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Washington's Residential Drug Offender Sentencing Alternative: *Recidivism & Cost Analysis*

Over the past two decades, the Washington legislature has amended state sentencing laws for drug-involved felony offenders. One of these changes occurred in 1995 with the passage of the Drug Offender Sentencing Alternative (DOSA).[1] This law allows certain offenders to receive reduced prison sentences in exchange for completing chemical dependency treatment.[2]

Since 1995, DOSA laws have been modified several times, each time broadening the eligibility criteria. In addition to the original "prison-based" DOSA, a modification in 2005 created a "residential" DOSA for offenders as an alternative to a prison sentence.[3] Offenders sentenced to residential DOSA receive chemical dependency treatment in the community. If treatment is not completed, the law requires that the offender serve the remainder of their sentence in confinement.

The Washington State Institute for Public Policy (WSIPP) was directed by the legislature to evaluate the impacts of both prison and residential DOSA.[4] In prior evaluations, WSIPP

Summary

Residential DOSA was created by the 2005 Legislature as an alternative to prison for offenders with substance abuse problems. When ordered by a court, an offender's sentence is reduced in exchange for completing chemical dependency treatment.

The Washington State Institute for Public Policy (WSIPP) was directed by the 2014 Legislature to evaluate the impact of residential DOSA. We selected a comparison group of similar offenders sentenced to prison-based DOSA. Findings show that:

- Residential DOSA is more expensive (by $564) compared with similar sentences to prison with chemical dependency treatment.
- Recidivism rates are lower for offenders sentenced to residential DOSA.
- The comparison group spends 5.3 months in confinement, whereas offenders sentenced to residential DOSA do not.

When possible, WSIPP conducts benefit-cost analysis to understand the long-term impacts of policies. In addition to residential DOSA's effect on recidivism, research indicates that crime is avoided through confinement, known as "incapacitation." We cannot empirically estimate the extent to which a residential treatment facility itself incapacitates offenders.

Thus, we are unable to determine the degree to which the benefits from the favorable recidivism reduction of residential DOSA would be offset by the increased costs of non-confinement.

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[1] Substitute House Bill 1549, Section 3, Chapter 108, Laws of 1995.
[2] RCW 9.94A.660.
[3] Engrossed Second Substitute House Bill 2015, Section 1, Chapter 460, Laws of 2005.
[4] Engrossed Second Substitute House Bill 1006, Section 12, Chapter 197, Laws of 1999. Engrossed Substitute Senate Bill 6239, Section 305, Chapter 339, Laws of 2006.

found that prison-based DOSA lowers recidivism rates for drug offenders but has no statistically significant effect on recidivism rates for property offenders.[5] At the time of WSIPP's last report in 2006, residential DOSA had not yet been fully implemented and could not be evaluated. Most recently, the 2014 Legislature directed WSIPP to evaluate the effectiveness of residential DOSA.[6]

This report is organized as follows:

- ✓ Section I contains background information on residential DOSA and prison-based DOSA sentences.
- ✓ Section II summarizes the key findings from our evaluation of the residential DOSA policy.
- ✓ Section III outlines our methodological approach and findings from our outcome evaluation of residential DOSA and its impact on recidivism.
- ✓ Section IV presents our estimate of the costs and benefits of residential DOSA.

A Technical Appendix is provided for supplemental analysis and technical detail.

[5] Drake, E. (2006). *Washington's Drug Offender Sentencing Alternative: An update on recidivism findings* (Doc. No. 06-12-1901). Olympia: Washington State Institute for Public Policy. S. Aos, Phipps, P., & Barnoski, R. (2005). *Washington's Drug Offender Sentencing Alternative: An evaluation of benefits and costs* (Doc. No. 05-01-1901). Olympia: Washington State Institute for Public Policy.

[6] Engrossed Substitute Senate Bill 6002, Section 609, Chapter 221, Laws of 2014.

I. Background

DOSA is a sentencing alternative for felony offenders where an offender's sentence is reduced in exchange for completing chemical dependency treatment. The legislative intent of DOSA is to increase the use of effective treatment for substance abusing offenders, thereby reducing recidivism.

Originally, DOSA sentences were only offered as a "prison-based" alternative where the standard sentence includes confinement and treatment in prison followed by supervision in the community. The prison-based alternative has been available to courts as a sentencing option since 1995.[7]

To be eligible for a prison-based DOSA sentence,[8] offenders who are convicted of a felony must not have any of the following:

- ✓ Current or prior conviction for a violent or sex offense in the past ten years,
- ✓ Current conviction for a felony driving while intoxicated,
- ✓ Sentencing enhancement (e.g., criminal attempt, solicitation or conspiracy),
- ✓ Deportation order, or
- ✓ Prior DOSA sentence in the past decade.

Legislation in 2005 created a "residential" chemical dependency treatment-based alternative.[9] Offenders sentenced to residential DOSA must enter into chemical dependency treatment at a facility in the community.

Offenders sentenced to residential DOSA meet the same eligibility requirements as those for prison-based DOSA. In addition to those eligibility requirements, however, offenders sentenced to residential DOSA must also meet the following sentence length requirements:

- ✓ The high end of the standard sentence range for the current offense must be greater than one year; and
- ✓ The midpoint of the standard sentence range must be 24 months or less.

Thus, all residential DOSA offenders meet the eligibility requirements of prison-based DOSA; however, because of the sentence length requirements, not all offenders sentenced to prison-based DOSA meet the eligibility requirements of residential DOSA.[10]

Residential DOSA sentences require that an offender serve two years on community supervision or half the midpoint of the standard sentence range, whichever is greater. If an offender, sentenced to residential or prison-based DOSA, does not complete drug treatment or is administratively terminated from DOSA, the law requires that he or she return to confinement (either prison or jail) to serve the remainder of the sentence.

[7] Although DOSA was available as early as 1995, it was not used widely until the eligibility criteria were expanded in 1999 (an average of 55 people per year prior to the 1999 expansion).
[8] See Exhibit A1 the Technical Appendix of this report for a detailed exhibit on the historical eligibility criteria for DOSA.
[9] Engrossed Second Substitute House Bill 2015, Chapter 460, Laws of 2005.

[10] Approximately 26% of all prison-based DOSA offenders met the sentence length requirements for residential-based DOSA. These offenders became our comparison group for the evaluation of residential DOSA, as discussed in the next section.

II. Key Findings

In this section, we summarize key findings from our 2014 legislative assignment on residential DOSA. As described in Section III, we compared outcomes of residential DOSA participants to a group of similar offenders who were sentenced to prison-based DOSA.

✓ Offenders sentenced to residential DOSA are slightly more costly compared with similar offenders who went to prison-based DOSA.

Contrary to our expectations, we found that offenders sentenced to residential DOSA cost slightly more than a similar group of offenders who served their sentence in prison. The cost per residential DOSA participant was $16,740 compared with $16,176 for similar offenders who were sentenced to prison-based DOSA.

Although the comparison group of offenders spent 5.3 months in prison, whereas the residential DOSA participants did not, the cost of chemical dependency treatment in a community residential facility and the cost of supervision were higher for residential DOSA offenders. See Section IV for more detail.

✓ Seventy-six percent of the residential DOSA participants were classified as high risk for re-offense.

As described in Section I, to be sentenced to residential DOSA, statutory requirements preclude offenders with a violent felony conviction ten years prior to a DOSA sentence. Even with this exclusionary criterion, however, 76% of residential DOSA offenders were classified by the Department of Corrections as high violent or high non-violent risk for re-offense.[11] See Section III for more detail.

✓ Residential DOSA offenders have lower recidivism rates than similar offenders who went to prison-based DOSA.

After 36-months in the community, 52% of residential DOSA participants had new convictions compared to 58% of similar offenders sentenced to prison-based DOSA.

