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Pharmacotherapy for Opioid Addiction in Community Corrections

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Abstract

Pharmacotherapy for opioid addiction with methadone, buprenorphine, and naltrexone has proven efficacy in reducing illicit opioid use. These treatments are underutilized among opioid-addicted individuals on parole, probation or in drug courts. This paper examines the peer-reviewed literature on the effectiveness of pharmacotherapy for opioid addiction of adults under community-based criminal justice supervision in the US. Compared to general populations, there are relatively few papers addressing the separate impact of pharmacotherapy on individuals under community supervision. Tentative conclusions can be drawn from the extant literature. Reasonable evidence exists that illicit opioid use and self-reported criminal behavior decline after treatment entry and that these outcomes are as favorable among individuals under criminal justice supervision as the general treatment population. Surprisingly, there is no conclusive evidence regarding the extent to which pharmacotherapy impacts the likelihood of arrest and incarceration among individuals under supervision. However, given the proven efficacy of these three medications in reducing illicit opioid use and the evidence that in the general population, methadone and buprenorphine treatment are associated with reduction in overdose mortality, the use of all three pharmacotherapies among patients under criminal justice supervision should be expanded while more data are collected on their impact on arrest and incarceration.

Keywords

opioid addiction; heroin addiction; methadone treatment; buprenorphine treatment; naltrexone treatment; criminal justice; parole; probation

Introduction

In 2016, there were over 42,000 opioid overdose deaths in the U.S. (Center for Disease Control and Prevention [CDC], 2018). It is estimated that over 2.1 million people in the US are addicted to heroin, prescription opioid analgesics, and/or illicitly manufactured fentanyl and its analogues (Substance Abuse and Mental Health Services Administration [SAMHSA], 2017). In addition to deaths from drug overdoses, opioid addiction is associated with

morbidity and mortality from HIV (Des Jarlais et al., 1994; Mathers et al., 2010) and hepatitis (Dolan et al., 2005; Nelson et al., 2011). There is also a complex association between opioid addiction and criminal behavior (Chaiken & Chaiken, 1990; Craddock, Rounds-Bryant, Flynn, & Hubbard, 1997), arrest, and incarceration (Inciardi, 2008). Since the 1960s, there has been a renewed interest in exploring the potential contribution for pharmacotherapy in reducing illicit opioid use and crime among opioid-addicted individuals involved with the criminal justice system. This paper begins with a background on the types of medications available for treating opioid addiction in the U.S., and then a brief history of opioid treatment in the criminal justice system prior to the use of methadone maintenance. The paper then offers a review of the peer-reviewed literature on the use of pharmacotherapy for opioid addiction among adults under community supervision by the U.S. criminal justice system.

Background: Community Supervision

In the U.S., individuals involved in the criminal justice system are frequently subject to various types of supervision in the community. Probation, the most common form, consists of a court sentence that provides community supervision through a Probation Agency (which can be local, state or federal), generally as an alternative to incarceration (Bureau of Justice Statistics, 2018a). Parole is another variety of supervision and refers to conditional release from prison to serve the remaining part of a sentence in the community (Bureau of Justice Statistics, 2018b). Probationers or parolees can be *mandated* to be drug tested and to attend drug abuse treatment. Violations of the conditions of supervision (e.g., positive drug tests or failure to attend appointments with supervising officers) can result in incarceration. In other cases, individuals on probation or parole may not be explicitly mandated to treatment but may feel pressure from their parole or probation officer to attend treatment (Farabee, Prendergast, & Anglin, 1998) or they may seek treatment voluntarily.

Drug courts, whether state or federal, are specialized courts based on a model that includes screening and assessment, judicial interaction, monitoring (drug testing), graduated sanctions and incentives, and often additional substance abuse treatment (National Institute of Justice, 2018). In 2015, there were 3,142 drug courts in the US, supervising approximately 127,000 individuals (Marlowe, Hardin, & Fox, 2016). In a 2014 national survey of drug court coordinators, opioids were ranked as the primary substance of abuse by adults under drug court supervision in over 20% of drug courts in urban settings and in over 30% in rural and suburban settings (Marlowe, et al., 2016).

One potential outcome of community supervision is recidivism. However, recidivism has been defined in a variety of ways. It has been used to refer to a return to illegal behavior or, more often, to a subsequent arrest, incarceration, or conviction. Federal supervision appears to have lower rates of recidivism, defined as subsequent arrest, compared to state supervision. A US Federal Bureau of Justice Statistics (BJS) study found that 47% of individuals under federal supervision versus 77% of individuals under state supervision were arrested within five years of release from prison (Markman, Durose, Rantala, & Tiedt, 2016). Successful completion of supervision is another way of measuring outcome. For example, the average graduation rate in drug court programs, according to a survey of their

coordinators, was 59% in 2014 (Marlowe, et al., 2016). The literature is filled with efforts to reduce recidivism rates and increase successful supervision completion rates (Inciardi, 1990; Tonry, 2011).

Community Supervision and Pharmacotherapy

The “active ingredients” of community supervision in addressing opioid addiction appear to include behavior monitoring by the supervising officers, some form of drug testing, judicial oversight (for drug courts), sanctions (e.g., brief incarcerations), and drug abuse treatment participation. Despite demonstrated effectiveness in reducing illicit opioid use, drug abuse treatment provided in conjunction with supervision often does not include, and in some cases may actually prohibit, pharmacotherapy with buprenorphine, methadone, or naltrexone, three FDA-approved medications for the treatment of opioid addiction. Each of these medications has a strong evidence base in reducing illicit opioid use, based on extant randomized clinical trials (Krupitsky et al., 2011; Mattick, Breen, Kimber, & Davoli, 2009, 2014). In addition, large scale, multi-site studies based in community treatment programs using pre-post designs (Hubbard, Craddock, Flynn, Anderson, & Etheridge, 1997; Simpson, Savage, Lloyd, & Sells, 1978) showed that methadone was effective in reducing illicit opioid use and self-reported criminal behavior. These three medications have different characteristics and can be used in different settings (see Table 1).

As noted above, these medications are underutilized in community corrections as well as in jails and prisons (see Sharma et al., 2016, or Hedrich et al., 2012, for reviews of the evidence for the efficacy in correctional institutions). Pharmacotherapy for opioid addiction have reportedly been made available by only 17% of probation/parole agencies and 38–56% of drug courts (Friedmann et al., 2012; Matusow et al., 2013). Opioid-addicted individuals referred from the justice system reportedly have a greater delay in gaining admission to methadone treatment in the community, when such treatment is available to them, compared with self-referred patients (Gryczynski, Schwartz, Salkever, Mitchell, & Jaffe, 2011).

It has been argued that effectively treating individuals in the CJ system offers an opportunity to reduce illicit opioid use and associated criminal behavior (Chandler, Fletcher, & Volkow, 2009). However, opioid addiction’s association with criminal behavior is complex. In some individuals, criminal behavior predates the onset of addiction. Criminal behavior of such individuals tends to persist during periods of their life in which their addiction is in remission (albeit at a lower level), in contrast to individuals whose criminal behavior did not predate the onset of addiction (Inciardi, 2008; Nurco, Hanlon, Kinlock, & Duszynski, 1988). The kinds of crimes associated with opioid addiction often include possession and sale of drugs as well as activities related to the acquisition of illegal income to support the purchase of drugs. Such related crimes include shoplifting, theft, robbery, burglary, and prostitution (Ball & Ross, 1991). Violent crime among opioid-addicted individuals is relatively uncommon (Ball, Shaffer, & Nurco, 1983; Schwartz et al., 2009).

