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What is This?
Lifetime Benefits and Costs of Diverting Substance-Abusing Offenders From State Prison

Gary A. Zarkin¹, Alexander J. Cowell¹, Katherine A. Hicks¹, Michael J. Mills¹, Steven Belenko², Laura J. Dunlap¹, and Vincent Keyes¹

Abstract

Prisons hold a disproportionate number of society’s drug abusers. Approximately 50% of state prisoners meet the criteria for a diagnosis of drug abuse or dependence; however, only 10% of prisoners receive drug treatment. Diverting offenders to community-based treatment has been shown to generate positive net social benefits. We build on a lifetime simulation model of a nationally representative state prison cohort to examine diversion from reincarceration to community-based substance abuse treatment. We find that diversion provides positive net societal benefits to the United States and cost savings to the national criminal justice system. Our study demonstrates the societal gains from improving access to the community drug treatment system as an alternative to prison.

Keywords

benefits, costs, diversion, substance abuse

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Introduction

Substance abuse among offenders continues to concern policy makers because of its high prevalence and its effect on criminal behavior. In 2004, an estimated 32% of state prison inmates used drugs at the time of the offense for which they were incarcerated, 56% used in the month before the offense, and 53% showed signs of recent drug dependence or abuse (Mumola & Karberg, 2006). In addition, inmates who regularly use drugs have higher criminal recidivism rates (Belenko, 2006), which results in increased arrest and incarceration rates. Given the obvious burden on the criminal justice system and society caused by substance abuse within the offender population, investing in effective and targeted substance abuse treatment may make economic sense. Few offenders have access to substance abuse treatment, however. For example, at most 10% of state inmates report receiving any clinically or medically based substance use treatment while incarcerated (Belenko & Peugh, 2005).

A substantial literature demonstrates that community-based treatment as an alternative to incarceration—either by diversion or by a drug court—has positive net benefits to society and/or the criminal justice system (e.g., Aos, Phipps, & Barnoski, 2004; Barnoski & Aos, 2003; Carey & Finigan, 2004; Cowell, Broner, & Dupont, 2004; Logan et al., 2004; Mauser, Stelle Van, & Moberg, 1994; Roman & Harrell, 2001; Zarkin, Dunlap, Belenko, & Dynia, 2005). One limitation of these studies is that they typically focus on short-term outcomes and a single treatment episode.

In this article, we build on a lifetime simulation model that captures the episodic and recurrent nature of substance abuse and the multiple episodes of drug abuse treatment, crime commission, and reincarceration in jail or prison. By following individuals over their remaining lifetime, the model more fully accounts for the benefits and costs of substance abuse treatment received in prison and in community-based programs than an approach based on a static model or using data gathered over only a few years of individuals’ lifetimes (e.g., Daley et al., 2004; McCollister, French, Inciardi, et al., 2003; McCollister, French, Prendergast, et al., 2003; McCollister, French, Prendergast, Hall, & Sacks, 2004; Zarkin, Dunlap, Hicks, & Mamo, 2005). In this article, we present the lifetime benefits and costs of diverting substance-abusing offenders from prison to community-based treatment using the model.

The literature has recently started to apply dynamic simulation modeling to assess criminal justice policies (Auerhahn, 2008a, 2008b) and those that target substance-abusing offenders in particular. Auerhahn (2004) developed a dynamic simulation model of the California criminal justice system to assess the impact of a law passed in 2000 that was intended to reduce the
number of drug offenders entering prison. The results suggest that the law would not change the proportion of drug offenders in the population. This article, however, does not formally assess the benefits and costs of alternative scenarios. Bhati and Roman (2010) combine profiles of demographic, drug use, and criminal history attributes with behavioral estimates from several sources to simulate the impact of treating arrestees in the United States. The authors find that treatment alone averts millions of crimes. However, they do not translate their findings into monetized benefits and costs.