Although we found reductions in recidivism for the entire residential DOSA group, this effect is driven solely by higher risk offenders. That is, we find no improvements in recidivism for lower and moderate risk residential DOSA offenders. See Section III for more detail.

✓ At this time, we are unable to estimate whether the benefits of residential DOSA outweigh its costs.

Offenders sentenced to residential DOSA serve their sentence in the community in lieu of confinement (called "incapacitation"). We found that offenders sentenced to residential DOSA spent 5.3 fewer months in total confinement than the comparison group.

Residential DOSA has two opposing impacts on crime—a decrease in crime due to the reduction in recidivism as described above, and an increase in crime due to reduced incapacitation. Unfortunately, as we describe in Section III, we were unable to estimate the costs incurred through non-confinement of offenders sentenced to residential DOSA. Thus, we are unable to calculate the bottom-line costs and benefits of residential DOSA.

[11] See: Barnoski, R., & Drake, E.K. (2007). *Washington's Offender Accountability Act: Department of Corrections' static risk instrument* (Doc. No. 07-03-1201). Olympia: Washington State Institute for Public Policy.

III. Outcome Evaluation

The 2014 Legislature directed WSIPP to "examine its [residential DOSA] effectiveness on recidivism and conduct a benefit-cost analysis."[12] The ability to evaluate whether residential DOSA achieves a reduction in recidivism relies on identifying an adequate comparison group of offenders.

In an ideal experimental research design, offenders eligible for residential DOSA would be randomly assigned to either residential DOSA or a comparison group. With a successfully implemented random assignment, any observed differences in recidivism could be attributed to the effect of residential DOSA. Unfortunately, as is the case in many real-world settings, random assignment was not possible for this retrospective evaluation.

Instead, we use observational data and rely on a quasi-experimental research design. Unlike random assignment, this design cannot eliminate the risk that selection bias or unobserved factors may threaten the validity of our findings. For example, judges, aided by the advice of prosecutors and defense attorneys, decide whether to offer an offender a residential DOSA sentence. Furthermore, offenders must voluntarily agree to participate in drug treatment. These selection factors, which are often related to unobserved factors (to the researcher), can potentially bias the results.

To confidently make causal inferences about the findings from this quasi-experimental study, the threat of selection bias must be minimized. To do so, we implement a variety of research methods, including propensity score matching, which provide us the ability to test the sensitivity of our findings. In this section, we describe the study groups and present our results. Details on our methods are found in the Technical Appendix.

Study Groups

In discussions with stakeholders, we learned that some counties do not use residential DOSA as a sentencing option; instead, certain counties prefer prison-based DOSA.[13] Additionally, when residential treatment beds have reached capacity, eligible offenders may be sentenced to prison-based DOSA instead. These real-world conditions allow us to select a comparison group of offenders who likely would have been sentenced to residential DOSA had the sentencing practices or availability of treatment beds been uniform throughout the state.

Thus, our "comparison group" includes offenders who were sentenced to prison-based DOSA from 2006 to 2010 who also met the sentence length criteria for residential DOSA.[14] There are 508 offenders in the comparison group.

The "treatment group" includes offenders who were sentenced to residential DOSA from 2006 to 2010.[15] There are 1,162 residential DOSA offenders in the treatment group.

There are advantages and disadvantages to using offenders sentenced to prison-based DOSA as the comparison group. Like

[12] Engrossed Substitute Senate Bill 6002, Section 609, Chapter 221, Laws of 2014.

[13] See, for example, Hauge, R.D. (2005, September). DOSA sentence recommendations (Memorandum). Kitsap County Prosecuting Attorney's Office retrieved from http://www.kitsapgov.com/pros/DOSA_Sent_Rec.pdf

[14] Of all prison-based DOSA offenders during this timeframe, 26% met the sentence length criteria for residential DOSA.

[15] Although residential DOSA existed as a sentencing option in 2005, treatment beds were not available until 2006. Thus, no offenders received treatment through residential DOSA until 2006.

residential DOSA offenders, the comparison group also had to agree to a prison-based DOSA sentence. Because our comparison group of offenders was sentenced to prison-based DOSA, the influence of selection bias is reduced.

A disadvantage to using prison-based DOSA as the comparison group is that any "treatment effect" obtained in this evaluation derives from the comparison of one treatment versus another (prison-based DOSA vs. residential DOSA). That is, in this evaluation, we were not able to construct a "no treatment" comparison group.[16] Thus, our evaluation of residential DOSA compares two forms of drug treatment and sentences—one occurs in prison and the other in the community.

Methods

We use propensity score matching to select the comparison group. A propensity score is the probability that an offender would have been sentenced to residential DOSA based on observed characteristics. This method, commonly used in observational studies, allows researchers to reduce the threat of selection bias by matching a treatment group to a comparison group who had a similar probability of being assigned to residential DOSA. In this section, we present results from our matched study groups.

After using propensity score matching, we then apply logistic regression analysis to adjust for observed differences between the study groups. Controlling for these differences enables us to calculate adjusted recidivism rates. Detailed methods for this evaluation are described in the Technical Appendix.

Exhibit 1 displays the differences between the matched comparison and residential DOSA groups.[17] Only one variable—the need for chemical dependency treatment three months prior to the start of their sentence—approaches a statistically significant difference between the groups. This difference, however, does not favor the residential DOSA group.

Exhibit 1

Differences between the Matched Study Groups

	Comparison group	Residential DOSA	p-value
Age at-risk	34.8	34.5	0.539
Male	70%	72%	0.476
Black	19%	17%	0.362
White	81%	82%	0.827
Chemical dependency need prior to sentence[#]	0.36	0.43	0.064
Static risk felony score[##]	87	87	0.977
Static risk violent felony score[##]	86	87	0.582
Static risk non-drug score[##]	73	73	0.980
Total adult misdemeanor adjudications	4.0	4.1	0.728
Total adult felony adjudications	3.7	3.6	0.714
Number of observations	508	1,146	

Notes:
[#] This variable is the sum of a chemical dependency need in each month for three months prior to the sentence.
[##] These measures are from DOC's static risk instrument. See Barnoski & Drake (2007).

[16] We worked with staff at DOC to identify the best possible a comparison group for this study. It was not possible to find a comparable group of non-treated offenders.

[17] We show the differences between the study groups on a set of covariates used in the logistic regression analysis, which can be found in the appendix.

Recidivism Findings

Recidivism is defined as any offense committed after release to the community that results in a Washington State conviction.[18] We analyzed the following types of recidivism for this study:

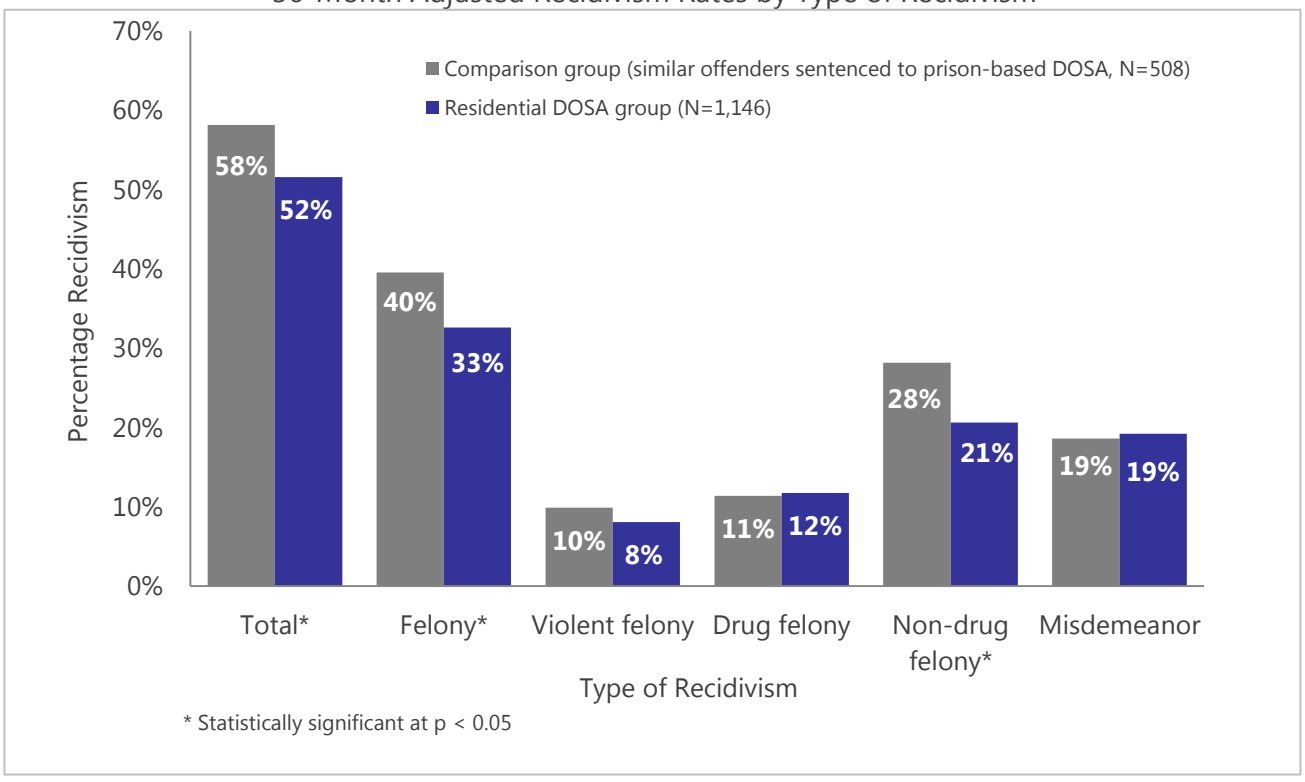
- Total recidivism (any misdemeanor or felony conviction),
- Felony recidivism,
- Violent felony recidivism,
- Drug felony recidivism,
- Non-drug felony recidivism, and
- Misdemeanor recidivism.

The follow-up period for each offender is 36-months. The "at-risk" date is the date an offender was in the community with the potential to re-offend.[19] When calculating recidivism rates, we also allow an additional 12-month period for an offense to be adjudicated by the courts.

We display our regression-adjusted recidivism findings in Exhibit 2. With the exception of drug felony and misdemeanor recidivism, results show that offenders sentenced to residential DOSA had lower recidivism rates than the comparison group of similar offenders sentenced to prison-based DOSA. The results were statistically significant for total recidivism, felony recidivism, and non-drug felony recidivism.

Exhibit 2

36-Month Adjusted Recidivism Rates by Type of Recidivism



[18] Barnoski, R. (1997). *Standards for improving research effectiveness in adult and juvenile justice (*Doc. No. 97-12-1201). Olympia: Washington State Institute for Public Policy, pg. 2.

[19] Any days spent in confinement for a technical violation during the follow-up period were added onto the total follow-up period of 36-monthds. For example, if an offender spent 30 days in jail for a violation during the 36-month follow-up period, their total follow-up period for the recidivism analysis was 37 months.

Risk Level

In addition to analyzing recidivism for the overall groups, we conducted a subgroup analysis by risk level.[20] We did this analysis because we found that a substantial percentage of residential DOSA offenders have a high risk to reoffend, according to DOC's risk level classification. Exhibit 3 shows that 76% of the residential DOSA offenders in our matched sample were classified by DOC as high risk for re-offense.

Exhibit 3
Distribution of Risk Level Classification by Matched Study Groups

Risk level	Comparison group	Residential DOSA
High violent	38%	37%
High non-violent	37%	39%
Moderate	14%	16%
Lower	11%	8%
N	508	1,162

Notes:
See Barnoski & Drake, (2007) for information on DOC risk level classification.

Given this finding—a surprising one to us—we conducted a subgroup analysis to test if the effectiveness of residential DOSA was different for high risk offenders versus lower and moderate risk offenders.

For higher risk offenders, the results of our analysis were similar to the overall groups. When examining the impact of residential DOSA for lower and moderate risk offenders, however, we found no improvements in recidivism. Detail from our analysis can be found in the Technical Appendix.

This finding is consistent with what criminologists call the "risk principle;" that is, interventions and supervision should be commensurate with an offender's risk level.[21]

Revocations

When offenders sentenced to residential DOSA or prison-based DOSA do not successfully complete the requirements of their sentence,[22] the DOSA sentence can be revoked and the offender is required to serve the remainder of their sentence in confinement.

Forty-five percent of the residential DOSA group and 31% of the comparison group had their sentence revoked. The majority of revoked sentences were due to a new crime; others were for a technical violation. Approximately 23% of residential DOSA revocations were for a technical violation only compared with 18% of the comparison group.

Across the entire residential DOSA group, the average number of days spent in confinement for a technical violation was seven compared with four days of confinement for the comparison group.

[20] We conducted separate matching procedures for the subgroup analysis. See appendix for details.

[21] Andrews, D., Bonta, J., & Hoge, R. (1990). Classification for effective rehabilitation: Rediscovering psychology. *Criminal Justice and Behavior*, 17, 19–52.

[22] Conditions of the sentence include, for example, attend and complete chemical dependency treatment and abide all laws.

IV. Benefit-Cost Analysis

When possible, we use WSIPP's benefit-cost model to generate return-on-investment statistics for all evaluations. The results allow a consistent comparison of a variety of programs and policies.[23]

In benefit-cost analyses of criminal justice programs, the valuation of benefits in monetary terms takes the form of savings when crime is avoided. Crime can produce many costs, including those associated with the criminal justice system as well as those incurred by crime victims. When crime is avoided, these reductions lead to monetary savings or benefits. WSIPP's benefit-cost model estimates the number and types of crimes avoided (or incurred) due to the effect of a policy and the monetary value associated with that reduction. More details on our benefit-cost analysis are found in the Technical Appendix.

We estimate the cost, per participant, for residential DOSA relative to the comparison group.[24] As shown in Exhibit 4, we find that residential DOSA costs approximately the same as prison-based DOSA. Although the comparison group of offenders spent 5.3 months in prison and the residential DOSA participants did not, the cost of chemical dependency treatment in a residential facility and the cost of supervision were higher for residential DOSA offenders.

Exhibit 4

Cost Per Participant for Residential DOSA and Prison-Based DOSA

Cost per participant	Estimation procedure
Residential DOSA	
$9,488	Cost of supervision (for 516 days)
$6,862	Cost of chemical dependency treatment
$389	Cost of a revocation for technical violations (average of 7 days of confinement for the total residential DOSA group)
$16,740	**TOTAL cost per residential DOSA participant**
Prison-based DOSA#	
$9,237	Cost of confinement (for 160 days in prison)
$2,034	Cost of chemical dependency treatment
$4,677	Cost of supervision (half the midpoint of the standard range for this group was 252 days)
$227	Cost of a revocation for technical violations (average of 4 days of confinement for the total prison-based DOSA group)
$16,176	**TOTAL cost per prison-based DOSA participant#**

Notes: All confinement costs include operating and capital costs for prison estimated at $58 per day.
We estimate the cost of prison-based DOSA for our comparison group in Section II of this report. Thus, this cost estimate is an approximation of those prison-based DOSA offenders who also meet the eligibility criteria for residential DOSA; not a cost estimate for all prison-based DOSA offenders.

[23] Washington State Institute for Public Policy (2014). Benefit-cost technical documentation. Olympia, WA: Author.

[24] The cost per participant is the average cost, which includes successful and unsuccessful residential DOSA offenders. We include treatment costs, supervision costs, and all costs associated with unsuccessful or revoked offenders.