History of pharmacotherapy for opioid addiction among criminal justice-involved individuals

In the broadest sense, the use of pharmacotherapy for opioid addiction in the U.S. dates to the early 20th century and the establishment of morphine clinics in numerous cities. These clinics were active from the opening of the first morphine clinic in Jacksonville, Florida in 1912 through the closing of the clinic in Shreveport, Louisiana in 1923 (Musto, 1987). Nearly all were operated by local health departments. A notable exception was the morphine clinic in New Haven, Connecticut that was under the auspices of its Police Department from 1918 to 1920 (Musto & Ramos, 1981). This effort at opioid agonist maintenance was discontinued due to rigorous enforcement of regulations written by the Treasury Department in support of the Harrison Narcotics Act of 1914 and a 1919 ruling of the Supreme Court. The regulation essentially made the use of any opioid medication for ambulatory maintenance treatment of addiction (including by gradual dose reduction) illegal (Musto, 1987). During the four decades from the closing of the last morphine clinic in Shreveport until the opening of the Dole/Nyswander methadone maintenance program in New York City in 1964, opioid agonist maintenance treatment for opioid addiction was defined as illegal, i.e., not a legitimate practice of medicine, by the Federal Government.

As convictions and incarcerations under the Harrison Narcotics Act mounted, federal prisons were becoming overcrowded and unruly with smuggled drugs entering prisons. This situation led Congress to authorize the opening of special prisons in Lexington, Kentucky in 1935 initially termed a narcotics farm and Fort Worth, Texas in 1938 in the hopes of treating the inmates for their addiction (Musto, 1987). These facilities provided imprisonment and residential treatment of opioid addiction for Federal prisoners and later for both voluntary and involuntary patients (Glasscote, Sussex, Jaffe, Ball, & Brill, 1972). The approach taken at these institutions, later officially called US Public Health Service Hospitals, was based on treating physiological withdrawal symptoms with methadone (starting in 1949), vocational assignments, and talk therapy with psychiatrists, psychologists, social workers, and vocational counselors (Brill & Lieberman, 1969). The reported experience with patients discharged from Lexington to various parts of the country was that the majority of patients relapsed after their return to the community (DeFleur, Ball, & Snarr, 1969; Duvall, Locke, & Brill, 1963; Inciardi, 1988a). But even before reports of the relative lack of success of this program, other approaches to treatment were being tried, such as religious activities, Narcotics Anonymous, and Synanon (a residential self-regulating community).

Early efforts aimed at dealing with heroin addiction solely through criminal justice supervision in the community were typically less than fully successful. In an historic review, Joseph (1988) noted that of the 673 individuals under parole assigned to a special unit with trained officers to provide intensive supervision between 1956 and 1961, 73% either relapsed, were arrested again, or were re-institutionalized on parole violations. Half of the individuals who successfully completed parole had relapsed within less than three years. From 1963 to 1965 a new approach consisting of counseling by social workers and nurses, urine drug testing, and supervision was provided to 159 individuals on probation with heroin addiction. This approach reportedly had a 78% relapse rate, a 48% re-arrest rate, and 25% conviction rate (Joseph, 1988).

Civil Commitment

Civil commitment laws (i.e., the use of the legal system to compel people to attend treatment) were passed in California in 1961 and subsequently in New York in 1962 (Anglin, 1988). The California program's stated goals were to treat, rehabilitate, and control but not to punish – although individuals who were non-compliant could be returned to additional institutional care for various violations (Kramer, Bass, & Berecochea, 1968). In California, the program could last up to seven years. Treatment had two phases including a residential phase for six months in prison (which in subsequent years was shortened) followed by a parole phase during which the patient had to meet with a parole agent, attend group counseling, undergo urine drug testing, and/or a challenge with nalorphine to uncover illicit opioid use. Only about one third of outpatients on parole who were committed to California's program were in good standing after 12 months (Kramer, et al., 1968). Once methadone maintenance became available in California in 1970, patients in the California A program were permitted to participate (Anglin, 1988). The civil commitment program in New York, was considered less successful than the California program (Inciardi, 1988b). It was operated by the New York State Department of Social Welfare which had little experience with this population, in contrast to the Department of Corrections in California (Inciardi, 1988b).

Federal civil commitment law, the Narcotic Addict Rehabilitation Act (NARA), was passed in 1966. The law encompassed several categories of addicted individuals including: (1) voluntary patients who could enter treatment rather than being prosecuted; (2) people who refused voluntary treatment and were convicted; and, (3) people whose relatives could commit them against their will (Tieman, 1981). It consisted of screening for suitability and if found suitable, approximately six months of residential treatment at one of the US Public Health Service Hospitals, which were no longer viewed as prisons. This was followed by psychosocial treatment in the community paid for by the Federal government. In a report on the post-release follow-up of the first 252 men treated for opioid addiction at Lexington under NARA, Lagenauer and Bowden (1971) found that 45% used opioids shortly after they were discharged. The Special Action Office for Drug Abuse Prevention (SAODAP), created by President Nixon in 1971, expanded the voluntary public sector treatment system (including methadone maintenance) and permitted methadone treatment to be included as a treatment approach through NARA (Tieman, 1981). Anglin (1988) noted that the experiences with these civil commitment programs served as forerunners to the current referral system to treatment from the courts, probation, and parole agencies. Although these three civil commitment programs only infrequently admitted individuals to treatment involuntarily without criminal charges (Anglin, 1988), there are now efforts in a variety of US states to again institute civil commitment programs (Jain, Christopher, & Appelbaum, 2018).

An additional approach that involved linking the criminal justice system to the expanding community treatment system, was initiated by SAODAP. This program, initially called Treatment Alternative to Street Crime in the 1970s (TASC; now called Treatment Accountability for Safer Communities) (Anglin, Longshore, & Turner, 1999), provided assessment and linkage to treatment (including pharmacotherapy) in the community through

case finding and management, as an alternative to incarceration. Arrestees who were released on bail or on their own recognizance, were linked to treatment and the courts through TASC to allow progress in treatment to be considered in further prosecution and sentencing. This service continues in various parts of the U.S. to this day

Purpose of this paper

As detailed in the history section above, the criminal justice and health systems have been grappling with opioid addiction for over 100 years. Many advances in scientific knowledge and in pharmacotherapy have occurred since the morphine clinics were operating in the early 1900s. Methadone, buprenorphine, and naltrexone formulations have been shown effective in reducing illicit opioid use in the community (Lee et al., 2016; Mattick, et al., 2009, 2014). The extent to which pharmacotherapy for opioid addiction is effective for reducing opioid use and criminal activity for adults under community supervision has been reported in a number of peer-reviewed publications. These publications will be reviewed in the present article in order to inform policy makers, correction and health officials, and other interested parties on their use. This article will not report on the use of pharmacotherapy in jails and prisons because that topic has been reviewed relatively recently (Hedrich, et al., 2012; Sharma, et al., 2016) and most individuals in the criminal justice system are not incarcerated.

Methods

The first and second authors (RPS and MM) conducted literature reviews of the English language peer-reviewed literature in Pub Med and Psychinfo through May 2018. Thus, we did not include material from book chapters or monographs in the results section of this article. In the material that follows we relied on the search of the following key words: methadone treatment, buprenorphine treatment, naltrexone treatment, medication assisted treatment and community supervision, parole, probation, pre-trial supervision, drug court. Because of differences between the U.S. and other countries' CJ systems, only articles regarding the U.S. were considered. Article title and abstracts were reviewed to determine their appropriateness for the paper, which included adults with opioid dependence under CJ community supervision whose outcomes were reported after treatment with FDA-approved medications. References were examined to find relevant papers that did not appear in the literature review. In contrast to the Cochrane review on pharmacologic treat for individuals in the criminal justice system only reviewed randomized clinical trials, most of which were conducting in jails or prisons (Perry et al., 2015), we review reports of randomized trials and non-randomized trials that contained patient outcome data. The findings from the literature are reviewed below and organized by medication.

