NEW MEXICO Sentencing Commission

THE UNIVERSITY OF NEW MEXICO

A Discussion with Dr. Brady Horn on the Cost-effectiveness of Jail-based Methadone Maintenance Treatment

Brady Horn, PhD
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NEW MEXICO Sentencing Commission

Our Guest, Dr. Brady Horn

Dr. Horn is an applied micro-economist with a focus in public economics and applied econometrics. A large portion of his research is dedicated to evaluating applied health programs, and he is particularly interested in the safety-net and disadvantaged populations. As a researcher in New Mexico, there are many important and complicated health issues, including crime, substance use disorder, and health disparities. To address these issues Dr. Horn has worked with researchers from many other disciplines including law, psychology, medicine, and criminal justice to better understand how safety-net programs can be best used to improve health and reduce disparities. Dr. Horn has published a wide range of papers evaluating the economic impact of many safety-net intervention programs. He is also interested in the impact of laws and policies used to mitigate risky health behavior, and how these laws can sometimes have secondary impacts and/or unintended consequences.

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The Paper

Brady P. Horn, Xiaoxue Li, Barbara McCrady, Paul Guerin, Michael T. French. Cost-effectiveness analysis of a large jail-based methadone maintenance treatment continuation program in New Mexico. *Journal of Substance Abuse Treatment, Volume 115, 2020,108042.* 1 Aug, 2020. ISSN 0740-5472. https://doi.org/10.1016/j.jsat.2020.108042.

Please email Dr. Horn or NMSC for a copy of the paper.

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Journal of Substance Abuse Treatment 115 (2020) 108042

Contents lists available at ScienceDirect

Journal of Substance Abuse Treatment

journal homepage: www.elsevier.com/locate/jsat

Cost-effectiveness analysis of a large jail-based methadone maintenance treatment continuation program in New Mexico

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ARTICLE INFO

JEL classification:
H42
H43
I12

Keywords:
Opioid use disorder
Methadone maintenance
Cost-effectiveness analysis
Jail
Recidivism

ABSTRACT

The U.S. has the second-highest incarceration rate in the world and spends more than $80 billion annually to house inmates. The clinical research literature suggests that methadone maintenance treatment (MMT) is an effective method to treat opioid use disorders (OUD) and that jails are a potentially valuable environment to implement MMT. Currently, jail-based MMT is rarely implemented in practice, due in part to resource limitations and other economic considerations. The primary goal of this study was to perform a cost-effectiveness analysis (CEA) of jail-based MMT using data from a unique MMT continuation program located in a large urban jail in New Mexico. Recidivism data were collected for a three-year period both before and after incarceration, and quasi-control groups were constructed from both substance-using and general populations within the jail. Base models show that inmates enrolled in jail-based MMT exhibited significantly fewer days of incarceration due to recidivism (29.33) than a group of inmates with OUDs who did not receive MMT. Economic estimates indicate that it cost significantly less ($23.49) to reduce an incarcerated day using jail-based MMT than incarceration per se ($116.49). To mitigate potential sample selection bias, we used both propensity-score-matching and difference-in-differences estimators, which provided comparable estimates when using the OUD non-MMT comparison group. Difference-in-differences models find that, on average, MMT reduced recidivism by 24.80 days and it cost $27.78 to reduce an incarcerated day using jail-based MMT. Assuming a willingness to pay threshold of the break-even cost of reducing one incarcerated day, we estimate a 93.3% probability that this MMT program is cost-effective. Results were not as strong or consistent when using other comparison groups (e.g., alcohol-detoxified and general-population inmates). Overall, results suggest that it costs substantially less to provide jail-based MMT than incarceration alone. Jail administrators and policymakers should consider incorporating MMT in other jail systems and settings.