Preliminary Benefit-Cost Findings

When WSIPP undertakes a benefit-cost analysis, we sum the estimated benefits, along with the costs to provide a statewide view on whether a program produces a favorable bottom-line result. Because we are unable to provide a comprehensive picture of the benefits and costs of residential DOSA, however, our benefit-cost analysis is incomplete.

A preliminary benefit-cost estimate of this policy is displayed in Exhibit 5. As described in Exhibit 5, we cannot estimate the empirical benefits to taxpayers and crime victims of the incapacitation effect.

The net cost of residential DOSA is $564 per participant as shown on line (1). In addition to the cost of the policy, we found a decrease in total recidivism—six percentage points—for those who were sentenced to residential DOSA.

Participation in residential DOSA results in a savings of $5,439 from decreased crime victim costs and $2,064 from reduced taxpayer costs on the criminal justice system—the total savings from reduced recidivism, $8,259, is shown on line (2).

We are unable to empirically estimate how many crimes are avoided due to incapacitation as shown on line (3) and discussed below. Therefore, we would expect a reduction in the benefits obtained from the recidivism effect, but we cannot empirically estimate whether the benefits of residential DOSA would outweigh its costs.

Exhibit 5

Benefits and Costs per Participant for Residential DOSA vs. Prison-Based DOSA in 2013 Dollars

Benefits and costs per item	Benefits per participant
Policy cost	
Residential DOSA	
Cost per participant for assessment, treatment, & supervision	$16,740
Prison-based DOSA (comparison group)	
Cost per participant for assessment, treatment, confinement & supervision	$16,176
(1) Net residential DOSA cost	**-$564**
Recidivism effect	
Decreased crime victim costs due to decreased recidivism	$5,439
Decreased taxpayer costs due to decreased recidivism	$2,064
Deadweight cost of taxation	$756
(2) Total recidivism savings	**$8,259**
Incapacitation (cost of non-confinement):	
Increased criminal justice system costs from incurred crimes	An evidence-based finding cannot be estimated at this time.
Increased crime victim costs from incurred crimes	
(3) Total incapacitation cost	
Bottom line:	
Total net benefits (cost) per participant (4) Net	An evidence-based finding cannot be estimated at this time.
Benefit-to-cost ratio	
Monte Carlo risk analysis	

Notes: More detail on cost estimates are provided in the technical appendix of this report.

Incapacitation

In addition to its effect on recidivism, the residential DOSA law affects crime rates in Washington through what criminologists call "incapacitation." Incapacitation not only prevents a specific individual from committing crime while confined; it can also have a broader effect by deterring others from committing crime through the threat of confinement.

In lieu of confinement, offenders sentenced to residential DOSA serve their sentences in the community while participating in residential treatment. Thus, one result of the residential DOSA law has been to decrease the statewide incarceration rate by avoiding prison sentences. For example, we found that the comparison group of prison-based DOSA offenders spent 5.3 months in prison (whereas the residential DOSA group did not).

We have previously reviewed the research literature and found that a decrease in statewide incarceration rates generally results in an increase in crime rates.[25] Based on this research, we expect that crime rates would increase under a policy, such as residential DOSA, that reduces incarceration rates.

This research literature examines confinement relative to non-confinement. Residential DOSA, however, is not strictly non-confinement since offenders do spend time in residential facilities. We cannot empirically determine how comparable a residential DOSA treatment facility is to non-confinement. On the one hand, if treatment is not completed, the law requires that offenders serve the remainder of their sentence in confinement, which could deter criminal offending. Furthermore, treatment facility staff or community corrections officers may encourage patients to remain in treatment, which could reduce the likelihood of patients leaving the facility.

On the other hand, however, according to Washington State law, participation in residential DOSA treatment must be voluntary and treatment staff cannot prevent patients from leaving a voluntary facility.[26] This voluntary aspect dampens any potential incapacitation effect of residential DOSA itself.

Because of these competing factors, we cannot determine the degree to which residential DOSA compares to non-confinement. Thus, we cannot apply our prior research findings to this study to estimate an incapacitation effect of the residential DOSA policy.

Given our findings from the incapacitation literature, we can presume that the number of crimes avoided through incapacitation will be greater than zero. That is, assumptions from the incapacitation literature would lead us to believe that some crime is avoided through confinement. We are unable, however, to empirically estimate how many crimes are avoided. Therefore, we would expect a reduction in the benefits obtained from the recidivism effect.

[25] Aos, S. & Drake, E. (2013) *Prison, police, and programs: Evidence-based options that reduce crime and save money. (*Doc. No. 13-10-1901). Olympia: Washington State Institute for Public Policy. See also: Nagin, D. (2013). Deterrence in the twenty-first century: A review of the evidence*. Crime and Justice: A review of research.* Chicago, IL: University of Chicago Press. Marvell, T.B. (2010). *Prison population and crime. Handbook on the economics of crime*, B.L. Benson & P.R. Zimmerman (Eds.). Cheltenham, UK: Edward Elgar Publishing.

[26] RCW 71.12.

Technical Appendix

Washington's Residential Drug Offender Sentencing Alternative: Recidivism & Cost Analysis

Appendix

A. I. DOSA Eligibility Criteria

Exhibit A1 displays the eligibility criteria required for DOSA sentences since the law came into effect in 1995.

Exhibit A1

Comparison of 1995, 1999, and 2005 DOSA Legislation

Legal requirements	Year of DOSA legislation		
	1995	1999	2005
Current felony conviction	• Manufacture, delivery or possession with intent to manufacture/deliver a controlled substance • Criminal attempt, solicitation, or conspiracy to commit these crimes.	• All felonies, with exception of violent or sex offenses.	• All felonies, with exception of violent or sex offenses.
Prior felony conviction	• No prior felony convictions.	• No violent or sex felonies.	• No violent or sex offenses within the last ten years. Cannot have served a DOSA sentence within the last ten years.
Immigration	• No requirements.	• Not subject to deportation detainer or order.	• Not subject to deportation detainer or order.
Sentence length	• Midpoint of standard range greater than 12 months.	• Standard range greater than 12 months.	• For "prison-based" alternative, standard range greater than 12 months. For "residential" DOSA, two years on community custody, or half the midpoint of the standard sentence range, whichever is greater.
Community supervision/ revocations	• One year community custody; court may revoke.	• Remainder of sentence on community custody; DOC may revoke.	• Remainder of sentence on community custody; DOC may revoke.

A. II. Outcome Evaluation: Study Group Selection & Matching Procedures

The 2014 Legislature directed WSIPP to "examine its [residential DOSA] effectiveness on recidivism and conduct a benefit-cost analysis." The ability to evaluate credibly whether residential DOSA achieves reductions in recidivism relies on identifying an adequate comparison group of offenders.

In an ideal research design, offenders eligible for residential DOSA would be randomly assigned to either residential DOSA or a comparison group. With a successfully implemented random assignment, any observed differences in recidivism could be attributed to the effect of residential DOSA. Unfortunately, as is the case in many real world settings, random assignment was not possible for this retrospective evaluation.

Instead, we use observational data and rely on a quasi-experimental research design. Unlike random assignment, this type of design cannot eliminate the risk that selection bias or unobserved factors may threaten the validity of its findings. For example, judges, aided by the advice of prosecutors and defense attorneys, decide whether to offer an offender a residential DOSA sentence. These selection factors, which may be related to unobserved factors such as an offender's motivation, can potentially bias the results of the study in favor of the treatment group (residential DOSA).

To confidently make causal inferences about the findings from this quasi-experimental study, selection bias must be minimized. To do so, we implement a variety of statistical techniques that provide the ability to test the sensitivity of our findings. In this section of the appendix, we describe the study groups and present findings based on our preferred model estimates.

