for buprenorphine versus methadone in relation to job-finding rates suggest that there may be underlying differences between buprenorphine recipients and methadone recipients in their capacity to experience employment-related benefits from taking medications for opioid use disorder (MOUD). Patients treated with methadone tend to have more severe disorders than those treated with buprenorphine and may also face other employment barriers. Some past research suggests that methadone treatment may be less compatible with employment than buprenorphine treatment, as in most cases methadone is administered in person on a daily basis at a specialty treatment facility, whereas buprenorphine is dispensed as a take-home prescription (Richardson et al. 2012).

Receiving medication alone may be insufficient to guarantee employment.

Individuals with OUD often face multiple hurdles to becoming employed (see, for example, Morgenstern et al. 2003, Ware et al. 2021), and our results indicate that receiving medications alone may be insufficient to guarantee employment. Past research suggests that intensive case management may be an important complement to medication-assisted treatment for OUD among patients seeking to obtain (or maintain) employment.⁷ In addition, more work could be done to help employers facilitate treatment and support patients in recovery, as workplace interventions have been shown to be effective toward those goals (Holtyn et al. 2021).

The Americans with Disabilities Act (ADA) requires that employers provide reasonable accommodation for individuals with OUD, such as offering work schedules that don't conflict with treatment schedules. Adherence to such guidelines is likely to be incomplete, even though employers stand to lower their health-care bills and minimize productivity losses by helping patients stay on their medications (Henke et al. 2020). Employees may be reluctant to discuss such accommodations with employers owing to the ongoing stigma against both receiving medications for OUD and people with OUD (National Academies of Sciences, Engineering, and Medicine 2019). More optimistically, recent policy innovations give states the option to expand permissions for take-home doses of methadone and to deploy mobile OUD treatment units, options that should reduce the potential incompatibility between receiving treatment for OUD and becoming or staying employed.⁸

Rhode Island represents an appropriate context for studying the relationships between opioid use, employment, and treatment. In 2020 the state's age-adjusted opioid-related mortality rate was the 10th highest in the United States, according to data from the CDC.⁹ Like the United States as a whole, the state saw a resurgence in opioid-related mortality in 2020 after experiencing a brief period of relatively stable death rates (see Figure 1). Rhode Island has been a pioneer in tackling the opioid crisis, instituting a variety of policies that aimed to expand access to medications and complementary therapies for OUD. For example, the state was the first to offer streamlined authorization for medical students to prescribe buprenorphine, and it recently became the first state in the nation to deploy a mobile methadone van to serve neighborhoods lacking a specialty treatment facility.

The Rhode Island Data Ecosystem employed in our analysis is the only administrative data set we are aware of that links employment records with information from medical claims. Ours

7 See, for example, Meara (2006), Zarkin et al. (2002), and Siegal et al. (1996).

8 See Fred Trapassi, "Suboxone Not the Only Answer, Methadone Still a Needed Option," *Providence Journal*, August 27, 2022, <https://www.providencejournal.com/story/opinion/columns/2022/08/27/suboxone-methadone-both-tools-answer-opioid-epidemic-harm-reduction/10318057002/>.

9 When this report was written, state-level numbers were not available nationally for 2021, but the national rates and Rhode Island rates, which were available, had climbed to record highs.

is accordingly the first study to use individual panel data to study the relationships of interest. Although the linked records are available only for Medicaid enrollees, the state's Medicaid population in 2018 accounted for nearly 62 percent of its total opioid-related deaths (as discussed below). Because the data capture a population that has elevated rates of opioid use disorder along with below-average employment rates, this population represents a suitable group for identifying potential opportunities to improve both health outcomes and economic outcomes.

II. State and Federal Policies Aimed at Protecting and Promoting Employment among OUD Patients

Workers suffering from substance use disorders, including OUD, are protected from various forms of employment discrimination under the federal Americans with Disabilities Act (ADA). Primarily, workers can't be refused employment or have their jobs terminated simply by virtue of having been diagnosed with a substance use disorder in the past, provided illegal drug use is not ongoing. During the job interview phase, some questions about current and/or past drug use may be permitted, but not if they would reveal the presence of a past substance use disorder from which an individual is recovering. However, the regulations do not prohibit discrimination against workers found to have recently engaged in illicit drug use or whose job performance is deemed inadequate owing to drug use (Aoun and Appelbaum 2019). In addition, the ADA prohibits employer discrimination against individuals on the basis of receiving medications to treat OUD, unless they cannot do the job safely and effectively when using such medications. For example, regulations from the US Department of Transportation disallow certain types of vehicles to be operated by an individual using methadone or buprenorphine.

Workers with OUD are protected from employment discrimination under the federal Americans with Disabilities Act (ADA).

For decades, Rhode Island state law has offered additional protections for workers in relation to drug use. For example, one Rhode Island law permits pre-employment drug screenings only after a conditional job offer has been made. The same regulation also allows employers to request drug tests for current employees provided there is reason to believe that substance use is impairing job performance. Employees who test positive must be given the chance to rebut the results and be retested. If a positive test is confirmed, workers cannot be terminated immediately and must be allowed to enter a treatment facility. An employee whose testing indicates continued use of controlled substances after treatment may then be terminated. Further details are provided in Box 1.

Rhode Island is home to more than a dozen "Center of Excellence" facilities, which are recognized nationwide as providing a high standard of care for OUD that includes access to medications (including methadone, buprenorphine, and/or naltrexone), behavioral counselling, and tight coordination with other state programs offering housing assistance, education assistance, and vocational training.¹⁰ In late 2021, Rhode Island's Employment and Training Administration was awarded a third installment of federal grant funding to provide workforce training for an estimated 670 Rhode Island residents with OUD.¹¹

10 For details, see Rhode Island Department of Behavioral Healthcare, Developmental Disabilities & Hospitals' "Centers of Excellence for Opioid Use Disorders," <https://bhddh.ri.gov/substance-useaddiction/individual-and-family-information/help-opioid-dependence/centers-excellence>, accessed September 28, 2022.

11 For details, see "US Department of Labor Awards \$1.3M in Funding to Continue Employment, Training Services to Combat Rhode Island's Opioid Crisis," US Department of Labor news release, November 1, 2021, <https://www.dol.gov/newsroom/releases/eta/eta20211101>.

Box 1

Federal and Rhode Island Laws Protecting Workers with OUD and Supporting the Rights of Workers to Use Medications to Treat OUD

The Americans with Disabilities Act (ADA) is the primary federal protection for opioid use disorder (OUD) patients against various forms of discrimination in the workplace. The ADA was passed in 1990 and substantially broadened in 2008 to cover a wider range of conditions. Under the law, workers can't be refused employment or have their job terminated simply by virtue of having been diagnosed with a substance use disorder (including OUD) in the past, provided illegal drug use is not ongoing. During the job interview phase, some questions about current and/or past drug use may be permitted, but not if they would reveal the presence of a past substance use disorder from which an individual is recovering.

Employers may adopt or administer reasonable policies or procedures, including drug testing for existing employees, designed to ensure that individuals are not engaging in the illegal use of drugs. The regulations explicitly do not prevent discrimination against workers found to have recently engaged in illicit drug use or whose job performance is deemed inadequate owing to drug use (Aoun and Appelbaum 2019). However, individuals who test positive for an opioid, including medications used to treat OUD, are given the opportunity to demonstrate that the medication is being taken as prescribed and under medical supervision. These individuals may not be denied, or fired from, a job for this legal use of medication unless they cannot do the job safely and effectively or are disqualified under another federal law. For example, regulations from the US Department of Transportation disallow the use of methadone or buprenorphine when operating certain types of vehicles.