Robert Wood Johnson Foundation | Center for Health Policy at the University of New Mexico

THE UNIVERSITY of NEW MEXICO CASAA

The Economic Impact of Jail-Based Medication Assisted Treatment: A Cost-Effectiveness Analysis of a Large Jail-Based Methadone Maintenance Treatment Program in New Mexico

Brady P. Horn[a,b*], Xiaoxue Li[a], Paul Guerin[c], Barbara McCrady[b] and Michael T. French[d]

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[b]*Center on Alcoholism, Substance Abuse, and Addictions (CASAA), University of New Mexico*

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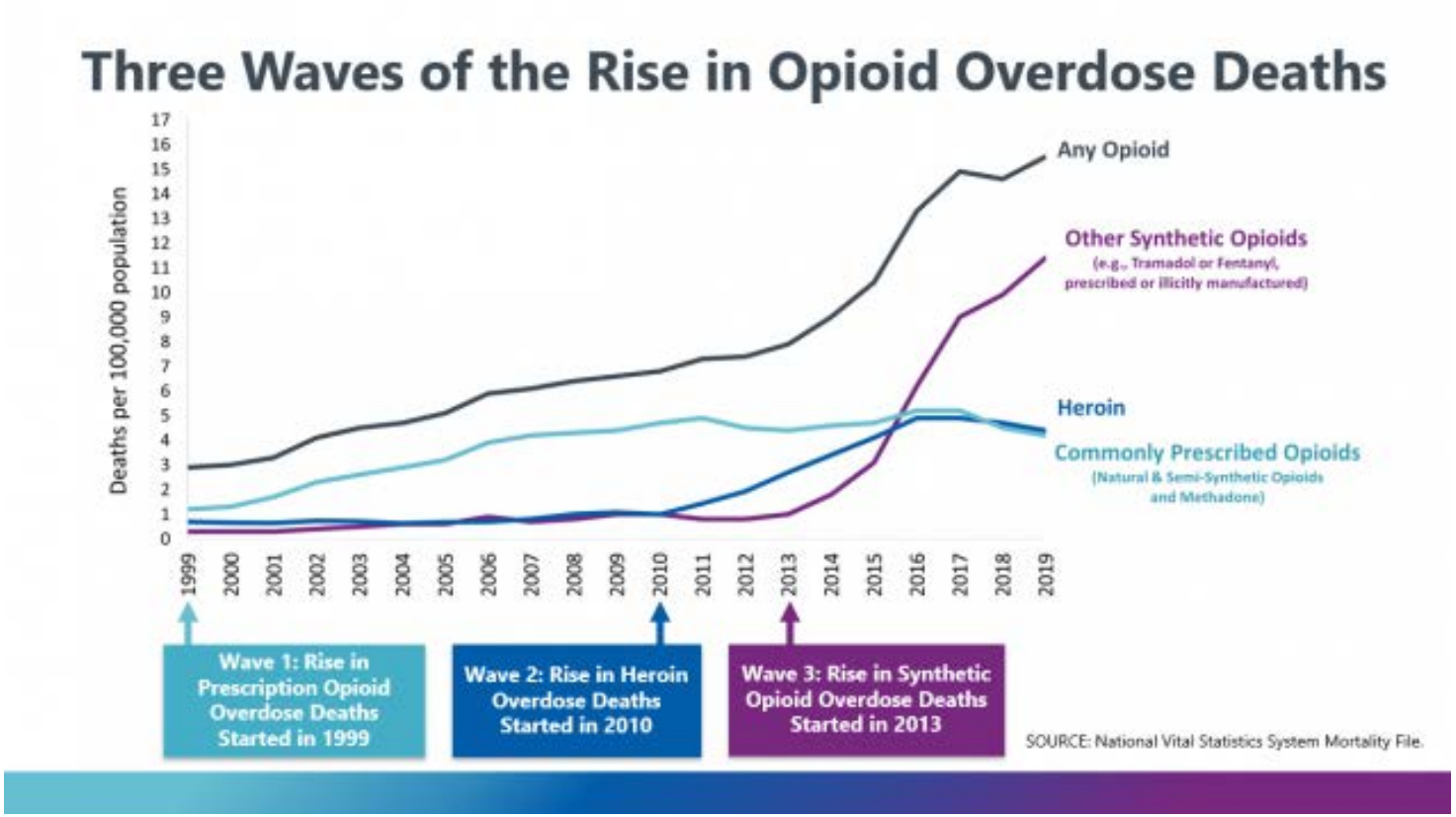
Financial support: provided by the National Institute on Drug Abuse (R21DA040819).