Study Group Selection

The first step in conducting an outcome evaluation is to identify a valid comparison group. In this study, unfortunately, it was not possible to locate a comparison group of non-treated offenders.[27] In our discussions with key stakeholders, we learned that, when residential DOSA treatment beds are at full capacity, judges may alternatively sentence offenders to prison-based DOSA. Thus, the most logical comparison group for this study was offenders sentenced to prison-based DOSA.[28]

Not all prison-based DOSA offenders, however, are eligible for residential DOSA. Thus, we limited the comparison group to prison-based DOSA offenders sentenced after 2005 who met the following residential DOSA sentencing criteria:

- The high end of the standard sentence range for the current offense must be greater than one year, and
- The midpoint of the standard sentence range must be 24 months or less.

There are advantages and disadvantages to using prison-based DOSA offenders as the comparison group. One advantage is that these comparison group offenders met all the residential DOSA eligibility criteria. Furthermore, these offenders opted into prison-based DOSA which gives us more confidence that any unobserved factors that could be related to selection into treatment, such as motivation, are similar since both groups elected to participate in DOSA. One disadvantage to this comparison group is that we are comparing a treatment to a treatment; thus, we are unable to estimate a full treatment effect relative to a non-treated group. From a policy perspective, this means that our evaluation of residential DOSA can be

[27] When residential DOSA was first implemented, offenders were sentenced to the alternative before residential treatment beds were available to DOC. We explored the possibility of using this group of offenders for a comparison group. Unfortunately, however, DOC staff was unable to locate, electronically and systematically, this ideal comparison group in DOC data.

[28] Our study group selection was also dictated by the balance of the study groups after propensity score matching. For example, we tested the possibility of selecting a comparison group before residential DOSA was implemented in 2005; however, we were unable to improve upon the balance using prison-based DOSA offenders as the comparison group.

described as a test of whether residential DOSA provides an effective alternative to, or in addition to, prison-based DOSA.

To select the treatment and comparison groups, we received data from the Department of Corrections to identify both prison and residential DOSA offenders. We linked these data to sentencing data from the Caseload Forecast Council (CFC) to determine which prison-based DOSA offenders met the residential DOSA sentencing criteria listed above. When DOC and CFC data were not in agreement as to whether the sentence was a residential or prison-based DOSA sentence (e.g., DOC data indicated the sentence was a residential DOSA, but CFC data indicated the sentence was a prison-based DOSA), we excluded those records (5% of all sentences in the data) from our analysis.[29] According to the Revised Code of Washington, offenders cannot receive more than one DOSA sentence in a ten-year period; however, we found subsequent DOSA sentences for some offenders and included only the first DOSA sentence for this study except in cases where an individual received residential DOSA second. In these instances, we included the residential DOSA sentence, not the prior prison-based DOSA sentence.[30]

In order to conduct a recidivism analysis, offenders in our study groups must have been "at-risk" for recidivism in the community by July 2010, which allows enough time to conduct a 36-month recidivism analysis.

After implementing the study selection criteria, 26% of all prison-based DOSA sentences met the sentence length criteria for residential DOSA. We implemented the propensity score matching discussed below, which gave us a comparison group for this study of 508 offenders. The treatment group includes 1,162 offenders who were sentenced to residential DOSA from 2006 to 2010.

Propensity Score Matching

While the timing and selection attributes of a quasi-experimental design pose possible threats to the validity of a study, we attempted to minimize these influences using propensity score matching. A propensity score, shown in equation (1), is the probability that an individual will be assigned to the treatment condition given a set of observed characteristics, which we estimated with a logit model:[31]

$$(1)\ \ p_i = \Pr(Z_i = 1|X_i) = \frac{1}{1 + e^{-(\alpha+\beta_1 X_{1i}+\cdots+\beta_k X_{ki})}}$$

In equation (1), α represents the intercept of the model and β_j represents the parameter of the model for covariate X_j, $Z=1$ represents the treatment, and e is the base of the natural logarithm. Thirty-seven covariates, displayed in Exhibit A2, were used in the propensity score model including a variety of criminal history variables, demographic information, chemical dependency treatment need three months prior to the index sentence, whether the individual began treatment within the first 60 days, static risk scores,[32] and county fixed effects.[33] We included interaction terms and higher order terms as necessary to improve the balance across covariates.

Our preferred matching procedure was Epanechnikov kernel-based matching with common support restrictions and an optimal bandwidth chosen using leave-one-out cross validation.[34] Kernel-based matching

[29] If multiple sentences existed for the case, we used the highest sentence length.
[30] RCW 9.94A.660.
[31] The propensity score was estimated using the pscore command and the matching procedures were performed using psmatch2 in STATA.
[32] Barnoski & Drake, (2007).
[33] County fixed effects can control for time-invariant unobserved factors within a county that may be related to an individual's probability of recidivating. Additionally, some counties use residential DOSA differently. See, for example, Hauge, R.D. (2005, September). DOSA sentence recommendations (Memorandum). Kitsap County Prosecuting Attorney's Office retrieved from http://www.kitsapgov.com/pros/DOSA_Sent_Rec.pdf
[34] Studies using Monte Carlo simulation and leave-one-out cross validation found that kernel-based matching performed better than nearest neighbor methods. See Frölich, M. (2004). Finite-sample properties of propensity-score matching and weighting estimators. *Review*

uses every treated subject and every control within the region of common support and then weights the controls based on their distance from the treated individual's propensity score. Common support restrictions ensure sufficient overlap between the treated and comparison groups by including only those individuals that fall within the region where the propensity scores intersect. Fourteen treated individuals were not within the common support region and were excluded from the analysis.[35] The weight imposed also depends on the bandwidth chosen for the kernel matching estimator. We calculated an optimal bandwidth (0.165) for our broadest measure of recidivism (any felony or misdemeanor recidivism) and used that across all outcomes.[36]

We used various diagnostics to determine the extent to which the propensity score matching improved balance between the treated and comparison groups. A common measure of balance is the standardized percent difference (or bias) calculated as the difference in the mean/proportion for the treated and comparison groups divided by the pooled standard deviation for each covariate. We then multiply this value by 100 to obtain the standardized percent bias and calculate the bias for each of the 37 covariates included in the propensity score model. This measure is preferred to traditional t-tests as the standardized difference is not influenced by the study's sample size. Additionally, t-tests are used for making inferences about a population based on a sample; balance, on the other hand, is specific to the sample. Standardized bias values greater than ten usually indicate imbalance.[37] Exhibit A2 displays the percent standardized bias for each covariate in the propensity score model before and after matching. After matching, most differences were greatly reduced and all but one covariate fell below the 10% threshold.

of Economics and Statistics, *86*(1), 77-90; and Black, D.A., & Smith, J.A. (2004). How robust is the evidence on the effects of college quality? Evidence from matching. *Journal of Econometrics, 121*(1), 99-124. We also tested the sensitivity of our results using nearest neighbor methods and find similar results to the kernel-based matching (see Exhibit A3).

[35] Two treatment subjects were dropped due to missing data.

[36] The optimal bandwidth was calculated using leave-one-out cross validation as in Galdo, J.C., Smith, J., & Black, D. (2008). Bandwidth selection and the estimation of treatment effects with unbalanced data. *Annales d'Économie et de Statistique*, 189-216.

[37] Austin, P.C. (2009). Balance diagnostics for comparing the distribution of baseline covariates between treatment groups in propensity-score matched samples. *Statistics in Medicine, 28*(25), 3083-3107.