We focus this analysis on offenders in state prisons for three reasons. First, state correctional systems house about 87% of the prison population (Glaze, 2010). Second, most of the research on correctional treatment and drug-related recidivism has been conducted in state prisons. Thus, most of the available data for model parameters are generated from studies on state prisons. Finally, the federal prison population includes inmates convicted of federal crimes, and, as a result, inmates are less likely to be substance abusers, more likely to be non-substance-abusing drug traffickers, and have very different demographic characteristics than state inmates (Belenko, 2002; Mumola & Karberg, 2006). Focusing on state inmates is thus more relevant for substance abuse and substance abuse treatment policy analyses.

**Method**

*The Dynamic Simulation Model*

We developed a dynamic simulation model that follows a nationally representative cohort of individuals who are incarcerated in the state prison system in the United States (see Zarkin et al., 2012, for an evaluation of alternative treatment policies). The model tracks individuals’ substance abuse, criminal activity, employment, and health care utilization until death or up to and including age 60, whichever comes first, as they move in and out of incarceration and drug treatment programs. Individuals vary in their initial characteristics as well as how they progress through the model. Therefore, the simulated cohort displays natural variation that mirrors reality. The model is a discrete event simulation (DES) built using Arena software (Rockwell Automation). Key advantages of a DES model over alternatives, such as a Markov model, are that it allows for stochastic variation in behavior and outcomes across individuals (unlike deterministic models), is flexible in modeling dynamics, allows individuals’ attributes and history to affect their progression, and can perform analyses at the individual level on cumulative lifetime activities (Winston, 1993).
Model States

States and transitions between states are structured to allow the model to capture important features—such as substance abuse, treatment (prison- or community-based), crime, arrest, incarceration, employment, and health care—while also simplifying reality so that estimates can be computed and validated. The entire cohort of individuals starts out in prison. Substance abuse in the current study refers to abusing/being dependent on alcohol or using other drugs. Someone who abuses substances is referred to as an abuser. As individuals progress through their lifetimes, they pass through one or more of seven mutually exclusive states—three incarcerated and four in the community—at any given time. Individuals incarcerated in prison or jail can be in the following states: nonabuser, abuser not in treatment, and abuser in treatment; the latter state only applies to those in prison as the model assumes that treatment is not offered in jail. The four model states in the community are abuser, nonabuser, aftercare (community-based treatment immediately following prison release), and non-aftercare community-based treatment. Community-based treatment can be received either because of a referral by the criminal justice system into a diversion or aftercare program or directly from the community without a criminal justice referral. Aftercare treatment is defined in the model as participating in community-based treatment within 1 month following release from prison. It is recognized separately from other community-based treatment because the literature suggests it is particularly successful for an offender population (e.g., Martin, Butzin, Saum, & Inciardi, 1999; Mitchell, Wilson, & MacKenzie, 2007; Wexler, Melnick, Lowe, & Peters, 1999).

Substance abuse has four categories: alcohol dependence, other drug use excluding infrequent marijuana use, both alcohol dependence and other drug use, and neither alcohol dependence nor drug use. Infrequent marijuana use is excluded as a substance of abuse because it is associated with fewer negative social consequences than other drugs. Because there is little reliable evidence on substance abuse transition rates while incarcerated, the dynamics of substance abuse in prison and jail are not modeled and individuals are assumed to be nonusers while incarcerated. Instead, incarcerated individuals’ use status is based on their use status in the month before entry into prison or jail. Treatment in prison has two modalities: outpatient drug-free and residential. Community-based treatment has three modalities: outpatient drug-free, residential, and methadone maintenance therapy. Individuals are assumed to be nonusing while in treatment.
Transitions Between States

The model simulates life paths based on transitions between the seven states described above and to a terminating death state. At the end of each month, individuals either remain in the same state or move to another. The likelihood of moving to another state depends either on a transition probability or, in the case of release from prison or exit from treatment, whether the individual has completed a specific length of stay. Many of the model’s transition probabilities and lengths of stay in treatment are dependent on individual attributes. Primary attributes are age (grouped into ages 21-25, 26-35, 36-45, and 46-60), race/ethnicity (Black, Hispanic, and White/other), and gender. Most transition probabilities are estimated by either logistic (binary parameters) or linear (continuous parameters) regression with main effects of age, race/ethnicity, and gender. The predicted values from these logistic and linear regressions were then used as the parameter inputs for the model; predicted values varied by age, race/ethnicity, and gender when these variables were significant at the .05 level. Other attributes and factors (e.g., substance abuse treatment history) were also included in select parameters. Key transitions in the model are the initiation and cessation of alcohol or drug abuse, entry into and success of treatment, and incarceration and release from prison.

