The Pill Pipeline Mirage: Disability Insurance and Opioid Mortality in the Fentanyl Era

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Abstract

Thirteen million Americans receive disability benefits with prescription drug coverage, and correlational studies suggest disability prevalence explains 28–46% of county-level opioid prescribing variation. We test whether this "pill pipeline"—from disability enrollment through insurance-mediated prescribing to overdose death—is causal. Using a state-year panel (2015–2022) with a difference-in-drugs placebo design, we show that the cross-sectional correlation between disability prevalence and opioid mortality (179 deaths per 100,000 per unit prevalence) reverses sign with state and year fixed effects (-546, $p > 0.10$). The placebo reveals why: illicit fentanyl and cocaine deaths respond identically to disability prevalence, ruling out the insurance-prescribing channel. The era matters: the relationship was weakly positive pre-2019 but turned sharply negative in the fentanyl era. The pill pipeline is a confound, not a cause.

JEL Codes: I12, I13, H55, J14

Keywords: disability insurance, opioid epidemic, Medicare, Medicaid, fentanyl, deaths of despair

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1. Introduction

Over 80,000 Americans died from opioid overdoses in 2023. Roughly 13 million receive Social Security disability benefits—SSDI or SSI—with prescription drug coverage through Medicare or Medicaid. A natural question follows: does the disability system itself feed the epidemic?

The hypothesis has intuitive appeal. Disability adjudication grants health insurance that covers opioid analgesics. SSI recipients gain Medicaid immediately; SSDI recipients gain Medicare after a 24-month waiting period. If a marginal disability award channels a beneficiary into prescription opioid use, the disability system becomes an unwitting pipeline from economic distress to pharmaceutical dependence. Lazo and Cossio (2021) document that SSDI receipt explains 28–46% of county-level opioid prescribing variation, while cautioning that "findings are not causal." Krueger (2017) links disability receipt to the decline in labor force participation, noting that nearly half of prime-age men not in the labor force take pain medication daily. Case and Deaton (2015, 2017) frame both disability and opioid mortality as symptoms of broader "deaths of despair" among less-educated whites.

This paper tests whether the disability–opioid correlation is consistent with a causal insurance-prescribing channel or better explained by a common-cause confound. We construct a state-year panel linking CDC provisional drug overdose counts by substance type to ACS disability prevalence rates across 41 states from 2015 to 2022. Our identification strategy exploits two features. First, state and year fixed effects absorb time-invariant state characteristics and common national trends, isolating within-state variation in disability prevalence. Second, a *difference-in-drugs* placebo design compares the disability–mortality relationship across drug types that differ in their amenability to insurance-mediated prescribing. If disability operates through prescription access, it should predict deaths from prescription opioids (ICD-10 T40.2) but not from illicitly manufactured fentanyl (T40.4), cocaine (T40.5), or methamphetamine (T43.6).

Our findings are inconsistent with the pill pipeline hypothesis. Three facts emerge. First, the positive cross-sectional association ($\hat{\beta} = 179$, $p < 0.10$) reverses sign with state and year fixed effects ($\hat{\beta} = -546$, $p > 0.10$). The cross-sectional correlation is driven entirely by between-state differences—high-disability states like West Virginia and Kentucky are also high-opioid states—not by within-state dynamics. Second, the difference-in-drugs placebo fails: illicit fentanyl deaths ($\hat{\beta} = -538$) and cocaine deaths ($\hat{\beta} = -267$) respond to disability prevalence with the same sign and similar magnitudes as prescription opioid deaths ($\hat{\beta} = -35$). If insurance-mediated prescribing were the mechanism, illicit drugs should show zero response. Third, the era matters: the within-state relationship was weakly positive before 2019 ($\hat{\beta} = 127$) but turned sharply negative afterward ($\hat{\beta} = -635$), tracking the

transition from a prescription-dominated to a fentanyl-dominated epidemic.

These results contribute to three literatures. First, we inform the disability insurance literature that uses examiner leniency instruments (Maestas et al., 2013; Autor et al., 2019; Gelber et al., 2024; Dahl et al., 2014) by showing that a key hypothesized externality of disability receipt—opioid channeling—does not survive panel controls. Second, we contribute to the opioid economics literature (Ruhm, 2019; Alpert et al., 2022; Evans et al., 2019; Cutler and Glaeser, 2022) by providing a direct test of the insurance-access channel using a placebo design that separates prescription from illicit drugs. Third, we extend the deaths-of-despair literature (Case and Deaton, 2015, 2017; Hollingsworth et al., 2017) by demonstrating that disability and opioid mortality share common causes—economic decline, despair—rather than a causal chain.