UNM

Background on Substance Use Disorders

- **Chronic Mental Health Disorder** in which the use of alcohol and/or drugs causes significant impairment - such as health problems, disability, and failure to meet major responsibilities at work, school, or home (SAMPSA)
  - DSM–5 criteria ≈ tolerance, craving/inability to quit, negative consequences
- **Prevalent**: in 2015, 22 million U.S. residents (8.2% of the population) met diagnostic criteria for SUDS (CBHSQ, 2016)
  - An even higher percentage engage in risky substance misuse such as binge drinking, heavy drinking, and nonmedical use of prescription drugs
- **Costly:** hinders overall health, employment outcomes, financial stability, and relationships.
  - Excessive alcohol use causes 88,000 deaths per year (CDC, 2017)
  - 480,000 deaths a year are caused by cigarette smoking (CDC, 2017)
  - The cost of addiction in the U.S. are over $519 billion (Kasunic & Lee, 2014)

Background on Substance Use Disorders



Background on Substance Use Disorders

Just how bad is the opioid epidemic?

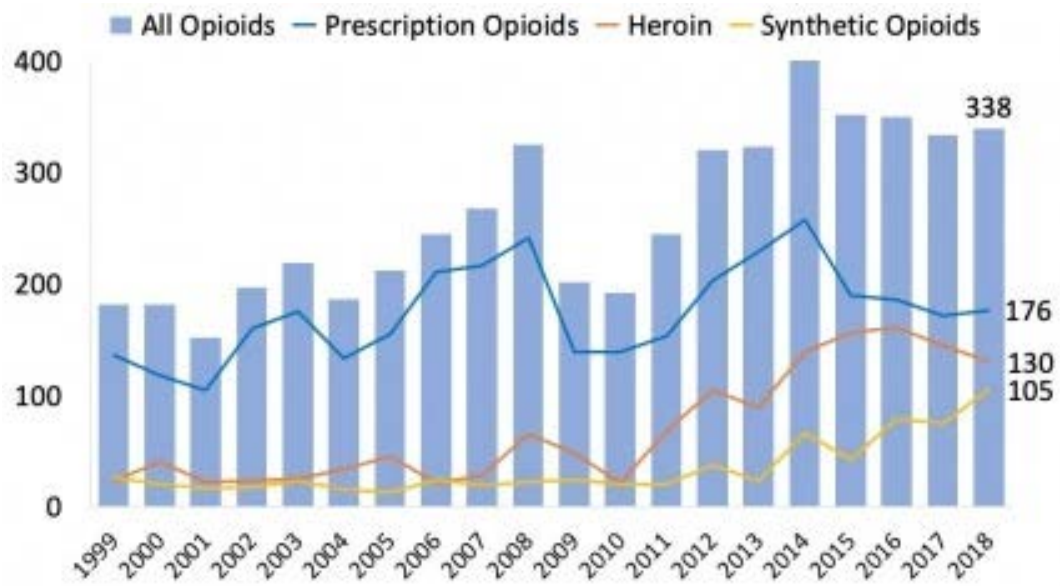
- Drug overdoses are the leading cause of death for Americans under 50
- Cause more deaths (70,630 in 2019) than many well-documented societal problems:
    - HIV/AIDS at its peak (50,806 in 1995), gun deaths at their peak (39,773 in 2017), drinking and driving at its peak (26,172 in 1982)
    - All car crashes fatalities in 2016 (37,461), the entire Vietnam War (58,222 Americans)

✓ *Drug overdose death estimates obtained from NIDA's drugabuse.gov; HIV mortality estimates obtained from hivinsite.ucsf.edu; gun deaths mortality estimates obtained from CDC wonder database; drinking and driving mortality estimates obtained from https://pubs.niaaa.nih.gov/publications/arh27-1/63-78.htm; car crash fatality estimates obtained from NHSTA; Vietnam war fatality estimates obtained from https://www.archives.gov/research/military/vietnam-war/casualty-statistics*