Results

Findings of this review regarding naltrexone, methadone and buprenorphine treatment are summarized below in Table 2. Because articles on naltrexone treatment reported on the use of both its oral and extended release formulations, and because these formulations impact adherence to treatment, they will be treated here as distinct pharmacotherapies.

The effectiveness of oral naltrexone in reducing illicit opioid use and criminal justice involvement among individuals under community supervision.

We identified two studies examining oral naltrexone for individuals under community supervision, both of which were conducted in Philadelphia. In a pilot study, Cornish and colleagues (1997) randomly assigned 51 federal probationers and parolees with a history of opioid addiction (on a 2:1 basis) to receive directly observed oral naltrexone or no medication, in the context of twice-weekly counseling for a 6-month period. Participants were able to self-refer to the study or to be referred to enter the study by their supervising officer. There were no significant differences in treatment retention between study conditions. In contrast, both the rates of opioid-positive urine test results and of revocation of probation or parole with consequent return to prison favored the naltrexone condition (both $ps < .05$). This pilot randomized trial demonstrated the feasibility of providing directly observed oral naltrexone to a population under community supervision through a federal parole and probation agency.

A larger randomized trial of oral naltrexone was also conducted in Philadelphia by the same research team (Coviello, Cornish, Lynch, Alterman, & O'Brien, 2010). In this study, the sample included 111 adults under supervision who were referred to the study from county and federal parole and probation agencies, drug court, an alternative to incarceration program, an early parole program, public defenders, and outpatient and inpatient drug treatment programs. Eligible participants were randomly assigned to start an intensive outpatient counseling program with directly observed oral naltrexone or without medication. During the 6-month treatment phase, there were low rates of treatment retention with no statistically significant differences between conditions (32% for the naltrexone vs. 29% the no-medication group, respectively). Urine drug screening test results were difficult to interpret due to the amount of missing data. At the 6-month follow-up interview, there were no significant between-condition differences in urine opioid-positive tests or in the number of parole violations or drug charges based on official records. The authors thought that the likely difference in findings between their two studies with supervised oral naltrexone was that their initial pilot study was conducted with participants under closer federal supervision than the supervision that was provided to the more heterogeneous population in their subsequent, larger study.

The effectiveness of extended-release naltrexone in reducing illicit opioid use and criminal justice involvement among individuals under criminal justice supervision.

Extended-release naltrexone (XR-NTX) is a monthly intramuscular injection that was developed to overcome the lack of adherence to non-supervised oral naltrexone (Minozzi et al., 2011). Lee and colleagues (2016) reported on a five-site random assignment study conducted with 308 adults with criminal justice involvement. Criminal justice involvement could include probation, parole, drug court participation, or other court-mandated treatment, as well as individuals who were "criminal justice involved" (i.e., individuals in the 12 months prior to study enrollment who were released from jail or prison, made plea-bargain arrangements, or had been under community supervision). Other inclusion criteria were: ages 18–60 years old with DSM-IV opioid dependence and a negative opioid urine test. A total of 74% of participants were on parole and probation. The majority (65%) of

participants had not used opioids in the 30 days prior to enrollment and only 9% required opioid detoxification prior to enrollment. All participants received brief counseling (e.g., medical management) and referral to outpatient drug abuse treatment. They were randomly assigned to receive six months of XR-NTX or to receive no medication through the study. The primary outcome was median time to relapse. Relapse was defined as 10 days of opioid use in a 28-day period measured through either self-report or opioid-positive urine drug testing (i.e., two consecutive opioid-positive results with missing samples counted as positive). Seventy-eight percent of the participants received a third injection and 61% received a sixth injection. The XR-NTX condition had a significantly longer time to relapse compared to the no-medication condition (10.5 vs. 5.0 weeks to relapse, respectively; $p < .001$); significantly lower overall relapse rate (43% vs. 64%, respectively; $p < .001$), and significantly lower rates of opioid positive tests (25.9% vs. 44.3%, respectively; $p < .001$). However, there were no significant differences in terms of self-reported percentage of participants who were incarcerated (22.9% vs. 29.0%, respectively) or in the total number of days of incarceration. After the active six-month medication phase of the study, there were no longer significant differences between groups in opioid positive tests at the 52- and 78-week follow-up (51% vs. 54%, respectively for both groups combined).

In the five-site study by Lee and colleagues, there were no fatal or non-fatal overdoses in the XR-NTX group during the trial and at the 78-week follow-up, in contrast to 5 and 7 overdoses, respectively during those time frames in the no-medication group. The 6-month treatment retention rate was nearly double that of *oral* naltrexone in the above-mentioned study by Coviello and colleagues (2010). The study findings were consistent with the results of an earlier trial conducted in Russia, which showed the superiority of XR-NTX compared to placebo in suppressing illicit opioid use (Krupitsky, et al., 2011).

A multi-site pilot study conducted by Coviello and colleagues (2012) under an FDA Investigational New Drug (IND) permit to study a non-FDA approved formulation (Depotrex) of a monthly injectable extended release naltrexone among 61 parolees and probationers showed the feasibility and acceptability of its use in this population. Depotrex is a different formulation of XR-NTX than the formulation approved for use by the FDA in 2010 to prevent relapse to opioid dependence following detoxification.

There was one study that compared extended-release naltrexone to different medications, as well as to psychosocial treatment with no medication, specifically among parolees/probationers receiving treatment for opioid or alcohol problems. In this analysis of administrative treatment data from Missouri by Crits-Christoph and colleagues (2015), which included 1,199 patients with opioid problems, propensity score techniques were used to statistically account for differences in the demographic and clinical characteristics of patients that received different treatments. The study found that the 136 patients with opioid problems who received XR-NTX had a median duration of care in the index treatment episode of 97 days, which was significantly longer than the duration of care among the 866 patients who received no medication (63 days) and not significant difference in comparison with the 163 patients who received buprenorphine (69 days). Outcome data from discharge records were available for a subset of patients with opioid problems. Abstinence rates at discharge were significantly higher among patients who received XR-NTX (67.2%; $n=58$)

compared to patients who received buprenorphine (25.0%; $n=68$) or no medication (50.6%; $n=484$). There were no significant differences between XR-NTX and any other treatment types in rates of arrest in the past 30 days at discharge. The findings from this study highlight the potential efficacy of XR-NTX in populations under criminal justice supervision. Strengths of the study include the large sample, naturalistic comparison of XR-NTX to different medications and no medication, and the use of propensity score methods to improve causal inferences. Limitations include potential biases arising from lack of random assignment and reliance on administrative admission and discharge data (e.g., unmeasured confounding and selection bias, incomplete records for patients on long-term medication who were not yet discharged).

Naltrexone: Summary

The two random assignment studies comparing oral naltrexone versus no medication found conflicting results. In the smaller pilot study by Cornish and colleagues (1997), those taking oral naltrexone condition had lower rates of opioid use and supervision revocation with resultant incarceration than those who took no medication. But these findings were not replicated in a larger, more heterogeneous sample using a similar study design by the same research team in the same city (Coviello, et al., 2010). Thus, in terms of oral naltrexone, based on these limited findings, oral naltrexone should be only considered for patients with close supervision and when the medication can be taken under direct observation.