All individuals begin the model in state prison, having already served some portion of their sentence. The length of stay in prison or jail depends on the length of the sentence and the percentage of that sentence that the individual will serve, both of which depend in turn on the type of offense for which the individual is incarcerated. The length of stay in jail is typically much shorter than the length of stay in prison.

Crime has three exclusive categories: violent, drug, and nondrug nonviolent. Individuals in the community may commit one or more crimes each month. The probability of committing crimes depends on whether a crime was committed in the previous month, time since last release from prison or jail, user status, and gender; it is higher for those who committed a crime in the previous month, substance abusers, and men. The number of crimes committed (conditional on committing a given type of crime) is assumed not to vary by individual attributes. For each crime committed, there is a probability of arrest. The probability of arrest is higher for violent crimes than for nonviolent crimes. The probability of arrest for a drug offense depends on time since last release from prison and user status. With each arrest, there is a probability of incarceration. A certain percentage of those incarcerated go to jail and the rest go to prison. For simplification, we assumed that the crime, arrest, and incarceration occur in the same month.
The model has separate probabilities of initiating substance abuse for individuals entering the community from incarceration and for those already in the community. Users reentering the community from incarceration without having received treatment in prison have relatively high rates of initiation in the first month after release (Butzin, Martin, & Inciardi, 2005). Once individuals are abusing substances, the model allows them to stop either with or without treatment. The probability of cessation is higher if a user receives treatment. While incarcerated, individuals are characterized by their substance abuse status in the last month in the community before incarceration. They may change their use status starting in the month they are released from prison into the community.

The treatment process in prison and in the community is governed by parameters for the probability of entry into treatment, treatment modality, length of stay, and probability of success. Treatment success is defined by stopping use the first month after treatment. Because substance abuse during prison is not explicitly modeled, success of treatment in prison is determined once the individual is released to the community, in the first month of release.

The probability of being employed in the community after release is calibrated to rise smoothly with time and then level out after the 1st year after release (Mallik-Kane & Visher, 2008). For health care other than substance abuse treatment, we model the probability of utilizing each of three modalities of care: inpatient, outpatient, and emergency department. We also model the probabilities of acquiring HIV and then developing AIDS; these are explicitly modeled because of their association with injection drug use and their high treatment costs.

**Validation**

The model was internally validated by verifying that the programmed model functioned correctly and accurately represented the desired dynamics (Gold, Siegal, Russell, & Weinstein, 1996). The model was externally validated by comparing model outputs and estimates with data from sources outside the model. To validate the crime data, we compared rearrest and reincarceration rates of the cohort after the initial release from prison with nationally representative recidivism data from the Bureau of Justice Statistics (BJS) for prisoners released in 1994 (U.S. Department of Justice, 2009). To validate substance abuse data, we compared the percentage of inmates who used before incarceration who then used in the 1st year after release with similar rates predicted from logistic regression output by Butzin, Martin, and...
Inciardi (2002). We also validated substance abuse rates after community treatment by comparing the percentage of community treatment participants using substances 1 year after treatment in our model with similar rates from the Drug Abuse Treatment Outcomes Study (DATOS; Hubbard, Craddock, Flynn, Anderson, & Etheridge, 1997; Simpson, Joe, & Brown, 1997). Any deviation between a given initial model estimate and its validation data counterpart was incorporated into the model so that the final model estimates closely matched the estimates in the validation data.

**Modeling Diversion**

To assess the lifetime benefits and costs of diversion, we compared baseline estimates with two hypothetical policy scenarios diverting offenders from prison to community treatment. In the baseline, we assumed there is no diversion from prison or jail into the community; all individuals who are released from state prison and subsequently rearrested and sentenced are sent to either prison or jail.