Background on Substance Use Disorders

Substance Use Disorders in New Mexico

- The annual economic cost of alcohol consumption in New Mexico is $2.2 billion (Sacks et al., 2015)
  - $1,084 per New Mexican or $2.77 per drink consumed in New Mexico
  - As of 2010, New Mexico ranked highest of all US states for cost per drink consumed
- Drug overdose rate is 30.2 per 100,000, which is 10th highest in the nation (CDC)



Number of drug overdose deaths in New Mexico Source: CDC WONDER

Background on Substance Use Disorders

<u>What does economics have to do with substance use disorders?</u>

- The goal of economics is to create the greatest amount of good possible with limited resources
  - Many times, budgets are limited. Thus, there is a tradeoff between more expensive more clinically effective interventions and cheaper interventions that can reach more people
- Understanding the (overall) societal impact of SUD treatment
  - If treatment is found to have a large impact on society it provides a strong argument that the amount of money (resources) that we allocate to treatment should be increased
- A large economic literature finds that substance use disorder treatment had a considerably and positive economics impact (Doran, 2008; French & Drummond, 2005; McCollister et al., 2003; Schori, 2011)
  - Major categories studies by economists: crime, employment/productivity, healthcare utilization

The Economic Cost of Crime

- The costs of substance use disorders in the US is estimated to be as high as $544 billion (Caulkins, Kasunic, & Lee 2014)
  - *opioid use disorders*: increased seven-fold since 1999; economic cost estimated at almost $80 billion annually (Florence et al. 2016)
- There are also substantial economic cost of crime in the US
  - Close to one in 100 adults are behind bars (Carson & Anderson 2016)
  - The cost of crime has been estimated to be as high as $1.7 trillion annually (Anderson 1999, Anderson 2011)
    - *Large recidivism rate:* Bureau of Justice Statistics study found re-arrest rates to be 56.7% for one year, 67.8% for three years, and 76.6% for five years
    - *Crime costs are substantial:* murder $10 million; rape $270,000; aggravated assault $120,000; imprisonment $24,000 (McCollister et al., 2017)
- Correlation between SUDs and crime (causal linkage unclear)
  - Half of prisoners meet criteria for drug dependence
  - Substance dependent prisoners are more likely to have extensive criminal records (Nunn et al. 2009)

Incarceration-Based Substance Use Disorder Treatment

How can we mitigate substance use disorders and crime?

- Incarceration-based substance use disorder treatment
  - Treatment within incarceration systems may "catch" more individuals that were not receiving community-based treatment (thus improving health, happiness, etc.)
  - These programs may also produce societal benefits (e.g., reduced crime, emergency department utilization etc.)

What has the prior economic literature found?

- Overall, substance use disorder treatment has been found to be very effective from an economic perspective
  - SUD treatment reduces substance use, improves health and reduces criminal activity (Campbell, Deck, & Krupski, 2007; Perry et al., 2014).
  - For every dollar spent on SUDs treatment, between $4 and $7 are returned in benefits (NIDA)
- SUD treatment is rarely implemented in U.S. criminal justice systems
  - Very little is known about the economic impact of MOUDs, especially for criminal justice populations (Settumba, Chambers, Shanahan, Schofield, & Butler, 2018).
  - Recent work is beginning to find that incarceration-based SUD treatment is effective in reducing post-release drug use and crime (Hedrich et al., 2012; Malta et al., 2019; Schwartz et al., 2009; Schwartz et al., 2017).

