Does Harm Reduction Reduce Harms? Overdose Evidence from Oregon's Measure 110

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Abstract

Drug overdose is the leading cause of death among 18-45 year olds in the United States (Families Against Fentanyl, 2021) and the eighth leading cause of death (unconditionally) overall (Center for Disease Control and Prevention, 2024). The majority of these deaths are attributed to synthetic opioids. Synthetic opioids define the third wave of an opioid epidemic that has persisted for three decades (Ciccarone, 2019). As usage patterns among people who use drugs (PWUD) evolved, healthcare providers also adapted their strategies for treating and preventing substance use disorders. Advocates for people who use drugs consistently employ harm reduction strategies. Approaches such as increased access to Medication-Assisted-Treatments (MAT), naloxone access, and syringe exchange programs have become popular policy choices in response to the overdose epidemic. We study a less popular policy choice: drug possession decriminalization. We estimate the impact of decriminalization on the fatal overdose rate in the context of Oregon's Measure 110 (M110). Enacted in February of 2021, M110 intended to reduce racial inequities within the incarceration system via the decriminalization of the possession of small amounts of drugs. While certainly successful in reducing arrests for drug possession Davis et al. (2023), we estimate the long-term effect of the policy's passing on a possible externality of the policy - fatal overdose.

Our primary analysis employs the synthetic control method (SCM). The SCM is favored for its capacity to construct a counterfactual in case studies lacking a clear control group and for its transparency and reproducibility (Abadie et al., 2010, Félix et al., 2017). The latter is particularly important in the context of the "replication crisis" which has impacted the credibility of social science research from health sciences to economics (Chang and Li, 2015, Camerer et al., 2018, Hillary and Medaglia, 2020). As a result of the linear factor model assumption, the SCM outputs a vector ω_j of optimally chosen weights observable to the practitioner; these weights may act as a compass to ensure that an individual is properly replicating an original study's design. Divergent results from two studies, Joshi et al. (2023) and Spencer (2023), which used the same data source

and model design, highlight the importance of replication in understanding how researcher decisions impact final conclusions. This is especially crucial in research designs intended to be transparent and agnostic about counterfactual selection, such as the one employed in this study.

We first replicate both Spencer (2023) and Joshi et al. (2023) to understand the differences between the studies. Both papers use preliminary mortality data from the Centers for Disease Control and Prevention's WONDER system (Center for Disease Control and Prevention, National Center for Health Statistics, 2021), covering the period from early 2018 to late 2021, reported on a monthly basis. Additionally, both studies match only on outcome.

We identify three primary sources of divergence between the studies: (1) the definition of overdose used (Spencer considers unintentional overdose deaths with ICD-10 codes X40-44, whereas Joshi et al. include all overdose deaths), (2) the level of dataset access (Spencer, like our study, is restricted, with state-by-month observations suppressed when there are fewer than ten overdose deaths, leading to imputation of missing data), and (3) timing convention (Spencer considers January 2021 as the start time of treatment[1]). Using minimum detectable effects analysis[2], we find that the difference in overdose definitions explains the short-run significance differences. Furthermore, through Monte Carlo simulation, we determine that imputing missing values affects the point estimate.

Upon replicating both early studies and validating our own short-run counterfactual weights, we extend the analyses through November 2023. We find a significant increase in overdose deaths attributable to the implementation of M110, regardless of the specification used—whether applying the original specifications from either author or a combination of both. The Average Treatment Effect on the Treated (ATT) results are summarized in Table 1. Our primary findings (shown in the top row) indicate an increase of over 1,000 additional overdose deaths in Oregon since the policy's implementation, representing approximately 14% of the total overdose deaths during this period.

Our main result aligns with theoretical literature but contradicts findings from studies on Portugal's decriminalization policy. According to Becker et al. (2004), if individuals internalize the cost of incarceration, decriminalizing drug use would reduce the price of the drug (considered a normal good) and thereby increase its consumption. The impact on both the number of users and the amount consumed varies depending on demand elasticities. Bretteville-Jensen (2010) estimates that legalizing drugs would lead to an increase in both the number of users and the quan-

[1]We note that this seems to be an error in coding rather than an intentional decision to account for anticipation effects.

[2]Synthetic control methods do not typically lend themselves to conventional power calculations due to their reliance on permutation-based inference. We initially estimated synthetic control models through the end of 2018, matching on lagged outcomes, and used 2019 as a placebo period for Oregon to assess power. In our initial tests for treatment effects, we failed to reject the null hypothesis—consistent with the absence of treatment during this period—and the estimated Average Treatment Effect on the Treated (ATT) was effectively zero. We then adjusted Oregon's outcomes for 2019 until we were able to reject the null hypothesis based on permutation tests.

tity consumed. However, empirical evidence has been constrained by the limited willingness of municipalities to experiment with decriminalization; so much of the early evidence relies on Portugal's 2001 decriminalization policy. Félix et al. (2017) report a decrease in overdose deaths attributable to this policy, with the effects being observed in the long term.

Further research is needed to identify the specific aspects of M110 responsible for the increase in overdose rates. We are examining elements of the policy that might influence both the supply of illicit substances entering Oregon and the demand for those substances. Preliminary results suggest that several supply-side factors contributed to the rise in overdoses, including a lack of preparedness for the fentanyl crisis[3] and insufficient support from law enforcement officials (Smiley-McDonald et al., 2023). Additionally, increased funding for drug treatment providers was allocated more than a year after M110's implementation, exacerbating the pre-existing shortage of treatment services (Public Consulting Group LLC, 2024). Although Oregon has since voted to recriminalize drug possession (Representative Jason Kropf and Senator Kate Lieber, 2024), our estimates and analysis of the mechanisms involved offer policymakers valuable insights into the requirements for successful decriminalization.

[3]Possession of fentanyl and other synthetic opioids, substances known for having a higher potency than its natural counterparts, were given the same restrictions on possession amount as heroin. This was not changed until June of 2023 via HB2645 (Boshart Davis et al., 2023).

	Spencer (2023)		Joshi et al. (2023)	
ATT Overall	0.811***	0.729***	0.77***	0.728***
P-Val	{0.02}	{0.02}	{0.02}	{0.02}
ATT 2021	0.413**	0.332**	0.304	0.215
P-Val	{0.02}	{0.04}	{0.1}	{0.26}
ATT 2022	0.636**	0.51**	0.613**	0.563**
P-Val	{0.02}	{0.04}	{0.02}	{0.02}
ATT Jan-Nov 2023	1.436**	1.365**	1.449**	1.42**
P-Val	{0.02}	{0.02}	{0.02}	{0.02}
Treatment	Jan	Feb	Jan	Feb

* P-val < 0.1; ** P-val < 0.05; *** P-val < 0.01

Table 1: Extension: Synthetic Control Estimate for Oregon, Include Longer Post-treatment Period

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