In the two diversion scenarios, diversion takes place after individuals from the state prison cohort are released, commit new crimes, are rearrested, and enter the criminal justice system. At that point, before any subsequent incarceration in jail or prison, individuals who are diverted are assumed to enter community-based treatment. The eligibility criteria for diversion are that the individual (a) has been arrested for a nonviolent or drug offense and sentenced to incarceration in prison or jail, (b) has no history of incarceration for violent offenses, (c) is currently abusing alcohol or drugs, and (d) has never previously been diverted from incarceration to treatment (see Belenko, Fabrikant, & Wolff, 2011). In Scenario 1, diversion-eligible offenders have a 10% probability of being diverted from incarceration to treatment in the community. Diversion-eligible offenders who are not selected for diversion are sent to prison or jail. Scenario 2 is designed to assess the degree to which outcomes, costs, and benefits scale as the proportion of eligible offenders who are diverted increases; under this scenario, the probability of diversion is increased to 40%. The hypothetical value of 10% is viewed as an attainable target for a diversion program nationally, and the hypothetical value of 40% is viewed as an ambitious societal target for a diversion program.

Once individuals are diverted into treatment, they follow the same process as baseline. Transition probabilities, such as the probability of drug use, and distributions, such as the length of stay in treatment, are the same as under baseline.
Computing Benefits and Costs

We defined lifetime economic benefits as the sum of the present value (PV) of earnings minus the sum of the PV of crime victimization costs; arrest, court, and incarceration costs; and health care costs (Zarkin, Dunlap, Hicks, et al., 2005; Zarkin et al., 2012):

\[
\text{Lifetime economic benefits} = \text{PV of lifetime earnings} - \\
(\text{PV of crime victimization costs} + \text{PV of arrest, court, and incarceration costs} + \text{PV of health care costs}).
\]

A discount rate of 3% was used for all PV calculations (Gold et al., 1996).

We likewise defined lifetime treatment costs as the PV of drug abuse treatment costs. These include costs incurred in prison and in the community. Societal net benefits equal lifetime economic benefits minus lifetime treatment costs. We compared the societal net benefits for each scenario with baseline to identify the most beneficial policy scenario. We also performed our analysis from the criminal justice system perspective. In this perspective, we calculated total criminal justice costs for our state prison cohort, which excluded earnings, crime victimization costs, and health care costs. We compared the cost savings (relative to baseline) for each scenario to identify the most beneficial policy scenario.

Sensitivity Analysis

We conducted sensitivity analyses to assess the robustness of study conclusions to changes in the model parameters. Because the focus of this analysis is on estimating net benefits of both policy scenarios, we estimated the incremental net benefits of each policy relative to baseline. The estimates were assessed for whether the ranking of the two scenarios as measured by net benefits changed or the net benefits changed sign. We performed a series of one-way sensitivity analyses of 21 of the most critical model parameters, each at plus and then minus 20% of the base value; this gave 42 separate extreme values (e.g., Earnshaw, Joshi, Wilson, & Rosand, 2006; Hamby, 1995). The parameters describe substance abuse initiation, cessation, and continued use; treatment receipt, success, and cost; the cost of diversion; and the occurrence and cost of crime, arrest, and incarceration.
Data

Our model includes 2,281 parameters, which are obtained from various data sources. The characteristics of the state prison cohort are from the 2004 Survey of Inmates in State Correctional Facilities (SISCF; U.S. Department of Justice, 2007). The weighted estimates represent the population of U.S. state prisoners in 2004 ages 21 to 60 ($N = 1.14$ million). Sixty percent of the sample is between 26 and 45 years old; 40% is Black, non-Hispanic; and 93% is male. Twenty-five percent were incarcerated for a drug offense, 28% for a nonviolent offense, and 48% for a violent offense.

A large proportion of the sample (62%) used substances recently before incarceration: 40% used illicit drugs only in the month before incarceration, approximately 7% were alcohol dependent only in the year before incarceration, and 15% used illicit drugs and were alcohol dependent before incarceration.