Our Study

In our paper we studied the Jail-Based MMT at the Bernalillo County Metropolitan Detention Center (MDC)

- A Methadone maintenance treatment program has operated as a public health clinic within the MDC since 2005
  - MDC is one of the fifty largest jails in the US and releases approximately 25,000 inmates per year
- At the time of this study the program only provided MMT to inmates that had been receiving treatment prior to incarceration
  - In 2019, 1,955 inmates participated in the MDC MMT program
  - Inmates are identified through a medical screening upon admission
  - Currently, the program is starting to initiate inmates on MMT as well (we are currently collecting data on this)
- 3-year (pre and post) crime information was collected for inmates between July 1, 2011 and December 31, 2011
  - 228 inmates received MMT during this period
  - Multiple comparison groups: opioid detoxified inmates (n=358), alcohol detoxified inmates (n=369), general population inmates (n=545)

Methods

- **Economic cost analysis:** evaluating the average cost of treatment per person (or per treatment week)
  - The DATCAP survey instrument (standardized costing software) was used to evaluate the costs of personnel, supplies and materials, contracted services, buildings and facilities, and equipment
- **Economic benefits:** while there are many potential benefits associated with effective SUD treatment, in this study we limited our analysis reductions in recidivism
  - We collected 3 years of recidivism data for MMT group and all 3 comparison groups
  - We also collected 3 years or incarceration data before the indexed incarceration event
- **Cost-effectiveness analysis**: compares program costs with reductions in recidivism

$$CER = \frac{C_{MMT}}{E_{control} - E_{MMT}}$$

- C_{MMT} ~ per-inmate cost of treatment
- $E_{control} - E_{MMT}$ ~ difference in recidivism days between the MMT and comparison group

✓ So, what you will get from this analysis is the dollar amount it will cost to reduce a recidivism day using jail-based MMT
  - For reference the average cost of an incarceration day at the MDC is $116.49

Results

Table 1. Annual Cost Estimates for the Jail-Based MDC MMT Program

		Quantity	Unit cost ($)	Total cost ($)	Share of total cost (%)
Personnel	Nurse	6240 (hrs)	$24.33[1]	$151,819	38.44%
	Counselor	2280 (hrs)	$15.00	$34,200	8.66%
	Pharmacist	1000 (hrs)	$50.00	$50,000	12.66%
	Director	1060 (hrs)	$23.08	$24,465	6.19%
	Physician	525 (hrs)	$40.00	$21,000	5.32%
	Accountant	95 (hrs)	$30.00	$2,835	0.72%
	Other personnel			$43,825	11.10%
Buildings and facilities	Lease/rental costs for program spaces	900 (sqft)	$15.58[2]	$14,022	3.55%
	Repairs and Maintenance	900 (sqft)	$1.23[2]	$1,105	0.28%
	Electricity	900 (sqft)	$1.93[2]	$1,737	0.44%
	Water and Sewer	900 (sqft)	$0.34[2]	$308	0.08%
	Telephone/Internet			$821	0.21%
Equipment and services	Supplies and materials			$40,177	10.17%
	Laboratory Services			$5,339	1.35%
	Computers	2	$200[3]	$400	0.10%
	Safe	1	$150[4]	$150	0.04%
	Printers	2	$50[3]	$100	0.03%
Miscellaneous resources				$2,621	0.66%
Total annual program cost				**$394,924**	**100%**

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Table 2. Client Case flows and Average Economic Costs

Average length of stay (weeks)	6
Average daily census (clients)	66
Average (per client) weekly economic cost ($)	$115
Total economic cost for an average treatment episode ($)[1]	$689

[1] To generate total economic cost for an average treatment episode, average weekly economic cost is multiplied by average length of stay.

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Results

Table 1. Summary statistics

	MMT (n=228)	Opioid no methadone (n=358)	Alcohol detoxified (n=369)	General population (n=545)	Total sample (n=1,500)
Demographics					
Male	156 (68.42%)	250 (69.83%)	272 (73.71%)	422 (77.43%)	1,100 (73.33%)
Age	34.63	33.10	39.90	35.29	35.80
African American	8 (3.51%)	15 (4.19%)	18 (4.88%)	34 (6.24%)	75 (5.00%)
Native American	17 (7.46%)	39 (10.89%)	97 (26.29%)	70 (12.84%)	223 (14.87%)
Hispanic	145 (63.60%)	204 (56.98%)	159 (43.09%)	290 (53.21%)	798 (53.20%)
Non-Hispanic White	53 (23.25%)	92 (25.70%)	84 (22.76%)	132 (24.22%)	361 (24.07%)
Other	5 (2.20%)	8 (2.23%)	11 (2.98%)	19 (3.49%)	43 (2.87%)
Criminal justice measures					
Prior Arrests	3.23	3.11	3.96	2.30	3.04
Prior incarcerated days	85.21	89.73	114.31	61.74	84.92
Duration of jail stay	51.38	41.05	30.95	46.50	42.12