Although there is only one randomized trial comparing XR-NTX with no medication among criminal justice involved adults (Lee, et al., 2016), it was a large multi-site random assignment study with a concurrent no medication control group. The criminal justice involvement and level of supervision were quite heterogeneous. This study found lower likelihood of relapse and less opioid use in the XR-NTX condition than in the no-medication condition, but no impact on incarceration. This finding is notable because participants in both groups received only brief counseling provided by the study (akin to medical management visits) with only referral to additional drug abuse treatment. Consistent with the findings of Lee et al. (2016) in the randomized trial, the retrospective study by Crits-Christoph et al. (2015) using administrative records likewise found an advantage for XR-NTX with respect to substance use but not criminal justice outcomes, as compared with non-medication treatment.

The majority of participants in the Lee and colleagues (2016) study, had already been opioid abstinent for 30 days or more prior to study enrollment, hence avoiding the known challenges of completing outpatient opioid detoxification and remaining abstinent for an adequate period of time prior to initiation of naltrexone treatment (Lee et al., 2018). It seems that the best approach would be to offer XR-NTX to opioid-addicted individuals under community supervision who would prefer not to receive methadone or buprenorphine treatment, recognizing that the evidence to date supports reduction in opioid use but no significant impact on arrest or incarceration.

The effectiveness of methadone maintenance in reducing illicit opioid use and criminal justice involvement among individuals under criminal justice supervision.

In contrast to the studies of naltrexone, we did not identify any randomized trials of methadone vs. no treatment for individuals under community supervision. However, over the past 50 years, a number of longitudinal cohort studies contrasted outcomes of patients treated with methadone maintenance who were under criminal justice supervision with patients who were not under such supervision. One of the first such reports, a descriptive study based on a retrospective record review without a control group, was published by Joseph and Dole (1970). They reported that of the 269 patients under probation or parole supervision in New York City and treated with methadone in the 6 years between 1964 and 1969, 193 (72%) had made “good adjustment” as defined by remaining in treatment and either being in good standing with their parole and probation supervision or having successfully completed supervision. In contrast, the remaining 76 (28%) had either been discharged from treatment for unremitting alcohol or drug or had violated the terms of supervision. Methadone patients under supervision had a lower treatment retention rate compared with methadone patients not under supervision (72% vs. 82%).

Interesting, because of limited availability of methadone treatment in the community, the New York City Probation Department in collaboration with several hospitals created five satellite methadone treatment programs situated in Probation Offices or offsite in hospital clinics (Joseph & Callanan, 1974). In these programs, the probation officers served as counselors. In a report on outcomes of 900 of these patients enrolled from February 1970 through November 1972, Joseph (1973) found that this patient cohort was retained in methadone treatment for 89% of potential amount of time the patients could have been exposed to methadone treatment in the community. Five hundred eighty five (65%) were still in treatment, 156 (17%) transferred to another treatment program, and 159 (18%) were discharged. Reasons for discharge of the 156 patients no longer in treatment included: 62 (39%) for failure to report, 51 (32%; representing 5.7% of the total sample of 900 patients) for incarceration, drug abuse, or behavioral problems; 33 (21%) voluntary discharge in good standing, 10 (6%) transferred to other treatment; and 3 died (2%). This report showed the feasibility of integrating methadone treatment with probation supervision.

Anglin, McGlothlin, & Speckart (1981) contrasted outcomes during a 7-year follow-up of matched male samples of first-time admissions to methadone treatment programs (MTPs) in three southern California counties between 1971 and 1973. Participants were matched based on whether they were on parole through the California civil addict commitment program with at least 30 months remaining on their commitment ($n=136$) or not on parole ($n=136$). Also, participants were matched based on their MTP, race, age, mean number of arrests, and amount of time incarcerated before MTP admission. The civil commitment program included low-caseload parole supervision and urine drug test monitoring. Both groups had marked reduction in self-reported regular illicit opioid use, criminal behavior as well as arrests, and incarcerations determined by official records, subsequent to treatment admission. There were no significant differences between patients on parole and patients not on parole in their pre-versus post-MTP admission status in terms of use of illicit opioids, self-reported days of criminal behavior, of the number of arrests, and time incarcerated. This

research suggested that patients treated with methadone while on parole had similar improvements compared to patients treated with methadone while not on parole.

Anglin, Brecht, and Maddahian (1989) conducted an analysis of 297 males interviewed an average of 6.6 years from their first MTP admission occurring between 1971 and 1973 to three southern California County MTPs. The goal of the study was to determine if there were differences among three groups of patients based on their coercion status. The “high coercion” group ($n = 111$) was defined as patients on parole or probation at the time of their MTP admission (as determined by official criminal justice records) who were required by their supervising officer to have urine drug test monitoring *and* who reported that their admission was related to their legal problems. The “moderate coercion” group ($n = 101$) was defined as patients on parole or probation who either were required to be urine drug test monitored *or* who reported that their admission was related to their legal problems. Finally, the “low coercion” group ($n = 84$) was defined as neither being on community supervision, nor being under urine drug test monitoring by the criminal justice system. Few significant baseline differences among the groups were found in demographic characteristics or variables such as parental history of alcoholism, conflict with parents, high school grades, age at leaving school, gang membership and related legal problems, age of first arrest, age at first heroin use, and age at first daily use of heroin. All three groups had significant reductions in pre- to post-admission time frames in self-reported illicit opioid use and time committing property crime, dealing drugs, and being incarcerated. In this study, self-reported opioid use and incarcerations were validated by urine drug testing and official arrest records, respectively. However, there were no significant differences among the three coercion groups. Thus, it appeared that in this early study of methadone treatment, patients who were mandated to treatment did as well as non-mandated patients.

Brecht, Anglin, and Wang (1993) replicated their above-mentioned study (Anglin, et al., 1981) using similar methods in a larger, more diverse sample. In this study, 618 male and female first-time admission MTP patients active in treatment on either June 30, 1976 or September 30, 1978 were drawn from a representative sample of the MTPs in six southern California Counties. Participants were divided into high, medium, and low coercion groups in this group’s previous work, described above, and interviewed an average of 4 to 6 years from their index treatment admission. All three coercion groups had significant reductions in self-reported illicit opioid use, days committing burglary, and property crime from their pre-treatment to during-treatment periods. There were no significant differences among the coercion groups in terms of treatment retention and self-reported illicit opioid use. Because the high and medium coercion groups had higher levels of pre-treatment criminal behavior than the low coercion groups, the medium and high coercion groups had significantly greater reduction than the low coercion group in terms of the amount of time committing burglary and property crime. Thus, coercion into methadone treatment appeared worthwhile given that coerced patients appeared to reduce their illicit opioid use and criminal behavior and responded to treatment in similar ways as non-coerced patients.

Desmond and Maddux (1996) compared 12-month treatment outcomes for patients in methadone treatment in San Antonio Texas, based on whether study participants were on parole or probation. Nearly half (48.5%) of the 610 participants, enrolled between 1989 and

1991, were on parole or probation. Overall, the entire sample showed marked reductions in urine positive opioid tests and self-reported days of criminal behavior from baseline to 12-month follow-up. Participants not under criminal justice supervision were significantly more likely than participants under supervision to be enrolled in treatment at 12-month follow-up (56% vs. 39%, respectively; $p = .0003$). Fewer non-supervised participants were discharged due to incarceration than supervised participants (18% vs. 44%, respectively) and were incarcerated for significantly less time (0.7 vs. 2.1 months; $p = .0001$). These authors attributed the differences in incarceration rates between the two supervision groups to the revocation of parole or probation by the supervising agents, who may have found out about criminal behavior or ongoing drug use in the supervised group. In contrast, non-criminal justice participants were more likely to be discharged for non-adherence with program rules (22% vs. 5%, respectively). There were no significant differences between the non-supervised versus the supervised groups in terms of self-reported days of criminal activity in the 12th month after admission (1.6 days vs. 1.4 days, respectively) or in percentage of urine opioid positive tests collected during drug treatment (31.9% vs. 36.3%, respectively). This study supported the use of methadone treatment among individuals under criminal justice supervision.