For decades, Rhode Island state law has offered additional protections, above and beyond those afforded by the ADA, for workers in relation to drug use. One such statute, entitled "Urine and Blood Tests as a Condition of Employment," has been in effect since August 2, 1996. The law permits pre-employment testing of private sector applicants only after a conditional job offer has been made; testing of public sector applicants is permitted only for public safety positions or positions where federal law requires such testing. It also allows employers to test specific employees if there is reason to believe that drug use is impairing job performance. Employers that wish to test must have a written drug abuse prevention policy in place, and they must use procedures that ensure privacy. Employees who test positive must be given the chance to rebut or explain the results and be retested. If a positive test is confirmed, workers cannot be terminated immediately and must be allowed to enter a treatment facility as a condition for retaining the job. After entering treatment, the employee is subject to further drug testing. An individual whose testing reveals continued illicit use of controlled substances may then be terminated.³

a See Lisa Guerin, "Drug Testing Laws in Rhode Island," Nolo, <https://www.nolo.com/legal-encyclopedia/drug-testing-laws-rhode-island.html>, accessed December 12, 2022.

Box 2

Opioid Use Disorder and Medications for Opioid Use Disorder

Diagnosing Opioid Use Disorder

The *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (*DSM-5*) defines an opioid use disorder (OUD) as “a problematic pattern of opioid use that leads to serious impairment or distress” (American Psychiatric Association 2013). The condition is also characterized as a chronic brain disease rooted in neurobiology (Volkow et al. 2016). The *DSM-5* includes a list of 11 symptoms that are used to diagnose an individual with either mild, moderate, or severe OUD according to the number of symptoms they display. Many cases of OUD go undiagnosed (Barocas et. al 2018). A diagnosis of opioid dependence is often necessary for insurance companies to reimburse treatments for OUD (American Society of Addiction Medicine 2017).

FDA-approved Medications for Opioid Use Disorder

Methadone

- Full opioid agonist: fully occupies opioid receptors in the brain.
- Schedule II drug: same regulatory class as cocaine and methamphetamines.
- As a long-acting opioid agonist, methadone suppresses opioid cravings and alleviates withdrawal symptoms. Unlike short-acting opioid drugs such as heroin, it does not produce a euphoric high when used as directed.
- Administered daily by mouth at a specialized opioid treatment program (OTP). To limit diversion of the drug for street use, only limited take-home doses are available for some patients. By law, patients must also receive psychological counseling.
- Carries risk of overdose if misused; interacts adversely with alcohol and anti-anxiety medications.
- Patients on methadone maintenance treatment have physical dependence on the drug; they will experience withdrawal symptoms if they stop taking the medication.
- However, patients do not have an addiction to methadone; they do not have a compulsive need to use the drug and can carry on normal social functions.
- Patients are permitted to drive while on methadone. Commercial licenses are restricted in some states.
- Longer treatment durations are associated with better outcomes; some sources recommend at least 12 months of methadone treatment.
- Used in the United States for treatment of OUD since the 1960s.

Buprenorphine

- Partial opioid agonist: only partly occupies opioid receptors in the brain.
- Schedule III drug: same regulatory class as ketamine and anabolic steroids.
- Also suppresses craving, alleviates withdrawal, and as a long-acting opioid, produces no euphoric high if used as directed.
- Prescribed only by qualified (“waivered”) providers for take-home use; typically taken daily as pill or sublingual film. Also available at OTPs. If received at an OTP, the patient must also receive counseling.
- Less potential for misuse than methadone, especially when mixed with naloxone as in the popular brand-name formulation Suboxone.
- Also interacts adversely with alcohol and anti-anxiety medications.
- Also leads to physical dependence but not addiction when used as directed.
- Longer treatment durations are associated with better outcomes; some sources recommend at least 12 months of buprenorphine treatment.
- Patients are permitted to drive while taking buprenorphine.
- Approved by the FDA for treatment of OUD in 2002.

III. Scientific Background: Opioid Use Disorder and Medications Used to Treat the Condition

Opioid use disorder (OUD) is defined by the *Diagnostic and Statistical Manual, Fifth Edition (DSM-5)* as a problematic pattern of opioid use that leads to significant impairment or distress (American Psychiatric Association 2013). See Box 2 for details. Medications for opioid use disorder (MOUD) refer to any of three medications approved by the FDA to treat the condition: methadone, buprenorphine, or naltrexone. When used as directed, both methadone and buprenorphine suppress cravings for opioids by occupying the same receptors in the brain that opioid drugs would occupy but without producing a euphoric high. Naltrexone suppresses cravings for opioid drugs by blocking, rather than occupying, the brain's opioid receptors and cannot produce euphoria.¹² A common formulation (typically marketed under the brand name Suboxone) combines buprenorphine and naltrexone to deter abuse of buprenorphine. This report's analysis does not consider naltrexone treatments owing to a variety of data limitations. See Box 2 for more information about methadone and buprenorphine.

The health benefits of treating OUD with either methadone or buprenorphine have been widely documented in scientific research publications.¹³ The World Health Organization and the US Department of Health and Human Services both strongly endorse the use of opioid agonist treatment (OAT), which involves the daily use of either methadone or buprenorphine after an initial period of detoxification from other opioids (World Health Organization 2009, Krantz and Mehler 2004). Despite the strong endorsement of medications for OUD by public health officials and the medical community, it is estimated that the vast majority of people suffering from an opioid use disorder are not treated with such medications. Nationwide, an estimated 35 percent of patients received any form of treatment for OUD in 2019, and a smaller but unknown fraction would have received medications as part of their treatment (Jones and McCance-Katz 2019).

It is estimated that the vast majority of people suffering from OUD are not treated with medications.

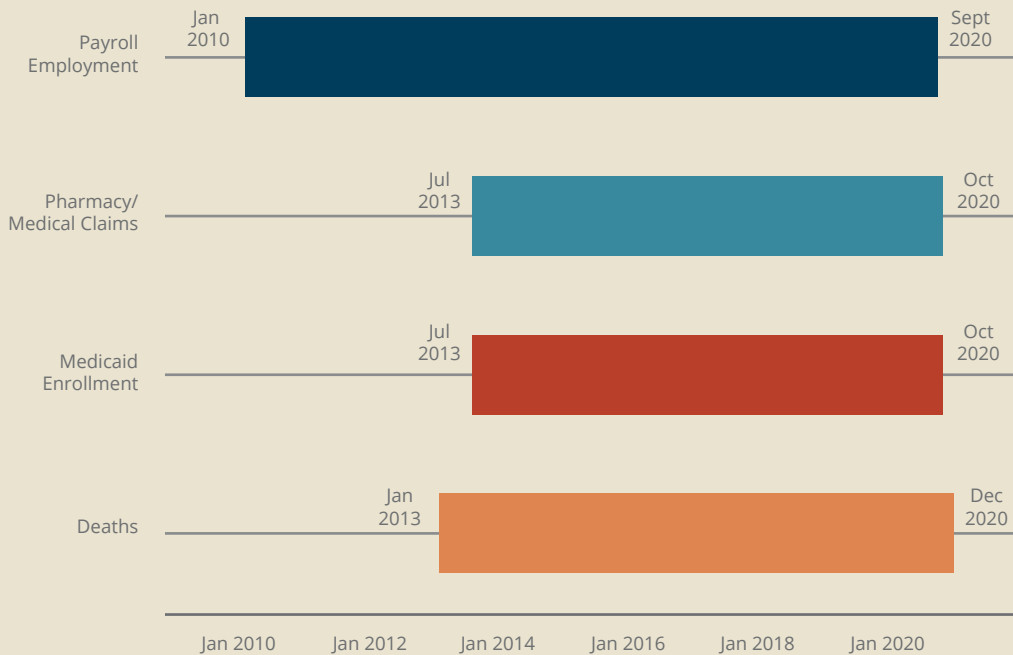
Individuals prescribed methadone are required to simultaneously enter into individual and/or group counselling, and the combination of medications and behavioral therapy is referred to as medication-assisted treatment (MAT). Many specialized opioid treatment programs (OTPs) that dispense methadone also offer a variety of complementary support services, such as job training and/or intensive case management. Individuals prescribed buprenorphine or naltrexone by an office-based provider are not required to undergo counselling unless mandated by the criminal justice system. A limitation of the analysis is that we can't observe the non-medical details of treatment programs, such as whether people are receiving job training or case management. However, methadone users are much more likely to have access to such services based on receiving methadone at or via an OTP, especially in Rhode Island, as compared with those receiving buprenorphine through a primary care physician or other office-based provider. To address the concern that we don't observe the non-medication aspects of treatment, we examine the association between medication and employment separately for methadone and buprenorphine.