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Table 3. Post-intervention cost-effectiveness results

	Mean post-intervention incarcerated days	Difference from MMT[1]	Cost-effectiveness ratio
MMT	105.74		
Opioid no methadone	135.07	29.33***	$23.49
Alcohol	126.80	21.06**	$32.72
General population	90.71	-15.03	-
All comparison groups	113.66	7.92	$86.99

[1] Statistical difference from methadone group is tested using a Wilcoxon rank-sum (Mann-Whitney) test. Cost effectiveness ratios are calculated using 2011 dollars.

* indicates significance at the .10 level, ** indicates significance at the .05 level, and *** indicates significance at the .01 level.

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Results

Table 4
DD cost-effectiveness results.

	Pre	Post	DD[a]	Cost-effectiveness ratio
MMT	85.21	105.74		
OUD no MMT	89.73	135.07	24.80**	$27.78
Alcohol detoxified	114.31	126.80	−8.04	–
General population	61.74	90.71	8.43**	$81.73
Aggregated comparison group	84.87	113.66***	8.26*	$83.41

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Table 5
PSM cost-effectiveness results.

	Difference from MMT	Cost-effectiveness ratio
I. Nearest neighbors[a]		
OUD no MMT	39.82**	$17.30
Alcohol detoxified	13.08*	$52.68
General population	5.54	$124.38
Aggregated comparison group	25.25	$27.29
II. Radius[b]		
OUD no MMT	37.63**	$18.31
Alcohol detoxified	4.28	$160.99
General population	8.75	$78.74
Aggregated comparison group	14.23	$48.42
III. Kernel		
OUD no MMT	40.47***	$17.02
Alcohol detoxified	3.41	$201.90
General population	12.80	$53.84
Aggregated comparison group	17.69	$38.96
IV. Stratification		
OUD no MMT	41.22**	$16.72
Alcohol detoxified	4.90	$140.61
General population	1.78	$386.43
Aggregated comparison group	17.72	$38.87