Hiller, Simpson, Broome, and Joe (2000) conducted a secondary analysis from a study of approaches to enhance treatment engagement during a 12-month longitudinal study of methadone patient outcomes in three MTPs in Texas. There were 710 participants of whom 35% were on parole, 7% were on probation, and 6% were awaiting trial. Patients were not directly coerced to enter treatment. Post-treatment incarceration was defined as any incarceration including a short time in a county jail or a prison sentence. Patients were divided into two groups based on whether they were under criminal justice supervision. Three-month follow-up data were reported for urine drug testing and self-reported criminal behavior. There were no significant between group differences in terms of opioid-positive urine tests at 3-month follow-up; however, the legal status group had significantly more cocaine-positive tests. Both groups reported significant decreases in criminal behavior following treatment admission. Neither the percentage of participants who reported illegal activity nor the number of days of committing illegal acts were found to be significantly different between the groups. At 12-months following treatment entry, the legal status group was significantly more likely to have spent any time incarcerated (41% vs. 11%, respectively) as well as time in state prison (32% vs. 7%, respectively). As with the study by Desmond and Maddux (1996), this study indicated that despite the lack of differences in self-reported criminal behavior between methadone patients with versus without a supervision status, patients with a legal status were more likely to be incarcerated. It is also possible that self-reported drug use and self-reported criminal activity may underestimate the extent of these behaviors.

Gryczynski et al. (2012) reported on a 12-month longitudinal study in four Baltimore treatment programs among probationers ($N=181$) treated with either methadone or Levo Alpha Acetyl Methadol (LAAM; a longer-acting opioid than methadone which is still FDA-approved but no longer available in the US) from 2001 to 2002. Participants were retained in treatment an average of 267.7 days ($SD=120.5$) out of 365 days with approximately 50% still in treatment after 12 months. In a pre- vs. post-treatment analysis, by self-report,

participants experienced a fourfold reduction in their days of heroin use, twofold reduction in days of cocaine use, and threefold reduction in days of illegal activity.

Kelly, O'Grady, Jaffe, Gandhi, and Schwartz (2013) reported on a secondary data analysis from a randomized trial comparing 12-month outcomes of 230 newly-admitted patients to interim methadone treatment (i.e., methadone without counseling for individuals on MTP waiting lists) versus standard methadone treatment. Participants were enrolled between 2008 and 2010 and consisted of 40% who were on parole or probation and 60% without such supervision. Both the parole and probation group and the non-supervised group showed marked decrease from baseline to 12-month follow-up in terms of self-reported days of illicit opioid use, criminal behavior, and opioid positive drug tests. Regardless of assignment to interim vs. standard methadone, there were no significant differences by criminal justice supervision status in terms of treatment retention; self-reported days of heroin or cocaine use; or, occasions of opioid or cocaine positive drug tests; self-reported days of illegal activity; arrest; or, days of incarceration. The parole/probation group had a significantly greater reduction over time in rates of cocaine-positive tests, which were attributable to the higher starting point for the probation/parole group as well as in self-reported days of illegal activity.

In a retrospective record review of the 2,931 patients with opioid dependence who were enrolled in the TASC Program in the southeastern U.S., Clark, Hendricks, Lane, Trent, & Cropsey (2014) found that only 329 (11%) were treated with methadone maintenance. Patients treated with methadone were less likely to fail supervision than those not treated with methadone (39.0% versus 52.9%, respectively; $p < .001$) and had a lower rate of relapse as measured by urine opioid positive test (32.9% versus 55.9%, respectively; $p < .001$) and longer time to relapse (89.7 days [$SD=158.8$] versus 60.5 days [$SD=117.9$], respectively; $p < .001$). This non-random assignment study was limited by differences between the two samples because the methadone patients were older and more likely to be married, white, living with their family, employed, and have health insurance. Notwithstanding the statistical controls used in the multi-variate analysis, these differences between the samples may well have contributed to the superior outcome of the patients treated with methadone.

Methadone Treatment: Summary

In contrast to the studies of naltrexone treatment described above, the extant studies of methadone treatment in patients under criminal justice supervision were longitudinal cohort designs without random assignment to a concurrent no-medication control condition. Overall, these studies found sharp reduction in self-reported illicit opioid use and criminal behavior after treatment initiation compared to the period prior to treatment. The studies that compared illicit opioid use outcomes of patients under criminal justice supervision with those not under supervision found no significant differences in terms of self-reported opioid use or opioid-positive urine screening test results, with the exception of the study by Clark et al., 2014. In terms of comparison of self-reported days of criminal behavior between the groups based on criminal justice status, there were mixed findings. Four studies found no significant difference in reduction in self-reported days of criminal behavior between supervision groups (Anglin, 1989; Anglin, et al., 1981; Desmond and Maddux, 1996; Hiller,

et al., 2000). In contrast, two reports (Brecht, et al., 1993; Kelly, et al., 2013) found a greater reduction in this outcome in the supervised group. Hence, compared to individuals not under supervision, parolees and probationers appear to respond as well or better to methadone treatment in terms of reducing their self-reported days of criminal behavior. Clark et al., 2014 found patients in the TASC Program who were treated with methadone were less likely to fail supervision compared with those not treated with methadone. The two papers that reported arrests found no difference between groups on the basis of criminal justice supervision (Anglin, et al., 1981; Kelly, et al., 2013). There were mixed findings regarding incarcerations with three studies finding no significant between-group differences in incarceration (Anglin, 1989; Anglin, et al., 1981; Kelly, et al., 2013) and two studies finding that the group with legal involvement had significantly higher rates of incarceration at 12-month follow-up (Desmond and Maddux, 1996; Hiller, et al., 2000). Taken together, these data indicate that patients with opioid addiction under community supervision should be offered methadone treatment because they will likely reduce their illicit opioid use even if they may not reduce their risk of incarceration.

The effectiveness of buprenorphine treatment in reducing illicit opioid use and/or criminal justice involvement among individuals under criminal justice supervision.

Mitchell and colleagues (2014) reported on 3- and 6- month outcomes of 300 newly-admitted African American buprenorphine patients of whom 124 (41.3%) were on parole or probation.. Participants were randomly assigned to either intensive outpatient or standard outpatient treatment in two non-OTP clinics in Baltimore, MD from 2010 to 2011. There were no significant differences between the two treatment groups in terms of: (1) treatment retention based on criminal justice status at both follow-up points (overall 75% and 60% retained, respectively); (2) self-reported opioid or cocaine use; (3) opioid or cocaine positive tests; (4) meeting DSM-IV opioid or cocaine dependence criteria; and (5) self-reported incarceration (17.1% incarcerated at least one day during the six month follow-up period).

The feasibility and acceptability of providing buprenorphine treatment at a community corrections site in Alabama was examined by Cropsey and colleagues (2013). This pilot study was conducted with 30 men and women with opioid dependence who were on parole, probation, or drug court supervision. These sample was quickly recruited over a two week period in 2010. Participants were able to receive buprenorphine at weekly medical management visits over 12 weeks. Participants remained in treatment for an average of 10.2 weeks ($SD=3.2$). During treatment, there was no significant change in the rate of opioid positive urine tests, however rates of drug injection did decline from 75.9% at baseline to 34.6% at week 6 ($p<.02$). This study, which did not have a control group, demonstrated the feasibility and acceptability of providing buprenorphine treatment onsite at community corrections.