12 The injectable form of naltrexone (brand name Vivitrol) has been found to reduce illicit drug use, while the pill form of naltrexone has not been found to consistently improve patient outcomes. See, for example, Lee et al. (2018) and National Institute on Drug Abuse (2020).

13 For details, see "US Department of Labor Awards \$1.3M in Funding to Continue Employment, Training Services to Combat Rhode Island's Opioid Crisis," US Department of Labor news release, November 1, 2021, <https://www.dol.gov/newsroom/releases/eta/eta20211101>.

Figure 2

Time Intervals Covered by Ecosystem Data Files



Source(s): Authors' calculations using data from Rhode Island Data Ecosystem. Within the Ecosystem, the payroll employment data are furnished by the Rhode Island Department of Labor and Training, the Medicaid claims and enrollment data are furnished by the Rhode Island Executive Office of Health and Human Services, and the deaths data are furnished by the Rhode Island Department of Vital Records.

IV. Data and Methods

The Rhode Island Ecosystem, is a data resource managed by the Rhode Island Executive Office of Health and Human Services (EOHHS) that links person-level and family-level data across multiple state agencies.¹⁴ The research team at the Federal Reserve Bank of Boston's New England Public Policy Center gained use of selective Ecosystem data for research purposes via a data user agreement with EOHHS. All data have been anonymized to protect confidentiality. The analysis described in this report makes use of Rhode Island Medicaid claims and enrollment records, payroll earnings records from the Rhode Island Department of Labor and Training, and death records from the Department of Vital Records within the Rhode Island Department of Health.

Payroll employment data and death records are available for the entire state population, whereas information on medical diagnoses and treatments is limited to Rhode Island's Medicaid population. Therefore, the analysis relating treatments for opioid use disorder with employment outcomes is restricted to the Medicaid population. Nonetheless, the state's Medicaid population is substantial and includes a disproportionate share of individuals diagnosed with OUD, as discussed below. Furthermore, individuals on Medicaid have below-average incomes and below-average levels of labor force participation compared with people not enrolled in Medicaid but who

14 The stated goal of the Ecosystem is to "drive holistic improvements in human well-being." For more information, visit <https://eohhs.ri.gov/initiatives/data-ecosystem>, accessed August 1, 2022.

are otherwise similar in age and gender. Therefore, the Medicaid population may stand to benefit disproportionately from policies aimed at either improving access to medications for OUD and/or raising the employment prospects of individuals with OUD.

The time periods covered by the data sources listed above are illustrated in Figure 2. Each payroll record pertains to a specific employee-employer pair and reports (1) the total earnings (wages or salary) paid to the individual by the given employer in the given quarter and (2) the employer's industry code at the three-digit North American Industry Classification System (NAICS) level or sub-sector level. The Medicaid pharmacy claims are observed as of specific dates, but the Medicaid medical claims are not dated. Separate records indicate the earliest date of receiving methadone among those ever receiving that treatment for OUD in addition to the earliest date of having an OUD diagnosis. Deaths records report the month of death and as many as five causes of death.

Given these data sets, among Medicaid enrollees we can observe payroll employment records and simultaneous health-care-related activity from 2013Q3 through 2020Q3. Refer to this report's accompanying working paper (Burke et al. 2022) for the details of how Medicaid data are aligned with employment data. An individual is said to be employed in a quarter if they have at least one payroll employment record dated in that quarter, where "employed" is shorthand for "having a nonzero wage record from a payroll job located in Rhode Island." Because the employment records are not limited to those of individuals enrolled in Medicaid at any given time, we observe employment records of Medicaid sample members even for periods in which those individuals were not on Medicaid (owing to intermittent Medicaid enrollment for some people).

A limitation of the employment records is that the earnings of Rhode Island residents working for out-of-state employers are not observed, nor are the earnings of self-employed individuals living in Rhode Island. Someone with no earnings record in a given quarter was either not employed in the quarter, self-employed in the quarter, or working for an out-of-state employer in the quarter. Using external survey data, we estimate that the observed employment rate among Medicaid enrollees aged 18 to 64 in our sample represents somewhere between 72 percent and 91 percent of the true employment rate for that population, depending on the year.¹⁵

Research suggests that self-employment among the low-income population tends to be characterized by marginal work for low pay and no benefits (see, for example, Edin et al. 2019). Although many parts of Rhode Island are within a reasonable commuting distance to employment centers such as the Greater Boston area, in-state employment is likely to involve shorter commutes on average and so could be preferred for that reason. Therefore, having a payroll job in Rhode Island is likely to offer advantages over other employment for the population in question, and the limitations of the employment data should not unduly alter the policy implications of this report.

Rhode Island's Medicaid population is substantial and includes a disproportionate share of individuals with OUD.

To test for the association between receiving an OUD diagnosis and the chances of separating from a job, we employ a multivariate regression analysis that controls for numerous factors that might also affect the chances of job separation, such as having a disability or having had a diagnosis of hepatitis C. In separate regression analyses, we test for associations between receiving buprenorphine or (separately) methadone and the chances of finding a job starting from a state of nonemployment, again controlling for potential confounding factors. In both analyses, we restrict the sample to individuals ever diagnosed with OUD and who ever received buprenorphine (or methadone,

¹⁵ See the accompanying working paper (Burke et al. 2022) for the details of this estimation.

Table 1

Descriptive Statistics of Medicaid Enrollees by OUD Status

	Full Medicaid Sample	OUD (Never)	OUD (Ever)
Median Age in 2018	36	35	39
Ever Observed Employed	75.0	75.6	69.1
Quarters Employed, If Ever Employed	18.1	18.4	14.3
Employment Spells, If Ever Employed	1.9	1.9	2.3
Employment Supersector			
Natural Resources and Mining	0.3	0.2	0.3
Construction	3.8	3.4	9.2
Manufacturing	5.5	5.6	4.4
Trade, Transportation, and Utilities	20.0	20.0	19.4
Information	0.6	0.6	0.3
Financial Activities	3.0	3.1	2.1
Professional and Business Services	17.2	17.2	17.2
Education and Health Services	19.6	20.3	10.7
Leisure and Hospitality	23.2	22.7	30.0
Other Services	4.3	4.3	4.7
Government	0.9	0.9	0.5
Unknown	1.5	1.6	1.1
Quarters on Medicaid	20.9	20.4	25.4
On Medicaid before Expansion	38.4	36.3	59.1
Hepatitis C	2.8	1.1	19.3
Alcohol Use Disorder	13.7	10.2	47.5
Disabled	19.7	18.1	34.6
Blind	3.3	3.2	4.9
Female	56.5	58.1	42,42.5
Number in Sample	218,826	197,840	20,279