Transition and outcome parameters determine whether individuals change states from month to month and determine the outcomes of these transitions when they occur. The guiding principles for identifying data sources for transition and outcome parameters were that the estimate is a suitable measure for the parameter of interest, nationally representative, and applies as closely as possible to the behavior of the 2004 state prison cohort. In spite of this goal, at times we needed to use older data because no other source was available to estimate the parameter of interest. For example, data from 1982 are used to estimate offense frequency (Chaiken & Chaiken, 1982) because that is the best source of data for that parameter.

Most transition and outcome parameter values were identified from the existing literature or from publicly available databases (see Zarkin et al., 2012, for a full description of sources). Many criminal justice-related parameters come from the SISCF and the Recidivism of Prisoners released in 1994 (the Recidivism database), both from the BJS (U.S. Department of Justice, 2007, 2009). The Recidivism database comprises the officially recorded criminal history of 38,624 prisoners in 15 states. Because the states included represent two thirds of released prisoners in 1994, the Recidivism sample is the largest source of data on released prisoners (U.S. Department of Justice, 2009). When parameters were not available, they were assumed and calibrated. Calibration entailed using the model to predict outcomes to compare the model prediction with existing estimates in the literature or other data sources. The assumed parameter estimate was then adjusted until the predicted outcome matched the existing estimate.
Results

Table 1 presents the results for both diversion scenarios compared with baseline. The first two rows show how the probability of diversion from jail or prison increases from the baseline value (0%) to 10% in Scenario 1 and 40% in Scenario 2, and the corresponding changes in the number of people who are diverted. The percentage and the total number of the 1.14 million state prison cohort that goes to prison and community-based treatment change as expected in response to policies designed to implement and improve diversion to community-based treatment. Over the course of a lifetime, Scenarios 1 and 2 increase the percentage of the state prison cohort that goes to treatment in the community from 34% to 41%. At the same time, the percentage of users who receive prison treatment decreases from 18.6% at baseline to 18.3% in Scenario 1 and 17.3% in Scenario 2. The percentage of months in the community that individuals abuse substances over the course of the lifetime decreases from 38.6% at baseline to 37.6% in Scenario 1 and 35.8% in Scenario 2.

We find sizable decreases in the number of crimes (conditional on committing crimes), the number of arrests, and the number reincarcerated (conditional on being reincarcerated). The net effect is that sizable decreases arise in total arrests, crimes, and reincarcerations for the state prison cohort. Comparing Scenario 1 with baseline shows a 2.5% reduction in the lifetime number of crimes committed (from 52 million to 50.6 million). Increasing the number diverted fourfold in Scenario 2 yields a 6.4% reduction in the lifetime number of crimes committed (from 52 million to 48.6 million). Similarly, arrests and reincarcerations drop substantially as we move from baseline to Scenario 2.

Table 2 presents the benefits and costs of the baseline and the two policy scenarios for the U.S. state prison cohort. Total lifetime earnings for the U.S. state cohort at baseline are US$116 billion (approximately US$101,626 per person). Crime victimization costs are US$67 billion (US$58,746 per person); arrest, court, and incarceration costs are substantially larger, with a baseline mean of US$255.3 billion (US$224,344 per person). Total baseline health care costs are approximately US$30 billion (US$26,177 per person). Total lifetime treatment costs for the U.S. state prison cohort at baseline are US$1.1 billion (US$2,694 per participant), which includes US$0.3 billion for community-based treatment (US$2,102 per participant), US$0.3 billion for prison-based treatment (US$1,502 per participant), and US$0.6 billion for aftercare treatment (US$2,061 per participant). Because mean crime victimization costs and arrest, court, and incarceration costs are larger than
Table 1. Model Settings and Lifetime Outcomes From Baseline and Policy Scenarios for the 2004 State Prison Cohort