A longitudinal study was reported by Gordon and colleagues (2015) for 64 buprenorphine patients on probation and parole. The three-month treatment retention rate was 67%. Participants reported a significant decline from baseline to 3-month follow-up in terms of self-reported days of heroin use and days of criminal behavior. This study did not have a comparison group comprised of individuals without criminal justice supervision.

Buprenorphine Treatment: Summary

As with methadone, we found no random assignment studies comparing buprenorphine treatment to a concurrent no medication control condition for individuals under CJ supervision. There was only one report that compared outcomes of patients treated with buprenorphine under criminal justice supervision with those not under supervision (Mitchell, et al., 2014). That study found no difference in illicit opioid or cocaine use, or incarceration over a 6-month post-treatment entry follow-up. The only other reports were longitudinal cohort studies of patients on parole or probation receiving buprenorphine treatment without a comparison group (Cropsey, et al., 2013; Gordon, et al., 2015) that found significant pre-treatment to 3-month follow-up reduction in illicit opioid use and in self-reported criminal behavior (Gordon, et al., 2015) and a significant reduction in drug injection but not in opioid positive urine tests from baseline to short-term follow-up (Cropsey, et al., 2013). These limited data support the use of buprenorphine through drug treatment programs for individuals under community supervision. We note the lack of reports that examined provider office-based buprenorphine in this population.

Discussion

The evidence supporting the effectiveness of extended-release naltrexone, methadone, and buprenorphine in reducing illicit opioid use in general populations that typically include at least some individuals under criminal justice supervision is clear (Lee, et al., 2016; Mattick, et al., 2009, 2014). Compared with research reports of studies in general populations, there have been relatively few studies that have examined the separate impact of criminal justice status on patient's drug use, criminal behavior, and criminal justice outcomes. There are a number of challenges in interpreting the literature in this latter area.

Challenges in Interpreting the Literature

One challenge to interpreting the extant evidence base is considerable variability in the methodological rigor of the studies. There were only a few randomized trials identified in this review, all of which were conducted with naltrexone. Most studies used less robust designs including prospective and retrospective longitudinal studies with vs. without a control group, and retrospective studies conducted by patient record review. The number of studies varied by type of medication, based in large part on the amount of time that the medications have been on the market. Pharmacotherapy for opioid addiction includes three very different medications (agonist, partial agonist, antagonist), with different formulations (oral, sublingual, injectable, implant), of different durations of action (daily, monthly, or six months), delivered in different settings (Opioid Treatment Programs or other drug treatment or health care settings). There were relatively fewer studies of naltrexone and buprenorphine compared with methadone.

A published Cochrane review (Perry, et al., 2015) reported on pharmacotherapy with criminal justice involved patients with opioid addiction; however, this review was limited to randomized trials, most of which were carried out during incarceration and hence were beyond the scope of this review. In contrast to the Cochrane review, given the relative lack of randomized trials, we chose to include peer reviewed publications that included other study

designs that were carried out exclusively in the U.S. and that were conducted among individuals who started treatment under criminal justice supervision in the community.

The studies that have been conducted use different definitions of criminal justice status in (e.g., parole, probation, drug court, awaiting trial, arrest in the previous 12 months). Community criminal justice supervision regimes could vary from civil commitment, parole after release from prison and probation as an alternative to incarceration, and pre-trial diversion. These types of supervision are applied with varying levels of intensity with a wide variety of caseloads, different drug testing methods and frequency, and different degrees of sanctions' certainty and severity. Of note, there are virtually no pharmacotherapy studies for opioid addiction reported from U.S. drug courts. The studies have different drug use outcomes (e.g., self-report and urine drug testing) and criminal justice outcomes (number of arrests, incarceration events, months of incarceration, brief incarceration vs. state prison, parole or probation revocation, arrest or incarceration for new crimes in contrast to parole and probation violations). The criminal justice outcomes were obtained by different means (e.g., self-report vs. official records).

In addition, such research is challenging to interpret because individuals under criminal justice supervision, in addition to being subject to arrest and charged with new criminal behavior (as would anyone not under supervision), are also subject to arrest and incarceration for violations of parole or probation. In addition, arrest rates and their associated charges can vary substantially by jurisdiction and even within jurisdiction over time in response to local police policies and resources allocated to the CJ system.

Despite these limitations, there are a number of tentative conclusions that we can draw from the extant literature. There is reasonable evidence that illicit opioid use and self-reported criminal behavior decrease after treatment entry for this population and that these outcomes are, for the most part, as favorable among patients with and without legal status. These findings support equal access to pharmacotherapy among individuals under criminal justice supervision as is available to voluntary patients. Further, the evidence supporting effectiveness of opioid pharmacotherapy on illicit opioid use and self-reported criminal behavior is consistent with findings from numerous clinical trials and large-scale longitudinal studies conducted in mixed legal status and non-legal status populations (Ball and Ross, 1991; Mattick, et al., 2009, 2014; Simpson, et al., 1978).

It is surprising that after 50 years of the availability of pharmacotherapy for opioid addiction, there is no conclusive evidence regarding the extent to which pharmacotherapy reduces the likelihood of arrest and incarceration among opioid-addicted patients under criminal justice supervision in the community. The extant research findings are mixed and, with the exception of the studies of naltrexone, the designs used suffer from a lack of rigor. At this point, given the proven effectiveness of pharmacotherapy in reducing illicit opioid use, it would be difficult to conduct an outpatient randomized placebo controlled or no treatment control group trial. However, given these conclusions, if parole and probationers are deprived of access to these medications by local policy, it would be a natural experiment to compare outcomes of patients treated with vs. without these medications. Even if the impact of pharmacotherapy on arrest and incarceration is uncertain, its impact on illicit opioid use

and self-reported criminal behavior is evident. In addition, methadone treatment is associated with reduced likelihood of HIV and hepatitis seroconversion (Dolan, et al., 2005; Metzger et al., 1993). Finally, methadone and buprenorphine treatment are associated with reduced likelihood of overdose death (Sordo et al., 2017). These important health findings would likely also be of benefit to individuals under criminal justice supervision.

Barriers to pharmacotherapy for opioid-addicted individuals under Criminal Justice Supervision

It was noted that engaging individuals under CJ supervision in pharmacotherapy for opioid addiction offers the potential to improve public health and safety, yet it remains underutilized (Chandler, et al., 2009). Despite efforts to engage opioid-addicted patients on parole and probation in pharmacotherapy, the criminal justice system has had a traditional preference for treatments that do not utilize medications (Bonnie, 2006; Hubbard, Collins, Rachal, & Cavanaugh, 1988). This preference appears to be slowly changing (Robertson & Swartz, 2018), although the extent of the change is presently difficult to quantify.

We found no large-scale, recent representative national surveys of the extent to which pharmacotherapy for opioid addiction was available to probationers and parolees. Individuals in these criminal justice systems may have access to drug abuse treatment through the various mechanisms available to patients in the public sector by either their own voluntary decision or through urging or referral from the supervising agencies. However, in a convenience sample of 50 criminal justice state agencies found that only 17% of probation/parole departments and 37.5% of drug courts made pharmacotherapy available (Friedmann, et al., 2012).

More is known about the availability of pharmacotherapy in drug courts compared with state and local Parole and Probation Departments. In a nationally representative survey of 186 U.S. drug courts, despite 98% reporting having at least some opioid addicted patients, buprenorphine, methadone, and naltrexone were only available through 40%, 26% and 18% of the courts, respectively (Matusow, et al., 2013). Half of the drug court personnel respondents indicated that opioid agonist medication was not available to participants with opioid addiction under any circumstances. Only one third (34%) reported that agonist therapy was permitted for drug court participants who had been using illicit opioids, while 40% reported that continued agonist maintenance was permitted for participants who were already receiving agonist therapy prior to drug court enrollment. As with parole and probation, there is a lack of additional recent data on the availability of pharmacotherapy in drug courts. Given the opioid epidemic, it would seem beneficial for parole and probation agencies to report the availability and use of these medications for their populations.