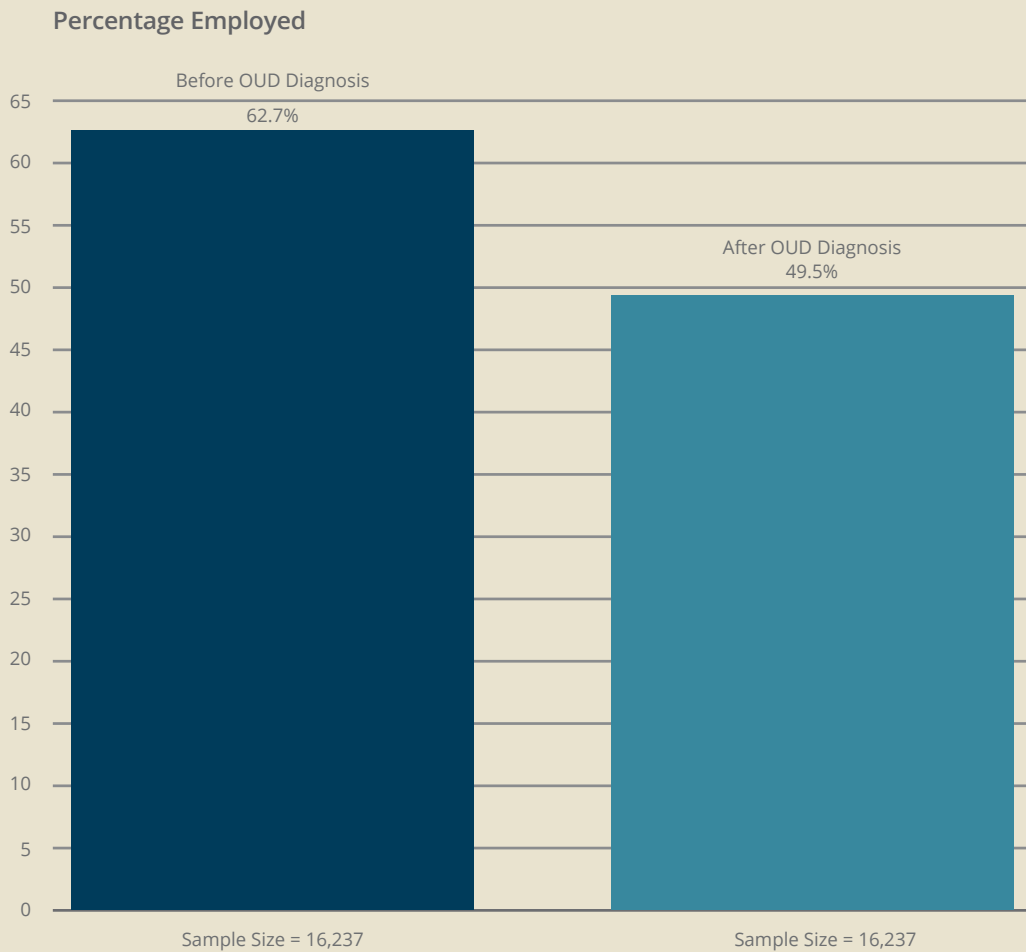
Note(s): Full Medicaid Sample consists of people enrolled in Medicaid in at least one month of 2018 and who were aged 18 to 64 as of 2018. The OUD (Never) sample consists of the subset of the Full Medicaid Sample who were never observed with any of the following: an OUD diagnosis, an opioid overdose diagnosis, or receipt of MOUD (methadone or buprenorphine). The OUD (Ever) sample consists of the subset of the Full Medicaid Sample who were ever observed with an OUD diagnosis. The “Ever” and “Never” determinations refer to the 2013Q3–2020Q3 period.

Source(s): Authors’ calculations using data from Rhode Island Data Ecosystem

or both, depending on the model). These analyses leverage the fact that we observe many individuals both before and after their initial OUD diagnosis and before and after they started taking buprenorphine or methadone. The complete details of the methods and additional sample restrictions are described in the accompanying working paper (Burke et al. 2022).

Figure 3

Employment Status Before and After First OUD Diagnosis



Note(s): The sample consists of Medicaid enrollees aged 18 to 64 who were diagnosed with opioid use disorder (OUD) at least once during the 2013Q3–2020Q3 period.

Source(s): Authors' calculations using data from Rhode Island Data Ecosystem

V. Results

Descriptive Analysis of Employment Patterns among Rhode Island Medicaid Enrollees in Relation to OUD Status

We begin by describing a variety of demographic, health, and employment indicators among Rhode Island Medicaid enrollees in relation to whether individuals have been diagnosed with opioid use disorder (see Table 1). The baseline sample for the descriptive analysis (labeled “Full Medicaid Sample” in the table) consists of individuals who were enrolled in Medicaid in at least one month in 2018 and who were between the ages of 18 and 64 as of 2018.¹⁶ The table also describes outcomes separately for two distinct subgroups of the baseline sample: those receiving at least one OUD diagnosis within the sample’s date range and those with no OUD diagnosis during the observation period. The group with an OUD diagnosis consists of over 20,000 individuals, or slightly more than 9 percent of all enrollees in the full 2018 Medicaid sample.

¹⁶ Our data set observes individuals aged 65 and over receiving Medicaid. These individuals are omitted from analysis for two reasons: (1) such individuals also qualify for Medicare, complicating the issue of observing their health-care activity, and (2) such individuals are less likely to be job-seeking compared with younger individuals.

As shown in Table 1, the OUD population is older, on average, than the average Medicaid enrollee (as of 2018) and much more likely to be male. Compared with those never diagnosed, OUD patients spent more time on Medicaid (from 2013 to 2020) and were less likely to have had a Rhode Island payroll job between 2010Q1 and 2020Q4. Although the difference in the employment rates (for having ever been employed) is relatively moderate between those diagnosed with OUD and other Medicaid enrollees, the OUD group appears to exhibit more intermittent employment. Among those ever employed in the relevant time period, OUD patients spent less time being employed and had a greater number of distinct employment spells. These patterns indicate that individuals with OUD either have relatively unstable employment patterns or, at the very least, exhibit more frequent transitions between self-employment and payroll employment or between in-state and out-of-state and employment.

Results in Table 1 suggest a negative association between having an OUD diagnosis and either obtaining or maintaining employment. However, individuals suffering from an opioid use disorder might simply be less likely to obtain/maintain employment than those without OUD for a variety of reasons not directly related to their condition. Also shown in Table 1, OUD patients are more likely to be employed in the leisure and hospitality supersector, which can be characterized by more transient or intermittent employment, and the construction sector, which can have similar employment characteristics. In addition, nearly half of those diagnosed with OUD also had a diagnosis of alcohol use disorder (AUD) during the observation period, and close to 35 percent were classified as disabled. The rates of AUD and disability are much lower in the non-OUD population. The OUD population also exhibits a much higher incidence of hepatitis C compared with those without OUD and a modestly higher rate of blindness.

To delve further into whether OUD itself presents barriers to employment, we exploit the fact that many OUD patients in the sample are observed both before and after their initial OUD diagnosis date.¹⁷ Figure 3 shows employment rates among OUD patients, measured on either side of their first diagnosis. The left bar indicates the percentage of Rhode Island Medicaid enrollees (eventually diagnosed with OUD) with at least one Rhode Island payroll employment record dated strictly before their first diagnosis date, and the right bar gives the percentage employed in or after the quarter of the first diagnosis. The underlying sample is the same for both bars. The share employed in the period after diagnosis is nearly 14 percentage points lower than the share employed before, and the difference is highly statistically significant. Although all sample members would have been older after their respective diagnoses, the median age at OUD onset, 37, is still well within the prime working age range. Therefore, the results are not likely to be driven primarily by retirements.

For a more rigorous assessment of whether OUD is incompatible with employment, we conduct a statistical analysis (described in detail in the accompanying working paper [Burke et al. 2022]) that takes advantage of the fact that we observe the timing of the OUD diagnosis in addition to numerous other factors that might affect the chances of separating from a job. The analysis reveals that, among those eventually diagnosed with OUD, the chances of leaving a job are significantly greater in the post-diagnosis period and are especially elevated in the quarter immediately after the initial diagnosis.

Results strongly suggest that having OUD makes it harder to retain a payroll job.

¹⁷ Even for those with an initial diagnosis date recorded as July 2013, employment status is observed as far back as January 2010.