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline</th>
<th>Access to prison/jail diversion: Scenario 1</th>
<th>Greater access to prison/jail diversion: Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of being diverted from jail or prison (%)</td>
<td></td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>Number of people diverted</td>
<td></td>
<td>0</td>
<td>44,192</td>
</tr>
<tr>
<td>Crime and criminal justice system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage committed a crime</td>
<td>74.1</td>
<td>74.0</td>
<td>74.1</td>
</tr>
<tr>
<td>Percentage arrested</td>
<td>68.2</td>
<td>68.1</td>
<td>68.2</td>
</tr>
<tr>
<td>Percentage reincarcerated</td>
<td>61.6</td>
<td>61.2</td>
<td>60.4</td>
</tr>
<tr>
<td>Number of crimes per person, if committed crimes</td>
<td>61.7</td>
<td>60.1</td>
<td>57.6</td>
</tr>
<tr>
<td>Number of arrests per person, if arrested</td>
<td>5.8</td>
<td>5.7</td>
<td>5.5</td>
</tr>
<tr>
<td>Number of reincarcerations per person, if reincarcerated</td>
<td>3.6</td>
<td>3.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Total number of crimes committed (1,000,000s)</td>
<td>52.0</td>
<td>50.6</td>
<td>48.6</td>
</tr>
<tr>
<td>Total number of arrests (1,000,000s)</td>
<td>4.5</td>
<td>4.4</td>
<td>4.3</td>
</tr>
<tr>
<td>Total number of reincarcerations (1,000,000s)</td>
<td>2.6</td>
<td>2.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Substance abuse and treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of months in the community using drugs (%)</td>
<td>38.6</td>
<td>37.6</td>
<td>35.8</td>
</tr>
<tr>
<td>Percentage of abusers who receive prison treatment</td>
<td>18.6</td>
<td>18.3</td>
<td>17.3</td>
</tr>
<tr>
<td>Total years spent in prison treatment per prison treatment participant</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Total years spent in prison treatment (1,000s)</td>
<td>43.9</td>
<td>42.3</td>
<td>39.5</td>
</tr>
<tr>
<td>Percentage of abusers who receive community treatment, including aftercare and those diverted</td>
<td>33.6</td>
<td>36.5</td>
<td>41.0</td>
</tr>
<tr>
<td>Total years spent in community treatment per community treatment participant</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Total years spent in community treatment (1,000s)</td>
<td>40.2</td>
<td>44.8</td>
<td>52.3</td>
</tr>
<tr>
<td>Total years of employment per person</td>
<td>8.9</td>
<td>9.1</td>
<td>9.4</td>
</tr>
<tr>
<td>Total years of employment (1,000,000s)</td>
<td>9.7</td>
<td>9.9</td>
<td>10.2</td>
</tr>
</tbody>
</table>

Note: Each replication consists of 30,000 individuals. Reported outcomes are means across 10 replications. Cohort represents 2004 state prison population ages 21 to 60; N = 1.14 million.
Table 2. Benefits and Costs of Treatment (in US$ Billions)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline</th>
<th>Access to prison/jail diversion Scenario 1</th>
<th>Greater access to prison/jail diversion Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earnings</td>
<td>115.7</td>
<td>118.1</td>
<td>122.4</td>
</tr>
<tr>
<td>Crime victimization costs(^a)</td>
<td>66.9</td>
<td>65.3</td>
<td>63.0</td>
</tr>
<tr>
<td>Arrest, court, and incarceration costs</td>
<td>255.3</td>
<td>250.6</td>
<td>242.5</td>
</tr>
<tr>
<td>Health care costs</td>
<td>29.8</td>
<td>30.0</td>
<td>30.4</td>
</tr>
<tr>
<td>Total lifetime economic benefits of treatment(^b)</td>
<td>−236.6</td>
<td>−228.0</td>
<td>−213.8</td>
</tr>
<tr>
<td>Diversion</td>
<td>0.0</td>
<td>0.1</td>
<td>0.3</td>
</tr>
<tr>
<td>Prison treatment</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Aftercare</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Community treatment</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Total lifetime treatment costs</td>
<td>1.1</td>
<td>1.3</td>
<td>1.4</td>
</tr>
<tr>
<td>Societal perspective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net benefits(^c)</td>
<td>−237.7</td>
<td>−229.3</td>
<td>−215.2</td>
</tr>
<tr>
<td>Net benefits versus baseline(^d)</td>
<td>—</td>
<td>8.5(^*)</td>
<td>22.5(^*)</td>
</tr>
<tr>
<td>Criminal justice system perspective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total criminal justice system costs(^e)</td>
<td>256.2</td>
<td>251.4</td>
<td>243.3</td>
</tr>
<tr>
<td>Total criminal justice system cost savings versus baseline(^f)</td>
<td>—</td>
<td>4.8(^*)</td>
<td>12.9(^*)</td>
</tr>
</tbody>
</table>