The Affordable Care Act has increased access to pharmacotherapy for patients with opioid addiction under community supervision *solely* in those states that have expanded Medicaid (Cuellar & Cheema, 2014). The National Association of Drug Court Professionals Board of Directors resolved that drug courts should not have blanket prohibitions to the use of pharmacotherapy to treat opioid addiction and that decisions to permit pharmacotherapy should be based on individualized assessments (National Association of Drug Court Professionals [NADCP], 2011). Importantly, as of 2015, the Office of National Drug Control

Policy requires all federally-funded drug courts to permit appropriate patients to be treated with FDA-approved medications for the treatment of substance use disorders and encourages them to use up to 20% of their funds to pay for pharmacotherapy for their uninsured patients (U.S. Department of Justice, 2015).

Despite this progress, there remain a number of barriers to the use of medications for patients under community criminal justice supervision. Major barriers include stigmatizing beliefs on the part of patients, providers, and criminal justice professionals, as well as their lack of knowledge about the effectiveness of medications in reducing illicit opioid use and criminal behavior (Csete & Catania, 2013; Friedmann, et al., 2012; Mitchell et al., 2016). Among the various medications, Matusow and colleagues (2013) found that respondents to the drug court survey had stronger negative attitudes toward methadone than buprenorphine. Educational and anti-stigma efforts are needed to increase the knowledge of leadership and staff in probation and parole agencies and drug courts about the effectiveness of medications in reducing illicit opioid use (Welsh et al., 2015). As noted previously, education is necessary but not sufficient to enact change in access to pharmacotherapy for adults under criminal justice supervision (Friedmann et al., 2015).

Many individuals under criminal justice supervision are uninsured or underinsured. The patchwork of support for substance use treatment for this population varies from state to state. Clearly, sustained and increased funding for patients with opioid addiction under community supervision is needed. The new extended-release formulations of naltrexone and buprenorphine may prove to be quite useful in improving adherence and patient outcomes, but at this time these are relatively expensive preparations and will not be available to most individuals without a pharmacy benefit and adequate funding to treatment providers. Short of creating a national health insurance program with parity for treatment of opioid addiction treatment, targeting resources over a sustained period of time to this area seems more than warranted.

Future Forward

Opioid-addicted patients may need and be willing to accept different medications at different times in their lives. Thus, ideally, all three medications and their various formulations that are approved by the FDA and are used to treat opioid addiction should be available to patients under criminal justice supervision. More research is needed to address the many gaps in the literature, including the availability of these medications in the various community criminal justice settings. Research is likewise needed on the impact of the pharmacotherapy, especially the new long-acting formulations of buprenorphine and naltrexone on arrest and incarceration, in this population. It is an open question whether certain patients under particular types of supervision may be more responsive to one medication than another. Finally, the type and level of psychosocial support for particular types of patients remains an open question.

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Table 1.

FDA-approved Medications Used to Treat Opioid Addiction

Medication	Action	Indication	Administration	Federal and State Regulations
Naltrexone	Opioid Antagonist	Prevention of relapse to opioid addiction after medically supervised withdrawal	Oral; intramuscular injection (extended release for 1 month)	Not a controlled substance. Can be prescribed by licensed medical practitioner.
Methadone	Opioid Agonist	Medically supervised withdrawal or maintenance	Oral	Opioid Treatment Program (OTP)
Buprenorphine	Partial Opioid Agonist	Medically supervised withdrawal or maintenance	Sublingual; buccal; subcutaneous injection (extended release for 1 month); dermal implants (extended release for 6 months)	OTP or by prescription from physicians, nurse practitioners, or physician assistants with a federal waiver to prescribe buprenorphine

Table 2
Summary of Articles Reporting Outcomes of Patients Treated with Medications for Opioid Addiction

Authors, year	Participants	Treatment	Study design	Drug Treatment Outcomes	Criminal Justice Outcomes
ORAL NALTREXONE					
Cornish et al., 1997	51 Federal parolees & probationers who were voluntary, self-referred, or referred by their agent.	Supervised oral naltrexone with twice-weekly counseling (<i>n</i> =34) vs. no medication with twice-weekly counseling (<i>n</i> =17)	Pilot randomized trial	Retention in treatment for 6 months: Naltrexone: 52% Control 33% (<i>ns</i>) Opioid positive tests: Naltrexone: 8% Control: 30% (<i>p</i> <.05)	Revocation with incarceration: Naltrexone: 26% Control: 52% (<i>p</i> <.05)
Coviello et al., 2010	111 parolees & probationers who were: self-referred, referred by county and federal parole and probation agents, drug court, an alternative to incarceration program, an early parole program, public defenders, or outpatient or inpatient drug treatment programs	Supervised oral naltrexone with intensive outpatient counseling (<i>N</i> =56) vs. intensive outpatient counseling without medication (<i>N</i> =55)	Randomized trial	Retention in treatment for 6 months: Naltrexone: 32% Control 29% (<i>NS</i>) Opioid positive tests difficult to interpret due to too much missing data: Naltrexone: 18% Control: 27% (<i>ns</i>)	Parole violations and drug charges from official records: (<i>ns</i>)
EXTENDED-RELEASE NALTREXONE					
Lee et al., 2016	308 adults with criminal justice involvement defined as in the 12 months prior to study enrollment having: been released from jail or prison; made plea-bargain arrangements; or been under community supervision (parole, probation, drug court, or other court-mandated treatment). Participants were self-referred or referred through drug treatment programs.	Extended-release naltrexone and brief counseling with referral to drug abuse treatment (<i>N</i> =153) vs. No medication and brief counseling with referral to drug abuse treatment (<i>N</i> =155)	Randomized trial	Median time to opioid relapse: XR-NTX: 10.5 weeks Control: 5.0 weeks (<i>p</i> <.001) Relapse rate: XR-NTX: 43% Control: 64% (<i>p</i> <.001) Opioid Positive Tests: XR-NTX: 25.9% Control: 44.3% (<i>p</i> <.001)	Reincarceration: XR-NTX: 22.9% Control: 29.0% (<i>ns</i>)
Crits-Christoph et al. 2015	1,199 male and female adults on parole or probation, in substance use treatment who reported opioid use as a primary, secondary, or tertiary problem.	Treatment with extended-release naltrexone (<i>n</i> =136), compared to oral naltrexone (<i>n</i> =34), buprenorphine (<i>n</i> =163), and psychosocial treatment without medications (<i>n</i> =866).	Retrospective analysis of administrative treatment data. Outcomes for treatment groups were compared using propensity score adjustment to account for clinical and demographic differences.	Median Treatment duration (days): XR-NTX: 97; vs. oral naltrexone: 63 (<i>ns</i>); buprenorphine: 69 (<i>ns</i>); no medication: 63 (<i>p</i> <.001). Abstinence at discharge: XR-NTX (<i>n</i> =58): 67.2%; vs. oral naltrexone (<i>n</i> =15): 40.0% (<i>ns</i>); buprenorphine (<i>n</i> =68): 25.0% (<i>p</i> <.001);	Arrests, past 30 days at discharge: XR-NTX (<i>n</i> =73): 8.2%; vs. oral naltrexone (<i>n</i> =16): 0% (<i>ns</i>); buprenorphine (<i>n</i> =85): 0% (<i>ns</i>); no medication (<i>n</i> =605): 5.6% (<i>ns</i>).