Table 2

Descriptive Statistics of Medicaid Enrollees by Medication Status for OUD

	Full Medicaid Sample	OUD and Buprenorphine	OUD and Methadone	OUD, never MOUD
Median Age	36	37	37	42
Female	56.5	41.9	40.1	43.8
Employed in Any Quarter in 2018	46.6	40.3	34.6	31.8
Median Yearly Earnings in 2018 (\$)	31,175	24,339	23,418	20,613
Received Methadone (Ever)	3.2	36.6	100	0
Received Buprenorphine in 2018	3.5	100	38.6	0
Mortality Rate per 1,000 Persons in 2018	4.8	10.7	12.9	16.6
Opioid-related Deaths in 2018 (Number)	145	35	35	40
Opioid-related Deaths in 2018 per 1,000 Persons	0.7	4.8	5.0	4.6
Percentage of All RI Opioid Deaths in 2018	61.7	14.9	14.9	17
Hepatitis C	2.8	23.2	32.9	10.6
Blind	3.3	5.7	6.0	401
Disabled	19.7	23.2	29.7	44.6
Opioid Overdose	1.3	18.4	18.7	6.9
Number in Sample	218,826	7,353	6,988	8,632

Note(s): Full Medicaid Sample consists of people enrolled in Medicaid in at least one month of 2018 and who were aged 18 to 64 as of 2018. The OUD and Buprenorphine sample consists of people who had at least one OUD diagnosis during the 2013Q3–2020Q3 period and received buprenorphine at least once during that same period. The OUD and Methadone sample is analogous to the OUD and Buprenorphine sample. The OUD never MOUD sample consists of people diagnosed with OUD at least once during the 2013Q3–2020Q3 period and who never received either buprenorphine or methadone during that period.

Source(s): Authors' calculations using data from Rhode Island Data Ecosystem

These results strongly suggest that having an opioid use disorder makes it harder to retain a payroll job, even if a separation is voluntary. This finding agrees with prior evidence that worker productivity is lower (Henke et al. 2020) among individuals with substance use disorders (including OUD) and with the fact that disordered opioid use results in physical and psychological impairments to performing a broad range of tasks. However, it could also happen that an individual experiences an adverse event—such as a major physical injury, the death of a loved one, or a divorce—that leads to their becoming both dependent on opioids and unable to hold down a job.¹⁸ Alternatively, an individual may have been employed and using opioids for some time

¹⁸ Major injuries might be inferred from the medical claims data, but their timing would be unobserved.

without getting medical help, and then at a certain point may have decided to seek medical treatment (prompting a diagnosis) and to subsequently quit their job in order to focus on recovery. However, even an intentional separation to enter treatment implies some degree of incompatibility between having an opioid use disorder and holding a job.

Does Receiving Medications for Opioid Use Disorder Influence Job Prospects among OUD Patients?

Next, we consider how receiving medications for OUD relates to health and employment outcomes, using a snapshot of outcomes in 2018 for additional subgroups of enrollees, as shown in Table 2. The first column refers to the full set just described in Table 1, and each of the remaining columns refers to a subgroup of individuals diagnosed with OUD; the subgroups are differentiated by their members' medication status. Members of the full Medicaid sample combined accounted for nearly 62 percent of all opioid-related deaths in Rhode Island in 2018, despite representing just 20 percent of the larger Rhode Island population in the same age range as of 2018.¹⁹ Perhaps surprisingly, the subsample diagnosed with OUD (combining the second, third, and fourth columns) accounted for just 40 percent of the state's opioid deaths in 2018,²⁰ which means that 22 percent of the state's opioid deaths occurred among Medicaid enrollees who did not have an observed OUD diagnosis during our sample period.²¹

Among individuals with OUD, those who received buprenorphine (at least once during the observation period) had the highest chance of being employed in 2018, followed by methadone recipients and, lastly, those who did not receive either medication during the sample period. Median total earnings in 2018 (calculated only for those with nonzero earnings for the year) follow a similar pattern. Earnings were below average among Medicaid enrollees with OUD compared with all Medicaid enrollees; for those with OUD, median earnings were highest among the buprenorphine recipients, followed closely by the methadone recipients, and lastly, by enrollees who received no medication for OUD (MOUD), who had significantly lower earnings.

In terms of health status, the all-cause mortality rate is elevated in each of the OUD subgroups compared with the general Medicaid population. Although all-cause mortality (for 2018) was highest among OUD patients who did not receive MOUD, opioid-related mortality in 2018 (per 1,000 sample members) was quite similar across all three subsets of OUD patients. In fact, opioid-related mortality was slightly lower among members of the non-MOUD subgroup than among members of either of the other two OUD subgroups (buprenorphine recipients and methadone recipients, respectively).

The higher all-cause mortality among the non-MOUD recipients likely reflects their older age, whereas their lower opioid-related mortality suggests that they have less severe cases of OUD compared with those treated with either methadone or buprenorphine for their condition. Reinforcing the suggestion of selective uptake of MOUD based on illness severity, the opioid over-

Among individuals with OUD, those who received buprenorphine had the highest chance of being employed.

19 These estimates, taken from the American Community Survey, represent the share of the Rhode Island population aged 19 to 64 insured by Medicaid in 2018. Given the narrower age range, the 20 percent estimate is not exact for our sample age range. Visit <https://www.census.gov/data/tables/time-series/demo/health-insurance/acs-hi.2018.html#list-tab-MHHR1OPN46IXBAFMZO>, and see cell AE212 of Table HI-05.

20 The 40 percent figure is less than the sum of the relevant values in the second, third, and fourth columns of Table 2, as there is significant overlap between the sets of individuals represented in the second and third columns.

21 It was pointed out in conversation with a public health official in Rhode Island that dying of opioid-related overdose need not indicate an opioid use disorder, as individuals abusing other drugs might accidentally encounter substances laced with opioids, especially fentanyl, that prove fatal.

dose rate is more than twice as high among OUD patients treated with either buprenorphine or (separately) methadone for OUD compared with the rate among those not receiving either methadone or buprenorphine. The implication is that those receiving MOUD have higher overdose rates than non-recipients despite receiving medications, not because of receiving them. In fact, having a nonfatal overdose itself may precipitate the receipt of medications, as some hospitals have a policy of offering buprenorphine to opioid overdose patients treated in the emergency room and/or of referring the patient after discharge to treatment facilities that employ MOUD (Jaeger and Fuehrlein 2020).

Buprenorphine recipients have a slightly lower rate of opioid overdose (fatal or nonfatal) than methadone recipients and a slightly lower opioid-related mortality rate per capita, but the differences are not statistically significant (there is an overlap of 36 to 38 percent between these two samples). Other health differences between these two groups are significant, however, as methadone recipients have a higher incidence of hepatitis C and disability than buprenorphine recipients; methadone recipients exhibited higher all-cause mortality despite having the same median age. The higher incidence of hepatitis C suggests that they are more likely to inject opioids than to take pills, as hepatitis C is often contracted by sharing needles with other users. The fact that methadone recipients are less likely to have been employed during the observation period (compared with buprenorphine recipients) may relate to these differences in health status and/or to the differences in underlying circumstances revealed by these health differences.

It is perhaps surprising that employment rates and earnings are higher among MOUD recipients compared with OUD patients not receiving MOUD, despite the evidence that MOUD recipients are likely to have more severe opioid use disorders and elevated rates of other health problems. Patients not receiving MOUD are older, however, and have a much higher disability rate than MOUD recipients. In addition, MOUD recipients might embody other factors, such as a higher education level, which could contribute to a tendency both to seek medication-assisted treatment for OUD and to become employed. In light of the apparent heterogeneity between MOUD recipients and other OUD patients, the analysis of the associations between MOUD and job-finding rates will be limited to the population that eventually receives MOUD. In this way, the estimated associations are based on contrasts in job-finding rates between people who have not yet started taking MOUD and those who have started on medications. Furthermore, we run separate analyses relating buprenorphine to job-finding rates and methadone to job-finding rates, based on the observed heterogeneity between recipients of those different medications and the different circumstances pertaining to receipt of those drugs.