Note: PV = present value.
\(^a\)Crime victimization costs exclude costs of pain and suffering.
\(^b\)Total lifetime economic benefits of treatment = PV of earnings − PV of crime victimization costs − PV of arrest, court, incarceration costs − PV of health care costs.
\(^c\)Societal net benefits = total lifetime economic benefits of treatment − total lifetime treatment costs.
\(^d\)Net benefits versus baseline = net benefits for each scenario − baseline net benefits.
\(^e\)Total criminal justice system costs = arrest, court, and incarceration costs + prison treatment costs + aftercare costs.
\(^f\)Total criminal justice system cost savings versus baseline = baseline total criminal justice system costs − total criminal justice system costs for each scenario.
\(^*\)Statistically significant at the .01 level.
earnings, the mean net benefits per person are negative at baseline and for both scenarios.

Compared with baseline, earnings increase and crime victimization costs and criminal justice system costs (arrest, court, and incarceration costs) decrease for the diversion scenarios, which leads to increased total benefits for the U.S. state prison cohort. At the same time, total lifetime treatment costs increase. Overall, the increase in benefits outweighs the increase in costs, which leads to an increase in net benefits for both scenarios. Relative to baseline, Scenario 1 yields US$8.5 billion higher net benefits \( (p < .01) \) and Scenario 2 yields US$22.5 billion higher net benefits \( (p < .01) \).

Figure 1 shows the cumulative number of crimes avoided through diversion (under Scenario 1) relative to baseline (with no diversion). Diversion to treatment results in a sizable decrease in lifetime crimes committed in the first 15 years of the diversion program. For example, approximately 1.1 million crimes are committed by Year 5 in the baseline scenario by those who would have been eligible for diversion had there been a diversion program. Under Scenario 1, 800,000 crimes were committed over that time period, which represents a 27% reduction from the no diversion baseline. The crimes avoided by diversion asymptotes at approximately 1 million lifetime crimes.

Figure 2 provides further insight into the crimes committed trajectory by focusing on crimes avoided within the first 12 months after diversion to
treatment. The number of crimes committed under Scenario 1 is at first higher than under baseline because as offenders are released to treatment in the community they have the opportunity to commit crimes that would not be possible if they were instead incarcerated. However, the benefits of treatment—reduced substance abuse, leading to reduced criminal behavior—soon begin to offset this effect. By the end of the 1st year of the diversion program, fewer crimes are being committed under Scenario 1 compared with baseline.

Table 2 shows the cost savings of the policies from the perspective of the criminal justice system only. This perspective includes arrest, court, incarceration costs, prison treatment costs, and aftercare costs. The two diversion policies result in cost savings to the criminal justice system. Scenario 1 generates criminal justice system cost savings of approximately US$4.8 billion over this cohort’s lifetime ($p < .01$), and Scenario 2 generates cost savings of approximately US$12.9 billion ($p < .01$).

Figure 3 presents the trajectory over time of criminal justice system cost savings for Scenario 1 (10% are diverted) compared with baseline (no diversion). Cost savings increase rapidly in the first 20 years and then flatten as offenders age. For example, 5 years after diversion begins, the systemwide savings for the cohort of 1.14 million are US$1.5 billion; the cumulative cost savings increase to approximately US$2.5 billion 10 years after diversion begins.
Under our one-way sensitivity analyses, the results changed little and the conclusions were quite robust. Of the 42 variations attempted, there were no cases of the ranking of the scenarios changing or the sign of net benefits changing.