Exhibit A2

Standardized Bias for Covariates in the Propensity Score Model

Variable	Bias unmatched	Bias matched	Bias reduction
Age at-risk	-4.23	-3.05	27.95
Black	0.83	-4.61	-455.87
Male	4.58	3.50	23.59
Number of months with CD treatment need prior 3 months	15.49	9.44	39.07
Static risk felony score	4.95	-0.14	97.10
Static risk non-drug score	0.34	0.13	62.39
Static risk violent felony score	8.22	2.69	67.34
Total adult felony adjs.	-0.22	-1.82	-735.22
Total adult misdemeanor adjs.	4.95	1.75	64.67
Black*Male	0.29	-3.16	-995.73
Male*Total juvenile felony adjs.	-4.94	-1.73	64.97
Male*Total juvenile felony property adjs.	-4.77	-1.95	59.19
Number of months with CD treatment need prior 3 months squared	17.14	10.35	39.63
Received CD treatment within 60 days	38.29	5.23	86.33
Sentence high range	0.29	-0.70	-138.50
Total adult felony drug adjs.	-1.82	2.29	-25.92
Total adult felony drug adjs.	6.52	0.04	99.37
Total adult felony property adjs.	-6.87	-3.55	48.23
Total adult misdemeanor alcohol adjs.	7.84	6.77	13.66
Total adult misdemeanor drug adjs.	-0.28	-2.92	-962.01
Total adult misdemeanor property adjs.	5.61	1.46	73.99
Total age at 1st offense	-5.03	-1.81	64.06
Total juvenile felony adjs.	-4.84	-3.82	21.01
Total juvenile felony property adjs.	-4.04	-4.29	-6.23
Total juvenile felony property adjs. cubed	-5.39	0.03	99.46
Total juvenile felony property adjs. squared	-5.59	-1.38	75.31
Total juvenile misdemeanor adjs.	7.66	2.00	73.91
Total juvenile misdemeanor alcohol adjs.	11.67	1.47	87.40
Total juvenile misdemeanor drug adjs.	3.05	0.88	70.99
Total juvenile misdemeanor drug adjs. squared	-1.21	0.69	42.97
Total juvenile misdemeanor property adjs.	5.62	1.48	73.57
Total juvenile misdemeanor property adjs. squared	4.53	3.52	22.29
Total misdemeanor alcohol score	9.94	4.80	51.67
Total misdemeanor drug score	1.21	-2.54	-110.17
Total misdemeanor property score	3.53	1.60	54.71
White	4.31	1.07	75.19
White*Male	7.74	3.20	58.63

Notes:
County-fixed effects are not displayed here because the intent was not to achieve balance on the county-fixed effects, but to control for county fixed-effects in the second stage equation (outcome model).
Bolded variables are those included in the logistic regression models examining recidivism outcomes.

Other diagnostic tests include Rubin's B which is the standardized difference in mean of the linear prediction of the propensity score and Rubin's R which is the ratio of variance of the treated and comparison group for the linear prediction of the propensity score. These values should be less than 0.25 and between 0.5 and 2, respectively, to indicate sufficient balance.[38] Our matching procedure produced Rubin's B of 0.227 (down from 0.54 before matching) and Rubin's R of 1.70 (compared to 0.91 before matching).[39]

Analytical Method

We used logistic regression on the matched sample for the second stage of the analysis using a comprehensive set of observed control variables (2) on the dependent variable—six different measures of recidivism. The regression model was weighted using the weight from the propensity score matching.

$$(2)\quad \log\left(\frac{p_i}{1-p_i}\right) = \left(\alpha + \sum_1^k \beta_j X_{ij}\right) + e_i$$

Recidivism is defined as any offense committed after release to the community that resulted in a Washington State court conviction.[40] The follow-up period is 36-months from the time the offender was "at-risk" in the community—the date an offender was in the community with the potential to re-offend. Typically, we use a 36-month follow-up period, which is our standard for adult offenders. We have found that this timeframe allows the researcher to capture approximately 80% of re-offense behavior when compared with a longer follow-up.[41]

In addition to the follow-up period, time is needed to allow an offense to be processed in the criminal justice system. The criminal justice process includes the time period between the date recorded for the commission of a subsequent offense and the resulting conviction of that offense. In our previous work, we have found that a 12-month adjudication period is adequate for adult offenders.

Some offenders in our sample spent time in confinement for technical violations during the follow-up period. Any days in confinement for a technical violation were added onto the total follow-up period of 36-months.

We tested the effects of residential DOSA on the following recidivism measures:

1) Total convictions (including felony and misdemeanors)
2) Felony convictions
3) Violent felony convictions
4) Drug felony convictions
5) Non-drug felony convictions
6) Misdemeanor convictions

[38] Rubin, D.B. (2001). Using propensity scores to help design observational studies: application to the tobacco litigation. *Health Services and Outcomes Research Methodology, 2(*3-4), 169-188.
[39] Rubin's B and Rubin's R were calculated using the pstest command in STATA.
[40] Barnoski, R. (1997). *Standards for improving research effectiveness in adult and juvenile justice.* (Doc. No. 97-12-1201). Olympia: Washington State Institute for Public Policy, pg. 2.
[41] Ibid.

Sensitivity Testing of Propensity Score Matching

In addition to kernel-based matching, we conducted sensitivity testing by matching the study groups using 1:1 nearest neighbor methods. This method randomly orders the treatment and control subjects and matches each treated individual within the region of common support to one control with the closest propensity score. We allowed for replacement, meaning comparison group members could be chosen more than once. We also imposed a caliper of 0.01, which only includes comparison group individuals within 0.01 of a treated individual's propensity score. Generally, the results for the nearest neighbor matched groups, shown in Exhibit A3, were not substantively different from the kernel matched groups.[42] Our preferred model estimates come from the kernel matched sample. This sample retains a greater number of unique individuals in the comparison group and studies have demonstrated that kernel matching tends to produce superior matching results compared with nearest neighbor matching.[43]

We also tested the sensitivity of our results to various specifications of the propensity score and logistic models (including exploring year fixed effects), bandwidth selection, and calipers. Additionally, we explored various restrictions on the sample selection from using all available data to restricting the sample to particular time periods. We found similar results regardless of sample selection, methods, or model specifications but found the best balance was achieved with the sample from 2005 to 2010 using the kernel-based matching.

[42] We did find the differences in the sign of the effect of residential DOSA on misdemeanor recidivism across matching methods (positive for kernel matching and negative for nearest neighbor methods); however, neither effect was statistically significant nor were they statistically different from each other ($p = 0.201$).

[43] See Frölich, M. (2004). Finite-sample properties of propensity-score matching and weighting estimators. *Review of Economics and Statistics*, *86*(1), 77-90; and Black, D.A., & Smith, J.A. (2004). How robust is the evidence on the effects of college quality? Evidence from matching. *Journal of Econometrics, 121*(1), 99-124.

Exhibit A3

Sensitivity Testing of Propensity Score Matching

Recidivism:		Study groups: Unmatched study groups	Kernel matched	Nearest neighbor matched[#]
Total	Residential DOSA	-0.341	-0.266	-0.354
	SE	0.118	0.091	0.092
	p value	0.004	0.003	0.000
	N	1,669	1,654	1,470
	AUC	0.706	0.705	0.696
Felony	Residential DOSA	-0.254	-0.301	-0.241
	SE	0.118	0.092	0.094
	p value	0.031	0.001	0.010
	N	1,669	1,654	1,470
	AUC	0.685	0.683	0.678
Violent felony	Residential DOSA	-0.234	-0.220	-0.501
	SE	0.197	0.152	0.146
	p value	0.235	0.148	0.001
	N	1,669	1,654	1,470
	AUC	0.767	0.763	0.715
Drug felony	Residential DOSA	0.002	0.035	0.178
	SE	0.173	0.134	0.140
	p value	0.989	0.793	0.203
	N	1,669	1,654	1,470
	AUC	0.696	0.685	0.676
Non-drug felony	Residential DOSA	-0.332	-0.412	-0.417
	SE	0.133	0.104	0.105
	p value	0.013	0.000	0.000
	N	1,669	1,654	1,470
	AUC	0.719	0.718	0.699
Mis-demeanor	Residential DOSA	-0.114	0.041	-0.154
	SE	0.137	0.109	0.107
	p value	0.405	0.705	0.151
	N	1,669	1,654	1,470
	AUC	0.627	0.619	0.605

Notes:

[#] The sample size for the nearest neighbor matching represents the sum of the number of unique controls chosen (341) plus the number of treated individuals used (1,129). We weighted the regression based on the frequency with which a control was chosen, yielding a weighted sample size of 2,258.