Job-finding Rate Analysis: Does Treatment with Medications for OUD Increase the Chances of Finding a Job among OUD Patients?

The results so far don't necessarily indicate a causal relationship between taking either methadone or buprenorphine for OUD and becoming or staying employed. From a policy perspective, the hope is that individuals who are currently out of work and suffering from OUD, and who would like a job, might raise their chances of finding and maintaining employment as a result of undergoing treatment with either buprenorphine or methadone.²² To gain insight into that possibility, we conduct a regression analysis that tests whether taking buprenorphine (and, in a separate model, methadone) has a positive association with the chances of finding a job in any given period, starting from a state of nonemployment.

22 Such treatment represents an extended process involving an initial detoxification period followed by an indefinite period of maintenance at a sustainable dose of either medication.

Table 3

Regression Sample Descriptive Statistics

	Buprenorphine Sample	Methadone Sample
Female	38.4	36
Male	61.6	64
Age Cohort 18–30	42.1	47.6
Age Cohort 31–41	33.8	31.5
Age Cohort 42–54	24.1	20.9
Received Buprenorphine Ever	100	48.9
Received Methadone Ever	40.9	100
Employed in Past	60.1	56.6
On Medicaid before Expansion	55.9	61.5
Blind	5.7	5.6
Disabled	20.8	23.9
Alcohol Use Disorder	52.5	47.4
Hepatitis C	22.7	31.4
Eventually Hired	64.4	63.4
Time to First Job-finding Event (Quarters)	6.6	6.9
Number of Quarters Employed	6.7	6.1
Number of Employment Spells	1.7	1.6
Number of Employment Spells, If Ever Employed	2.2	2.1
Length of Employment Spell after First Job-finding Event (Quarters)	3	2.7
Number in Sample	5,347	4,231

Note(s): The sample restrictions governing each sample and the definitions of all variables are described in the accompanying working paper (Burke et al. 2022). Employed in Past refers to those who are observed employed before their first nonemployment spell. Eventually Hired refers to those observed finding a job after their first nonemployment spell. First Job-finding Event refers to the first quarter of employment (if ever observed) after someone's first nonemployment spell.

Source(s): Authors' calculations using data from Rhode Island Data Ecosystem

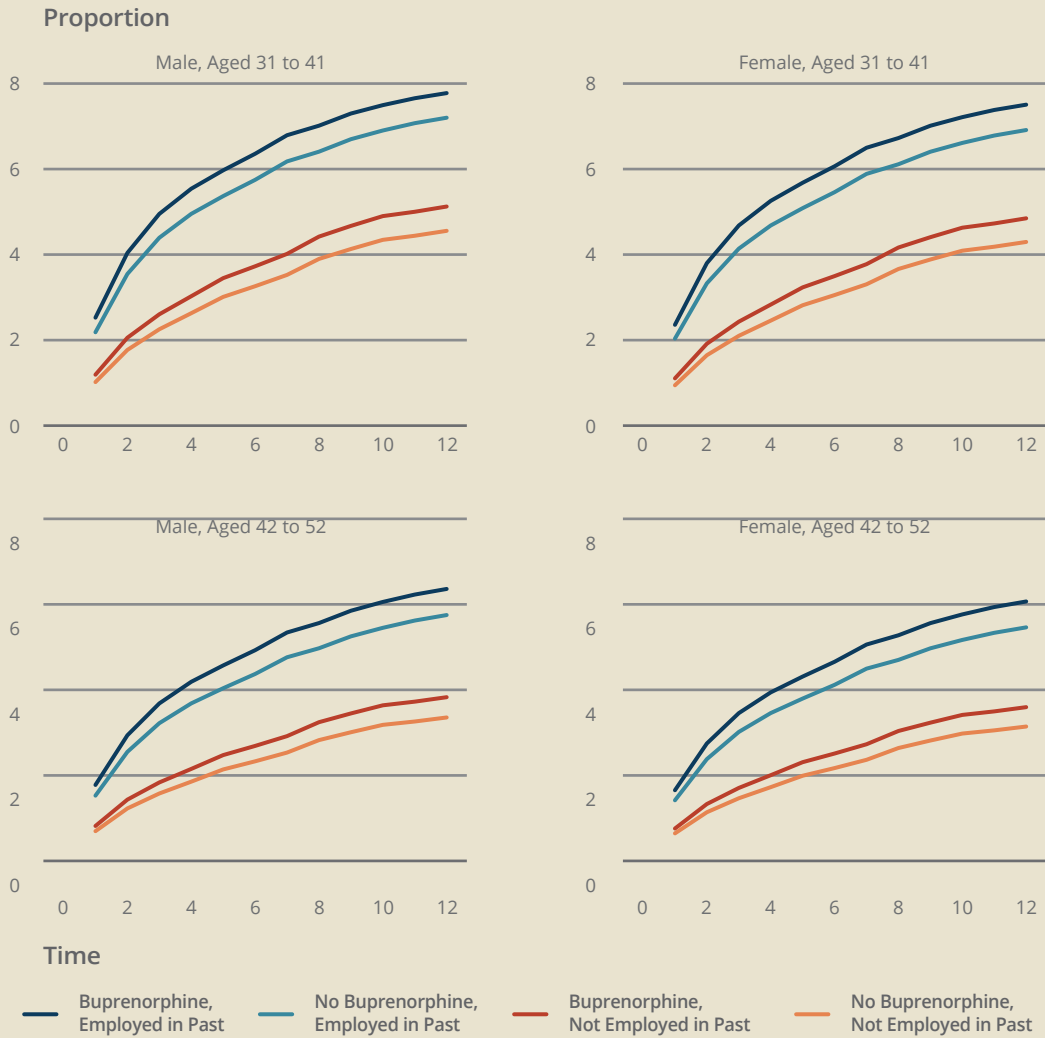
The sample used in the regression analysis of buprenorphine treatment in relation to job finding consists of more than 5,300 unique individuals and over 66,000 person-by-quarter observations. For the analysis of methadone treatment, the sample includes over 4,200 individuals who jointly contribute more than 53,000 observations. Table 3 shows selected descriptive statistics for the two regression samples, with 1,670 individuals appearing in both samples.²³ All variables in the table through the row for hepatitis C represent control variables that are adjusted for in the model.²⁴ The buprenorphine sample has a somewhat higher share of women, an older age

23 As the samples described in Table 3 have narrower selection criteria than those described in Table 2 (columns 2 and 3), the corresponding descriptive statistics differ somewhat between the tables.

24 The working paper (Burke et al. 2022) provides a complete description of the control variables as well as more details on sample construction, methods, and robustness analysis.

Figure 4

Predicted Cumulative Job-finding Rates by Buprenorphine Status and Past Employment Status



Note(s): The horizontal axis shows the number of quarters since the first nonemployment quarter. The vertical axis shows the (predicted) cumulative proportion of sample members who will have entered employment as of the given number of quarters. Individuals who find a job may or may not stay employed in later quarters. In the blue and red lines in each panel, we assume that someone started receiving buprenorphine one quarter after the start of their nonemployment spell and also received it in all subsequent quarters. In the green and yellow lines, we assume that buprenorphine was never received. For each scenario shown, we assume the following characteristics: not blind, not disabled, not on Medicaid before the expansion, never received methadone, and never diagnosed with alcohol use disorder, opioid use disorder, or hepatitis C. Estimates are based on a Cox proportional hazards regression, the details of which are described in the accompanying working paper (Burke et al. 2022)

Source(s): Authors' calculations using data from Rhode Island Data Ecosystem

distribution, and more members with alcohol use disorder (AUD), but the difference between the samples' employment measures is not stark. In the buprenorphine sample, a somewhat higher share of members was employed before their first nonemployment spell, but only a slightly higher share became reemployed during the observation period compared with the methadone sample members. Among those who did become reemployed, the average time until finding a job rounds up to seven quarters for both samples.