Discussion
Diverting substance-abusing individuals to treatment rather than incarcerating them in state prison has the potential to yield substantial public health and economic benefits (Chandler, Fletcher, & Volkow, 2009). This article simulates the lifetime benefits and costs of two scenarios of criminal justice diversion programs to enhance substance abuse treatment for a nationally representative cohort of 1.14 million state prisoners (those of the 1.32 million who are between the ages of 21 and 60). Our model captures the dynamics of substance abuse as a chronic disease, estimates the benefits of treatment over individuals’ lifetimes, and tracks the crime and criminal justice costs related to policing, adjudication, and incarceration.

Our results clearly demonstrate the net benefits to the United States and the national criminal justice system of diversion from prison to community-based treatment. Both diversion scenarios yield significant societal incremental net benefits relative to baseline, which captures the status quo. The largest increment to net benefits from baseline is for Scenario 2 in which 40%
of eligible incarceration-bound individuals are diverted to community-based treatment. Even if 40% is unattainable, our model demonstrates that sizable and important economic benefits accrue if only 10% are diverted.

Results from the national criminal justice system perspective mirror those from the societal perspective. Both diversion scenarios yield cost savings relative to baseline, and more diversion yields the largest cost savings. The criminal justice system results are particularly noteworthy because they show that diverting individuals to more effective (and expensive) community-based treatment results in cost savings overall to the criminal justice system. These savings are driven by reductions in crimes committed, which translate into lower policing, adjudication, and incarceration costs. The diversion scenarios demonstrate that avoided incarceration costs are a substantial portion of the cost savings. Importantly, these are conservative estimates of the cost savings to the criminal justice system (although perhaps politically more realistic) because they assume that community-based treatment costs are paid by the criminal justice system.

The lifetime societal net benefits accruing to the United States from our diversion scenarios are statistically significant and sizable, at US$8.5 billion (when diverting 10% of eligible offenders) and US$22.5 billion (when diverting 40% of eligible offenders), relative to baseline. The national criminal justice savings are similarly significant and sizable, at US$4.8 billion and US$12.9 billion, respectively. Importantly, the net benefits and cost savings estimates are conservative because the model follows only the single cohort of offenders who were incarcerated in 2004. As additional cohorts are considered in future years, the net benefits would be even larger.

One of the concerns about a diversion program is that offenders are released to the community where they may commit crimes instead of being incarcerated. Our analysis shows an immediate, short-lived increase in crimes. However, by the end of the 1st year, fewer crimes are committed, generating cost savings to the criminal justice system. These cost savings increase rapidly in the first 20 years and then flatten out as offenders age. This trajectory of cost savings mirrors the trajectory of the number of crimes averted.

The current study also provides insight into how net benefits and criminal justice cost savings may scale with respect to the size of the diversion program. Four times as many eligible offenders are diverted in Scenario 2 (40%) than in Scenario 1 (10%). Relative to baseline, this fourfold increase in the proportion yields about twice the net social benefit (a US$14 billion increase in the net benefit from Scenario 1 to Scenario 2) and more than twice the
national criminal justice cost savings (a US$8.1 billion increase in savings from Scenario 1 to Scenario 2). In results not reported, a third scenario was estimated where everyone eligible is diverted. Those findings affirm that net benefits and criminal justice cost savings continue to increase as the proportion diverted grows.

Our article has three limitations that are common to simulation models. First, the structure of the model represents a simplified version of reality. For example, the specific process of how incarceration-bound individuals are diverted into community-based treatment is not included in our model. Although this detail is needed in practice to implement a diversion program, it is not required for our core purpose of estimating the benefits and costs of a diversion program. Second, even with a simplified model structure, not all parameter values are available in the literature or in existing databases. In those cases, we assumed values for model parameters and then validated selected model outcomes with values available in the literature or in databases. Third, sometimes we used older data sources because no other data source was available to estimate the parameter of interest.

Despite these limitations, our model demonstrates the net benefits of implementing a diversion program for a nationally representative cohort of individuals incarcerated in state prison. Future work should seek to refine our diversion scenarios and evaluate scenarios that are the most policy-relevant to decision makers. In addition, our model can and should be implemented for specific states. To be the most useful for policy makers, this effort will draw on state-specific information on key data, such as the prevalence of diversion programs, costs, the prison treatment and aftercare system, and criminal behavior.

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