Preferred Model Estimates

Our preferred model for all measures of recidivism is displayed in Exhibit A4. Results from these models indicate that residential DOSA had a statistically significant negative effect ($p \leq 0.05$) on total recidivism (1), felony recidivism (2), and non-drug felony recidivism (5).

Exhibit A4

Preferred Model Estimates by Type of Recidivism

Recidivism dependent variable:	Total (1)			Felony (2)			Violent felony (3)			Drug felony (4)			Non-drug felony (5)			Misdemeanor (6)		
	Co-efficient	SE	P value	Co-efficient	SE	P value	Co-efficient	SE	P value	Co-efficient	SE	P value	Co-efficient	SE	P value	Co-efficient	SE	P value
Residential DOSA	**-0.266**	**0.091**	**0.003**	**-0.301**	**0.092**	**0.001**	**-0.220**	**0.152**	**0.148**	**0.056**	**0.134**	**0.676**	**-0.412**	**0.104**	**0.000**	**0.041**	**0.109**	**0.705**
Age at-risk	-0.016	0.006	0.009	-0.030	0.007	0.000	-0.028	0.011	0.015	-0.022	0.009	0.021	-0.028	0.008	0.000	0.012	0.007	0.074
Male	0.335	0.150	0.025	0.355	0.153	0.020	0.316	0.284	0.265	0.085	0.220	0.882	0.547	0.174	0.002	0.073	0.178	0.683
Black	0.553	0.135	0.000	0.002	0.134	0.987	0.337	0.205	0.099	-0.033	0.190	0.653	-0.050	0.151	0.739	0.677	0.148	0.000
CD need prior to sentence[1]	0.198	0.057	0.001	0.174	0.056	0.002	0.122	0.090	0.176	0.159	0.075	0.035	0.122	0.062	0.050	0.038	0.065	0.559
Static risk felony score[2]	0.012	0.004	0.003	0.012	0.004	0.003	-0.018	0.007	0.006	0.025	0.006	0.000	-0.001	0.005	0.802	0.000	0.005	0.970
Static risk violent felony score[2]	0.000	0.003	0.894	0.001	0.003	0.763	0.022	0.004	0.000	0.007	0.004	0.123	-0.003	0.003	0.330	-0.002	0.003	0.659
Static risk non-drug score[2]	0.010	0.003	0.002	0.004	0.003	0.197	0.018	0.006	0.001	-0.029	0.005	0.000	0.023	0.004	0.000	0.007	0.004	0.056
Total adult mis. adjs.[3]	0.022	0.017	0.188	-0.016	0.014	0.256	-0.032	0.027	0.229	0.004	0.019	0.840	-0.017	0.016	0.307	0.044	0.015	0.004
Total adult fel. adjs.[3]	-0.065	0.042	0.117	0.000	0.041	0.994	0.015	0.067	0.827	0.030	0.055	0.587	-0.021	0.047	0.659	-0.074	0.048	0.120
King	-0.077	0.135	0.569	0.241	0.139	0.084	0.128	0.223	0.566	-0.174	0.204	0.392	0.451	0.159	0.004	-0.375	0.166	0.024
Pierce	0.289	0.178	0.105	0.466	0.176	0.008	0.380	0.272	0.163	0.126	0.241	0.602	0.557	0.197	0.005	-0.219	0.209	0.296
Snohomish	0.130	0.155	0.401	0.016	0.161	0.920	-0.120	0.272	0.660	-0.455	0.264	0.085	0.295	0.179	0.098	0.181	0.177	0.306
Thurston	0.558	0.255	0.029	0.724	0.236	0.002	0.224	0.366	0.541	0.597	0.292	0.041	0.523	0.256	0.041	-0.261	0.303	0.389
Clark[4]	-1.330	0.608	0.029	-0.687	0.626	0.272	1.157	0.702	0.099	NA	NA	NA	0.321	0.628	0.609	-1.592	1.035	0.124
Yakima	0.149	0.212	0.481	0.302	0.207	0.146	-0.233	0.368	0.527	-0.601	0.364	0.099	0.661	0.224	0.003	-0.149	0.249	0.550
Spokane	-0.134	0.146	0.359	0.039	0.154	0.799	-0.342	0.284	0.228	0.145	0.208	0.485	0.010	0.184	0.959	-0.206	0.184	0.263
Intercept	-1.120	0.315	0.000	-1.302	0.314	0.000	-3.452	0.536	0.000	-2.158	0.448	0.000	-2.000	0.357	0.000	-2.265	0.359	0.000
N	1,654			1,654			1,654			1,654			1,654			1,654		
AUC	0.705			0.683			0.763			0.680			0.718			0.619		

Notes:

[1] This variable is a continuous measure counting chemical dependency need by month for three months prior to the index sentence.

[2] Static risk scores are calculated using the Department of Corrections' static risk instrument. See: Barnoski & Drake, (2007).

[3] Total adult misdemeanor and felony adjudications include current (index sentence) and prior misdemeanor and felony adjudications.

[4] The Clark County covariate is excluded from the drug felony recidivism model as no individuals in our sample from Clark County had a subsequent drug felony conviction; thus, the covariate was suppressed in this model.

Subgroup Analysis

We conducted a subgroup analysis by risk level classification to determine if the effect of residential DOSA differed by risk level.[44] To do this, we performed separate matching procedures and second stage regression models for higher risk offenders (N=1,243) and low/moderate risk offenders (N=374).

For higher risk offenders, our results were consistent with the overall groups (shown in Exhibit A4). We found statistically significant reductions in total recidivism, felony recidivism, violent felony recidivism, and non-drug felony recidivism. We varied the bandwidth to test the sensitivity and the results were not different.

For lower risk offenders, we were unable to produce balance on some covariates, however, we controlled for these covariates in the second stage model estimating recidivism. We varied the bandwidth to test the sensitivity of our results. In all instances, we did not find any significant differences across all measures of recidivism.

Timing of Recidivism

We investigated whether there were differences between the groups on the timing of recidivism by month. For those who were reconvicted during the 36-month follow-up period, the residential DOSA group recidivated at an average of 14.5 months and the comparison group recidivated at 14.1 months. We conducted survival analysis using Cox proportional hazards model, controlling for the covariates from our preferred model, and found no statistically significant difference between the residential DOSA and comparison groups on months to recidivism event.

[44] Barnoski & Drake, (2007).

A. III. Benefit-Cost Analysis

WSIPP's benefit-cost model is designed to produce, for the Washington legislature, internally consistent estimates of the benefits and costs of various public policies. WSIPP built its first benefit-cost model in 1997 to determine whether juvenile justice programs that have been shown to reduce crime can also pass an economic test. In subsequent years, as WSIPP has received new research assignments from the Washington legislature, the benefit-cost model has been revised and expanded to cover additional public policy topics.

A complete list of our current benefit-cost estimates for crime programs in addition to residential DOSA and drug treatment for offenders (as well as other public policy topics) can be found on the WSIPP website.[45] More detail on our analytic methods used to compute the costs and benefits of crime can also be found in WSIPP's Benefit-Cost Model Technical Documentation.[46]

Preliminary Benefit-Cost Result of Residential DOSA

When possible, WSIPP conducts benefit-cost analysis to understand the long-term impacts of policies. In addition to residential DOSA's effect on recidivism, research indicates that crime is avoided through confinement, known as "incapacitation." We cannot empirically estimate the extent to which a residential treatment facility itself incapacitates offenders. Thus, we are unable to determine, at this time, the degree to which the benefits from the favorable recidivism reduction of residential DOSA would be offset by the increased costs of non-confinement.