Table 4

Predicted Cumulative Job-finding Rates by Buprenorphine Status and Past Employment Status

	Employed In Past		Not Employed in Past	
	Buprenorphine	No Buprenorphine	Buprenorphine	No Buprenorphine
4 Quarters	0.55	0.50	0.30	0.26
8 Quarters	0.70	0.64	0.44	0.39
16 Quarters	0.83	0.77	0.55	0.49

Note(s): The table reports predicted cumulative job-finding rates for males aged 31 to 41, as of selected numbers of quarters after the first nonemployment quarter. Conditions involving Buprenorphine assume that someone started receiving buprenorphine one quarter after the start of their nonemployment spell and also received it in all subsequent quarters. Conditions involving No Buprenorphine assume that buprenorphine was never received. See the notes to Figure 4 for further details.

Source(s): Authors' calculations using data from Rhode Island Data Ecosystem

The regression analysis reveals that there is a statistically significant positive association between having received buprenorphine in the preceding quarter and the chances of becoming reemployed in the current quarter, on the order of an 18 percent increase.²⁵ (A table showing estimated coefficients is provided in the accompanying working paper [Burke et al. 2022].) Figure 4 illustrates this fact by showing the cumulative job-finding rates predicted by the model for four selected demographic groups. In the upper-left panel of the figure, the blue and green lines show outcomes for men aged 31 to 41, all of whom were employed before the start of their first nonemployment spell. The blue line assumes a hypothetical case in which an individual received buprenorphine continuously (in each quarter) starting with the quarter after their first nonemployment quarter. The green line represents a hypothetical scenario in which an individual never received buprenorphine. The contrast between these scenarios illustrates the maximum potential beneficial effects of buprenorphine on the cumulative job-finding rate after any number of quarters without a job, which amounts to about 5 to 6 percentage points over most of the range of elapsed time (see Table 4 for details). The red and yellow lines in Figure 4 show the equivalent contrast among men aged 31 to 41 with no previous employment. For that group, job-finding rates are generally lower across the board, and the positive association between buprenorphine and reemployment is somewhat weaker (also seen in Table 4).

The relative benefit of taking buprenorphine in the preceding quarter applies in similar measure to all other demographic groupings, including men aged 18 to 30 and 42 to 54 and women in each of the three age groups. However, the general level of the job-finding rate is higher among those (men or women) with previous employment, and job-finding rates decline systematically with age. Among those with no previous employment, women (in any age group) have lower job-finding rates than men (in the same age group), but otherwise women and men in the same age group exhibit very similar job-finding rates.

Further analyzing the associations between buprenorphine receipt and job finding reveals that the effect is concentrated in the quarter immediately following initiation of buprenorphine

25 We use an indicator of buprenorphine receipt in the preceding quarter, rather than the current quarter, to ensure that the buprenorphine was received strictly prior to the time when reemployment occurred. This is necessary because we do not observe the exact date within a quarter in which a job was started.

Table 5

Predicted Cumulative Job-finding Rates by Methadone Status and Past Employment Status

	Employed In Past		Not Employed in Past	
	Started Methadone	Never Started Methadone	Started Methadone	Never Started Methadone
4 Quarters	0.49	0.49	0.27	0.27
8 Quarters	0.66	0.66	0.39	0.39
16 Quarters	0.79	0.79	0.55	0.55

Note(s): The table reports predicted cumulative job-finding rates for males aged 31 to 41 as of selected numbers of quarters after the first nonemployment quarter. Conditions involving methadone assume that someone started receiving methadone one quarter after the start of their nonemployment spell and then may or may not have received it again in subsequent quarters. Conditions involving no methadone assume that methadone was never received. The estimates are based on a Cox proportional hazards regression, the details of which are described in the accompanying working paper (Burke et al. 2022).

Source(s): Authors' calculations using data from Rhode Island Data Ecosystem

treatment, whereas receiving buprenorphine beyond the first quarter after initiation may not lead to further increases in the probability of finding employment.²⁶ Refer to this report's accompanying working paper (Burke et al. 2022) for detailed results.

For methadone, we don't observe the date of each individual treatment event, only the date of the first treatment. In this case, we construct an indicator of having started methadone strictly prior to the current quarter. Once this indicator turns on, it remains on in all later periods. We find no significant association between that indicator and the chances of finding a job in any period. That is, in periods after an individual starts methadone, their chances of becoming reemployed are not significantly different from what they would be in periods before they started treatment, after other factors affecting the re-employment rate are controlled for. Even when the quarter immediately after initiation is singled out, no significant effect of methadone is observed. Table 5 illustrates cumulative job-finding rates for selected demographic groups by methadone status. Again, individuals with no past employment have consistently lower job-finding rates than people employed in the past.

When the sample is limited to those who eventually take both methadone and buprenorphine, recent buprenorphine treatment continues to predict a significantly higher job-finding rate. The estimates also suggest that methadone recipients may receive a benefit for job finding from the treatment in the quarter just after initiation and may experience a negative association with job finding in later periods after initiation, but those associations are not statistically significant. Results are described in detail in the accompanying working paper (Burke et al. 2022). The analysis suggests that members of this more homogeneous sample have the potential to benefit from opioid agonist therapy (whether it's methadone or buprenorphine), but that such potential may be most readily realized under treatment with the more convenient option of buprenorphine. Alternatively, the severity of the opioid use disorder itself might be changing over time such that when methadone treatment begins, the potential for it to boost employment prospects is very limited. Indeed, methadone is often recommended for more severe cases of OUD (McCance-Katz, Sullivan, and Nallani 2010).

²⁶ However, our previous research finds that staying on buprenorphine was associated with a lower risk of having a second nonfatal overdose following an initial overdose (Burke et al. 2021).

Table 6

Median Earnings among Regression Sample Members Employed Before and After Nonemployment Spell

Buprenorphine Regression Sample		
	Median Quarterly Earnings Before Nonemployment Spell	Median Quarterly Earnings After Nonemployment Spell
Started Buprenorphine Then Found Job	\$1,014	\$1,342
Sample Size	745	745
Found Job Then Started Methadone	\$1,152	\$1,241
Sample Size	1,575	1,575
Methadone Regression Sample		
	Median Quarterly Earnings Before Nonemployment Spell	Median Quarterly Earnings After Nonemployment Spell
Started Methadone Then Found Job	\$934	\$1,172
Sample Size	578	578
Found Job Then Started Methadone	\$1,012	\$1,170
Sample Size	1,144	1,144

Note(s): In columns labeled Buprenorphine Regression Sample, the sample consists of the subset of that regression sample's members who were employed both before and after their first nonemployment quarter, and similarly for the columns labeled Methadone Regression Sample. The sample restrictions are described in the accompanying working paper (Burke et al. 2022). Median Quarterly Earnings Before Nonemployment Spell refers to median single-quarter earnings (in dollars) in the quarter immediately prior to the start of an individual's first nonemployment spell. Median Quarterly Earnings After Nonemployment Spell refers to median single-quarter earnings in the earliest employment quarter after the start of an individual's first nonemployment spell. In all conditions, all events (such as Started Buprenorphine, Found Job) occurred strictly after the start of an individual's first nonemployment spell.

Source(s): Authors' calculations using data from Rhode Island Data Ecosystem

Finally, we consider some preliminary evidence on the association between MOUD and earnings. Table 6 shows median single-quarter earnings among regression sample members, both immediately before and immediately after their initial nonemployment spell, in relation to whether someone started receiving buprenorphine (or, alternatively, methadone) treatment before or after they became reemployed. (The calculations are limited to those who were employed on either side of their original nonemployment spell.) Median wages were higher after the nonemployment spell than before in all cases, but the increase in wages appears greater among those who initiated buprenorphine (or methadone) before starting their new job compared with those who first found a new job and only later began receiving buprenorphine (methadone) treatment. These findings suggest that starting MOUD treatment may help OUD patients achieve greater increases in earnings over time than they would achieve otherwise, but these results are preliminary.