Authors, year	Participants	Treatment	Study design	Drug Treatment Outcomes	Criminal Justice Outcomes
METHADONE					
Joseph & Dole, 1970	269 male and female MTP patients on parole or probation in New York City between 1964 and 1969	Methadone maintenance	Retrospective record review without a control group	193 (72%) patients made "good adjustment" (e.g., retained in treatment and either successfully completed supervision or were in good standing)	76 (28%) discharged from treatment for ongoing alcohol/drug use or for continuing criminal activity with subsequent violation of supervision
Joseph, 1973	900 probationers treated in methadone programs in probation offices in New York City between 1970 and 1972.	Methadone maintenance	Retrospective records review without a control group.	Patients retained for 89% of their possible time in treatment.	51 (5.7%) were incarcerated
Anglin, McGlothlin, & Speckhart, 1981	136 male MTP patients on parole vs. 136 matched male MTP patients not on parole in three County MTPs in southern CA with first admission between 1971 and 1973.	Methadone maintenance	Retrospective cohort study with interviews of matched MTP patients constituting a comparison group	Both groups reduced illicit opioid use over time but no significant between-group differences in treatment retention or illicit opioid use.	No significant between-group differences in self-reported days of criminal behavior or in official records of the number of arrests or time incarcerated.
Anglin, Brecht & Maddahian, 1989	297 males first time admission to three County MTPs in CA between 1971 and 1973	Methadone maintenance	Retrospective cohort study with interviews creating three comparison groups: High Legal Coercion ($n=111$); Moderate Legal Coercion ($n=101$); Low Legal Coercion ($n=84$)	All three groups had significant reductions in self-reported opioid use from the pre-treatment period to the time during the course of treatment, but there were no between-group differences.	All three groups had significant reductions in self-reported time committing property crime, dealing drugs, and being incarcerated.
Brecht, Anglin, & Wang, 1993	618 male and female patients who were active in a representative sample of OTPs in six California counties on either 6/30/76 or 9/30/78.	Methadone maintenance	Retrospective cohort study with interviews creating three comparison groups: High, medium, and low levels of coercion	No significant difference between coercion groups for retention in treatment. All three groups reported significant reductions in illicit opioid use from pre-treatment to follow-up. There was no significant between-group differences in reduction in illicit opioid use.	All three groups significantly reduced their self-reported criminal behavior. The high and medium coercion groups had significantly greater reductions in terms of number of days committing burglary and property crime compared to the low coercion group.
Desmond & Maddux, 1996	610 methadone patients of whom 296 (48.5%) were on probation) or parole and 314 (51.5%) were not on supervision in San Antonio, Texas admitted between 1989 and 1991.	Methadone maintenance	Secondary analysis by parole or probation status of prospectively collected data from a randomized trial.	Patients on probation or parole were significantly less likely to be retained in treatment at 12-month follow-up (39% vs. 56%). No significant difference in opioid positive urine tests (36.3% for parole and probation vs. 31.9% for voluntary groups).	No significant between group differences in self-reported days of criminal behavior. Parole and probation group had significantly more months incarcerated than the voluntary group during the 12 month follow-up (2.1 vs. 0.7 months).
Hiller et al., 2000	710 probationer (7%), parolees (35%), and	Methadone maintenance	Secondary analysis by legal vs. no legal status of prospectively collected data from a study	No significant difference in opioid-positive urine test results during the first three months of treatment	Legal status group were significantly more likely than the non-legal status group to spend time incarcerated (41%)

Authors, year	Participants	Treatment	Study design	Drug Treatment Outcomes	Criminal Justice Outcomes
	individuals awaiting trial (6%)		developing and evaluating different approaches to treatment.	between the legal status and non-legal status groups (46.3% vs. 40.8%, respectively). The group with legal status had significantly higher rates of cocaine positive urine tests (44.7% vs. 32.8%)	vs. 11%, respectively) and to be in a state prison (32% vs. 7%, respectively) during the 12 month follow-up.
Gryczynski et al., 2012	181 probationers enrolled in a longitudinal study in four treatment programs in Baltimore, MD admitted between 2001 and 2002.	Methadone and LAAM maintenance	Prospective cohort study without a control group.	Nearly half the participants were retained in treatment for 12-months (49%). Significant decrease from baseline to 12 month follow-up in self-reported number of days of heroin use (28.5 days vs. 6.5 days) and cocaine use (10.1 days vs. 4.9 days).	Significant decrease from baseline to 12 month follow-up in self-reported days of illegal behavior (12.7 days vs 3.7 days).
Kelly et al., 2013	230 participants of whom 40% were on parole or probation were enrolled in a randomized trial of methadone treatment with vs. without counseling at the beginning of treatment in two OTPs in Baltimore, Maryland. Participants were admitted between 2008 and 2010.	Methadone maintenance	Secondary analysis by probation and parole status of prospectively collected data from a randomized trial	No between-group differences in 12-month treatment retention rates. No significant differences in 12-month self-reported days of heroin or cocaine use or opioid positive drug tests. Probation and parole group had significantly greater reductions in cocaine positive drug tests	Parole/Probation group had significantly fewer self-reported days of criminal behavior in the 30 days prior to the 12-month follow-up (0.29 days vs. 1.3 days) No significant between-group differences in self-reported arrest or days incarcerated.
Clark et al., 2014	2,931 patients with opioid dependence enrolled in the TASC Program in the southeastern U.S., of whom 329 (11%) were treated with methadone	Methadone Maintenance	Retrospective record review.	Methadone patients were significantly less likely to fail supervision (39.0% vs. 52.9%; $p < .001$). Methadone patients had a lower relapse rate (32.9% versus 55.9%; $p < .001$) and longer time to relapse (89.7 days versus 60.5 days; $p < .001$)	
BUPRENORPHINE					
Mitchell et al., 2013	300 African American buprenorphine patients of whom 41% were on parole or probation and 59% were not on parole or probation in a randomized trial of outpatient drug treatment programs in Baltimore, Maryland. Participants were admitted between 2008 and 2010.	Buprenorphine treatment	Secondary analysis by probation and parole status of prospectively collected data from a randomized trial	No significant between-group differences in retention in treatment at 3 and 6 months (overall 75% and 60% at 3- and 6- months, respectively). There were no significant between-group differences in self-reported days of opioid or cocaine use or opioid or cocaine positive tests, or meeting DSM-IV opioid or cocaine dependence criteria at follow-up.	No significant between group differences in incarceration rate (17.1% overall).

Authors, year	Participants	Treatment	Study design	Drug Treatment Outcomes	Criminal Justice Outcomes
Cropsey et al., 2013	30 probationers, parolees, and drug court participants receiving buprenorphine treatment onsite at Community Corrections office	Buprenorphine treatment for 12 weeks	Prospective cohort study without a control group	Mean of 10.2 weeks (SD=3.2) of treatment retention. There were no significant differences over time in urine opioid positive tests. There was a significant reduction in self-reported drug injection from baseline (75.9%) to 6 week follow-up (34.6%; $p < .02$).	Not reported.
Gordon et al., 2015	64 probationers and parolees receiving buprenorphine treatment through three outpatient drug treatment programs in Baltimore, MD between 2011 and 2012.	Buprenorphine treatment.	Prospective cohort study without a control group.	67% retained in treatment at 3 months. Significant decrease from baseline to 3 month follow-up in self-reported days of heroin use.	Significant decrease from baseline to 3-month follow in terms of self-reported days of criminal behavior. 23.4% were incarcerated within 3 months of admission.