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Results

93.3%

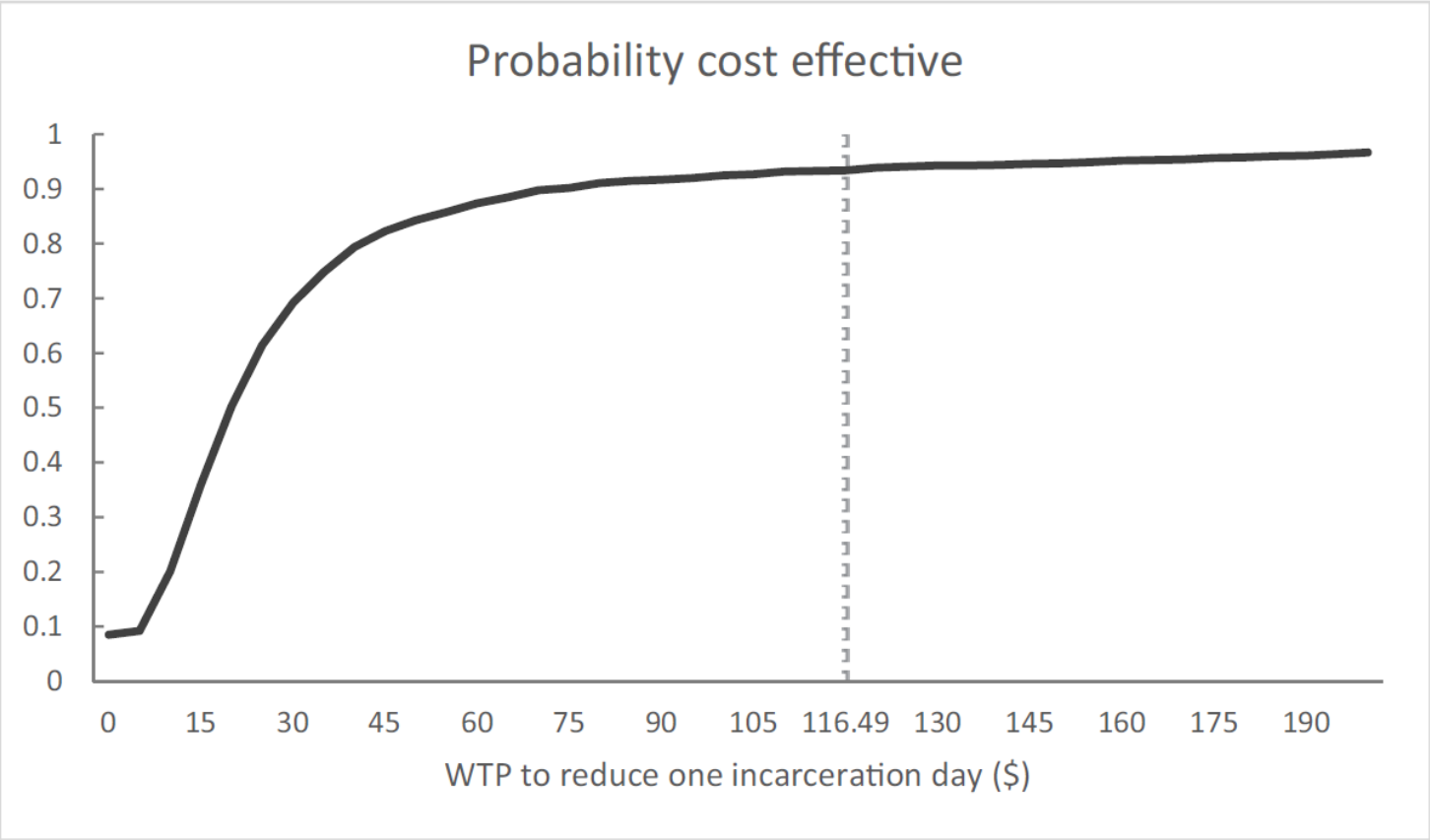

Fig. 2. Cost-effectiveness acceptability curve (CEAC) for reduced incarcerated days.

Discussion/Conclusion

- Substance use disorders hinder many aspects of individuals lives including health, employment, financial stability, and relationships. They also are associated with tremendous economics costs to New Mexico and United States
- One solution is incarceration-based substance use disorder treatment. However, treatment within incarceration is infrequently utilized, in part because little is known about the economic aspects of these programs
- In our paper we studied the MDC MMT program and found that it is associated with **lower recidivism** days and is **cost effective**
  - Compared with the opioid detoxification control: 29.33 (DD = 24.80) fewer recidivism days, cost-effectiveness ratio $23.49 (DD = $27.78)
    - An incarceration day in the MDC is estimated to cost $116.49
    - Results are robust to numerous different robustness checks and modeling specifications
- Thus, our results suggest that the MDC MMT program is valuable from an economic perspective
- Future work is needed to study jail-based MMT:
  - Utilizing a randomized design
  - From a (broader) societal perspective (including the societal cost of crime)
  - In other populations/ jail systems (generalizability)
  - MMT initiation rather than continuation

Thanks!

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THE UNIVERSITY of NEW MEXICO
CASAA

Robert Wood Johnson Foundation
Center for Health Policy
at the University of New Mexico

The question:

Is it cost-effective to treat OUDs with MOUDs in prisons and jails, and does treatment decrease future drug use and criminal activity?

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What implications does this study have for other jails and prisons?

What else is happening in substance use treatment research in New Mexico?

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Questions?

Next webinar: Wednesday, May 19, 2021
Topic: Competency and Behavioral Health

Registration link:
https://unm.zoom.us/webinar/register/WN_bfhZZxdkQaqqDe5Il4XSiQ

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Citations:

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