VI. Interpretation of Results and Policy Implications

The analysis above describes a variety of patterns and associations between an individual's opioid use disorder (OUD) status, treatment status (receiving either methadone or buprenorphine), and employment outcomes such as the job separation rate and the job-finding rate. These patterns were observed among Medicaid enrollees in Rhode Island over the 2013–2020 period. Results indicate that an initial OUD diagnosis may limit an individual's chances of maintaining an in-state payroll job, while an individual's chances of finding a job (from a state of nonemployment) appear to increase following treatment with buprenorphine for OUD, and especially in the quarter just after initiation. The latter result might reflect a pattern of taking an intentional pause from work to enter treatment and subsequently resuming work once one's condition has been stabilized, consistent with the notion that having untreated OUD may be incompatible with employment. Furthermore, the improvement in functioning that follows the initial induction and stabilization phase of buprenorphine treatment may be more dramatic than the additional benefit of merely continuing medication at later dates in the maintenance phase. From a medical standpoint, the initial phases of treatment may also preclude some forms of labor, as indicated by Mehrdad et al. (2015). Preliminary results also suggest that starting either buprenorphine or methadone may lead to greater increases in earnings among individuals with OUD who later become reemployed.

However, in light of data limitations, we can't be sure that these associations are causal. For example, the increased risk of job separation associated with the event of receiving an OUD diagnosis might reflect the impact of other adverse life events that could have contributed to both the disordered opioid use and the increased chances of leaving or losing a job, such as experiencing a major physical or emotional trauma. Although individuals with OUD are protected legally from employer discrimination, the stigmatization associated with OUD may, in practice, restrain the hiring and/or retention of such individuals, as evidenced by lawsuits against employers for violations of the relevant Americans with Disabilities Act (ADA) rule.²⁷

The positive association between buprenorphine treatment and finding a job might arise because an individual experiences a change in their circumstances that leads both to receiving treatment and finding a job. For example, an individual might receive an influx of family or public assistance that helps them secure stable housing, which subsequently makes it easier for them to both find a job and enter treatment. Alternatively, other unobserved factors may also peak during the initial phase of treatment, such as an individual's motivation to return to work and/or the extent of extra support they receive in the form of vocational training and other referrals.

Our analysis does not reveal any positive association between starting methadone treatment and becoming reemployed after a nonemployment spell, except for a statistically insignificant positive association among methadone recipients who also received buprenorphine at some point.²⁸ Although this result might seem disappointing, it does not mean that policy should discourage the use of methadone to treat OUD; evidence shows that methadone is highly effective and should be preferred over buprenorphine for some patients (McCance-Katz, Sullivan, and Nallani 2010).

27 The US Equal Employment Opportunity Commission (EEOC) sued Volvo for rescinding an employment offer after having learned the job candidate was taking medically supervised Suboxone (a combination of buprenorphine and naloxone) to treat OUD. Volvo paid damages of \$70,000 in 2018 as a result of this lawsuit. See "Volvo Refuses to Hire Worker Legally Taking Suboxone," *The Rehabs Journal*, American Addiction Centers National Rehab Directory blog, July 12, 2021, <https://rehabs.com/blog/volvo-refuses-to-hire-worker-legally-taking-suboxone/>.

28 We are aware of only one other study that relates methadone treatment specifically to reemployment, and that study (Richardson et al. 2012) observes, if anything, a negative association between methadone treatment and reemployment risk.

Our findings suggest two different possibilities. First, some individuals may face consistently low employment prospects despite starting methadone treatment, not because of it, owing to the severity of their disorder and other limiting factors such as homelessness. Methadone recipients with no previous employment seem to fit this description, as they exhibit consistently lower job-finding rates compared with people with past employment experience and even relative to buprenorphine recipients with no work history. Second, even for patients with relatively strong employment potential, such as those previously employed, the logistical requirements of starting and staying on methadone may impose extra impediments to finding a job that are not present with buprenorphine treatment. Therefore, providers might take into consideration whether someone is seeking employment when deciding which treatment to recommend, especially when medical considerations do not strongly favor one medication over the other. Unfortunately, some patients may still lack convenient access to a buprenorphine provider owing to their location, as suggested in Burke et al. (2021).

There is room for optimism despite the daily drumbeat of bad news related to the opioid crisis.

Our results also suggest implications for employers and policymakers in terms of helping patients achieve greater convenience in accessing medications for OUD. Employers should be encouraged to offer accommodation for employees to take time from work to visit an opioid treatment facility and receive methadone, or to adjust their schedules to allow for such visits. Employers under the ADA are required to offer “reasonable accommodation” for employees with substance use disorders to comply with treatment programs, but in practice, the extent of compliance may be constrained (Aoun and Appelbaum 2019). Beyond simply accommodating patients in recovery, employers might play a more proactive role by, for example, encouraging early substance use treatment, countering the stigmatization of treatment, and integrating opioid education into workplace safety training and health promotion programs (Shaw, Roelofs, and Punnett 2020).

Separately, policies introduced during the COVID-19 pandemic have allowed for a greater number of patients to receive take-home doses of methadone. These new policies were found to be largely successful, with no significant increases in illegal diversion of the medication (Brothers et al. 2021). Under these policies, Rhode Island currently allows opioid treatment programs (OTPs) to dispense 28 days of take-home methadone doses for fully stabilized patients and 14 days for selected other patients, in accordance with guidelines of the Substance Abuse and Mental Health Services Administration (SAMHSA). In August 2022, CODAC Behavioral Healthcare of Rhode Island launched the country’s first mobile methadone unit, an option permitted under new federal Drug Enforcement Administration regulations of 2021.²⁹ The clinic consists of a van operating six mornings per week (6:30 to 10 a.m.) in an area of Woonsocket not served by a methadone clinic, thereby greatly increasing convenience for patients in that area. The clinic not only dispenses methadone but also provides counseling services (via telehealth) as well as blood pressure, glucose, and mental health screenings. Increased deployment of such mobile units may offer life-saving benefits and make it easier for treatment recipients to hold a job.

29 See G. Wayne Miller, “A First in US, New Mobile Methadone Unit Seeks to Reduce Fatal Overdoses in RI,” *Providence Journal*, July 23, 2022, <https://www.providencejournal.com/story/news/healthcare/2022/07/23/rhode-island-mobile-methadone-unit-seeks-reduce-fatal-overdoses/10125640002/>.

Given these encouraging recent policy innovations and our results suggesting that taking medications for OUD can help patients return to work faster and possibly to increase their earnings, there is room for optimism despite the daily drumbeat of bad news related to the opioid crisis. If medications for OUD improve job prospects in addition to saving lives, then public and private sector stakeholders alike should favor strong policies promoting greater uptake of and adherence to such medications.

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About the Authors



Mary A. Burke is a senior economist and policy advisor with New England Public Policy Center (NEPPC) in the Federal Reserve Bank of Boston Research Department. She is an applied labor economist studying the economics of health behaviors and health outcomes, education, social norms, and the gig economy. Burke earned a BA in mathematics from Brown University and both an MA and PhD in economics from Johns Hopkins University. Before joining the Boston Fed in 2005, she served as an assistant professor of economics at Florida State University. She gives regular briefings on the New England economy to senior leaders with the Federal Reserve System and to public audiences.



Riley Sullivan is a senior policy analyst with the New England Public Policy Center (NEPPC) in the Federal Reserve Bank of Boston Research Department. He conducts analysis of regional economic and policy issues for the NEPPC. His research interests include education policy, income inequality, and urban and regional economics. Sullivan holds a master's degree in public policy from Georgetown University and a BA in history from Boston College. Before attending graduate school, Sullivan worked at Ostiguy High School, a school in Boston for students in recovery from drug addiction. He has also worked as a research analyst for Citizens for Citizens, a community action agency in Fall River, Massachusetts.

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New England Public Policy Center
Federal Reserve Bank of Boston
600 Atlantic Avenue
Boston, MA 02210

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