Overview

The overall objective of WSIPP's benefit-cost model is to produce a "what works?" list of evidence-based public policy options available to the Washington State legislature, ranked by return on investment. The ranked list can help policymakers choose a portfolio of public policies that are evidence-based and have a high likelihood of producing more benefits than costs. For example, if a public policy objective is to reduce crime, then policymakers in the state of Washington can use WSIPP's results to identify a portfolio of evidence-based policies (prevention, juvenile justice, adult corrections, and sentencing policies) that together can improve the chance that crime is reduced in Washington and taxpayer money is used efficiently.

For each evidence-based option we analyze, our goal is to deliver to the legislature two straightforward benefit-cost measures: an expected return on investment and, given the risk that we anticipate in our estimates, the odds that the investment will at least break even (that is, that it will have benefits at least as great as costs). To do this, we carry out four basic analytical steps.

- ✓ *What Works?* First, we determine "what works?" to improve outcomes. To do this, we rely on either outcome evaluations conducted in Washington (e.g., the current residential DOSA study), or we conduct systematic reviews of the research literature to identify policies and programs that demonstrate an ability to improve specific outcomes.
- ✓ *What Passes an Economic Test?* The second step involves applying economic calculations to put a monetary value on any improved outcomes (from the first step). Once monetized, the estimated benefits are then compared to the costs of programs or policies to produce an economic bottom line for the investment.
- ✓ *How Risky Are the Estimates?* Part of the process of estimating a return on investment involves assessing the riskiness of the estimates. Any rigorous modeling process involves many individual estimates and assumptions and some level of risk and uncertainty. We use a "Monte Carlo" approach

[45] http://www.wsipp.wa.gov/benefitcost
[46] http://www.wsipp.wa.gov/TechnicalDocumentation/WsippBenefitCostTechnicalDocumentation.pdf

to model this risk. The objective of the risk analysis is to assess the probability that the program will at least generate one dollar of benefits for each dollar of cost.

WSIPP's benefit-cost model is an integrated set of computational routines designed to produce three related benefit-cost summary statistics for each policy option we analyze: a net present value, a benefit-to-cost ratio, and a measure of risk associated with these bottom-line estimates. Each of the summary measures derives from the same set of cash or resource flows over time.

In the simplest form, the model implements a standard economic calculation of the expected worth of an investment by computing the net present value of a stream of estimated benefits and costs that occur over time, as described with equation (3).

$$(3)\quad \mathrm{NPV}_{\mathrm{tage}} = \sum_{\mathrm{y}=\mathrm{tage}}^{\mathrm{N}} \frac{\mathrm{Q_y} \times \mathrm{P_y} - \mathrm{C_y}}{(1+\mathrm{Dis})^{\mathrm{y}}}$$

In this basic model, the net present value, NPV, of a program is the quantity of the outcomes achieved by the program or policy, Q, in year y, times the price per unit of the outcome, P, in year y, minus the cost of producing the outcome, C, in year y. The lifecycle of each of these values is measured from the average age of the person who is treated, tage, and runs over the number of years into the future over which they are evaluated, N. The future values are expressed in present value terms after applying a discount rate, Dis. All cost estimates for this report are presented in 2013 dollars.

Cost of the Criminal Justice System

Calculating the monetary value of benefits from a reduction in crime requires the estimation of several elements essential to conducting benefit-cost analysis. The four essential elements necessary for WSIPP to conduct its benefit-cost analysis of criminal justice programs include the estimation of:

1) *Risk of reconviction*. We estimate the risk of being reconvicted of a crime for program participants relative to a base population of offenders who do not participate in the evidence-based program. Combining the effect size with criminal recidivism information from the untreated offenders allows us to estimate and compare the cumulative recidivism rates of offenders who participated in the evidence-based program with offenders who did not participate.
2) *Criminal justice system response.* We estimate the criminal justice system's response to crime and the resources used when crime occurs. We estimate the volume of crime that comes to the attention of the criminal justice system. Then, in conjunction with the program effect size, we estimate how much crime is avoided and the monetary benefits to taxpayers that result from this avoidance. For criminal justice system resources, such as police, courts, and prison, we estimate the frequency and duration of utilization for each resource affected. For example, if a conviction occurs, we estimate the probability that a certain type of offense (e.g., rape) results in a certain type of sanction (e.g., prison or probation) and the average length of time the sanction will be used.
3) *Crimes in Washington.* We estimate the total crime that occurs in Washington State including both crimes reported and not reported to the police to estimate the true impact of evidence-based programs on crime. To do this, we estimate the total number of crimes that occur in Washington. We scale-up reported crimes to include crimes that do not necessarily result in a conviction, which thus include crimes that were not reported to the police. From this, we estimate the total number of crimes that occur per conviction. This number is used in conjunction with recidivism data from the offender base population described previously to estimate the total number of crimes per conviction.
4) *Costs.* Costs for criminal justice system resources, victimization costs, and evidence-based program costs are estimated. The amount paid by taxpayers for each significant part of the local and state criminal justice system, such as police and sheriffs, superior courts and county prosecutors, local

juvenile detention facilities, local adult jails, state juvenile rehabilitation, and state adult corrections agencies, were estimated. Marginal operating costs were estimated for these components as well as annualized capital costs, when applicable.

Estimating the Cost of Residential DOSA

To conduct a benefit-cost analysis of residential DOSA, we estimated the cost of residential DOSA relative to the comparison group (those who were sentenced to prison-based DOSA, but eligible for residential DOSA) as shown in Exhibit A6. This cost estimation procedure allows us to use the effect size obtained from the outcome evaluation (in Section A. II of this appendix) to estimate the benefits and costs of residential DOSA.

DOC provided an average cost per participant for residential DOSA, $16,740, which includes the cost of treatment and supervision for the average residential DOSA participant. In addition to this cost, not all participants of residential DOSA successfully complete their sentence and spend some time in confinement. Therefore, WSIPP estimated a cost of $389 per participant for revoked sentences. For this estimation, we only included those sentences that were revoked due to a technical violation since the cost of a revoked sentence, served in concert with a sentence for a new crime, is accounted for in WSIPP's benefit-cost analysis. Thus, it is only necessary to account for the cost of time spent in confinement for technical revocations. The total cost for residential DOSA participants is $16,740.

To estimate the cost per participant for prison-based DOSA, we estimated the cost of confinement in prison at $9,334 per participant for the average sentence. It is important to note that, whenever possible, we estimate the costs for prison-based DOSA offenders who met the eligibility criteria of residential DOSA; not all prison-based DOSA participants. DOC provided a cost for treatment of $2,034 per participant. The cost of supervision in the community once an offender is released from prison is $4,677. The cost of a technical revocation for time in confinement is $227.

Exhibit A6

Cost Per Participant for Residential DOSA and Prison-Based DOSA in 2013 Dollars

Cost per participant	Estimation procedure
Residential DOSA	
$9,488	Cost of supervision (for 516 days)
$6,862	Cost of chemical dependency treatment
$389	Cost of a revocation for technical violations (average of 7 days of confinement for the total residential DOSA group)
$16,740	**TOTAL cost per residential DOSA participant**
Prison-based DOSA#	
$9,237	Cost of confinement (for 160 days in prison)
$2,034	Cost of chemical dependency treatment
$4,677	Cost of supervision (half the midpoint of the standard range for this group was 252 days)
$227	Cost of a revocation for technical violations (average of 4 days of confinement for the total prison-based DOSA group)
$16,176	**TOTAL cost per prison-based DOSA participant#**

Notes: All confinement costs include operating and capital costs for prison estimated at $58 per day.
We estimate the cost of prison-based DOSA for our comparison group in Section II of this report. Thus, this cost estimate is an approximation of those prison-based DOSA offenders who also meet the eligibility criteria for residential DOSA; not a cost estimate for all prison-based DOSA offenders.

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