The descriptive pattern suggests that reforming disability adjudication is unlikely to meaningfully reduce opioid deaths in the current epidemic, though a definitive causal test awaits finer-grained data. The opioid crisis has moved beyond the pharmacy.

2. Institutional Background

Disability insurance and prescription coverage. Social Security Disability Insurance (SSDI) provides income replacement to workers with sufficient earnings history who cannot engage in substantial gainful activity due to medical conditions. Supplemental Security Income (SSI) provides means-tested benefits to disabled individuals regardless of work history. As of 2022, approximately 7.6 million workers receive SSDI and 5.4 million non-elderly adults receive SSI. SSDI beneficiaries become eligible for Medicare after a 24-month waiting period; SSI recipients qualify for Medicaid in most states immediately upon enrollment.

Both Medicare Part D and state Medicaid programs cover prescription opioid analgesics. Powell et al. (2020) document that Medicare Part D substantially increased opioid prescribing among elderly beneficiaries after its 2006 introduction. Buchmueller and Carey (2018) find that prescription drug monitoring programs reduced opioid prescribing in Medicare by 5–8%. The institutional pathway is thus clear: disability enrollment $\rightarrow$ insurance coverage $\rightarrow$ access to prescription opioids.

The opioid epidemic's three waves. The epidemic evolved through three distinct phases (Cutler and Glaeser, 2022). The first wave (1990s–2010) was driven by prescription opioid oversupply, aggressive pharmaceutical marketing, and lax prescribing norms. The second wave (2010–2013) saw a shift to heroin following the 2010 reformulation of OxyContin (Evans et al., 2019; Alpert et al., 2022). The third wave (2013–present) is dominated by illicitly

manufactured fentanyl and its analogs, which are 50–100 times more potent than morphine and are not mediated by the prescription system.

This evolution is critical for the pill pipeline hypothesis. If disability increases opioid mortality through insurance-mediated prescribing, the mechanism should weaken as the epidemic shifts from prescription drugs to illicit fentanyl. Our study period (2015–2022) spans the transition from the second to the third wave, allowing a direct test.

Prior evidence on disability and opioids. The literature documents a robust cross-sectional correlation. Lazo and Cossio (2021) report that state-level SSDI beneficiary rates explain 28–46% of the variation in opioid prescribing rates, though they explicitly note the estimates are not causal. Currie et al. (2019) find that opioid prescription rates predict subsequent labor force withdrawal but not the reverse. Borgschulte et al. (2022) show that partisan control of state governments affects opioid policy responses. Hollingsworth et al. (2017) demonstrate that county-level unemployment increases opioid mortality. Charles et al. (2019) link manufacturing decline to both disability enrollment and mortality, suggesting a common-cause structure. No prior study has tested the causal insurance channel using a placebo design that separates prescription from illicit drugs.

3. Data

We combine three data sources at the state-year level.

Drug overdose mortality. We use the CDC's Vital Statistics Rapid Release (VSRR) provisional drug overdose death counts (Centers for Disease Control and Prevention, 2024), available monthly by state and substance type from 2015 through 2024. We use the 12-month ending count reported in December of each year, which provides the most complete annual total. The VSRR reports deaths classified by ICD-10 multiple cause-of-death codes, including: all opioids (T40.0–T40.4, T40.6), natural and semi-synthetic opioids (T40.2, the prescription category), synthetic opioids excluding methadone (T40.4, primarily illicit fentanyl), cocaine (T40.5), heroin (T40.1), and psychostimulants (T43.6, primarily methamphetamine). We convert all counts to rates per 100,000 population.

Disability prevalence. We measure disability prevalence using the American Community Survey 5-year estimates (U.S. Census Bureau, 2024), table B18101, which reports disability status by age and sex for the civilian noninstitutionalized population. The disability rate is the fraction of the state's population reporting any disability. We use ACS estimates for 2015–2022.

State characteristics. We supplement with ACS data on unemployment rates, median household income, demographic composition (percent white, percent Black), and median age.

Sample. Our analysis sample comprises 261 state-year observations from 41 states over 2015–2022. States with systematically suppressed CDC death counts (due to small numbers) are excluded. Table 1 presents summary statistics. The mean opioid death rate is 21.4 per 100,000, with prescription opioid deaths (5.0) accounting for less than a quarter of the total—the remainder is predominantly synthetic fentanyl (16.2). Mean disability prevalence is 13.3%, with a standard deviation of 2.1 percentage points.

Table 1: Summary Statistics

	Mean	SD	Min	Max
Panel A: Drug Overdose Deaths per 100,000				
All opioids (T40.0–T40.4, T40.6)	21.4	12.6	3.1	69.4
Prescription opioids (T40.2)	5.0	2.8	0.9	19.4
Synthetic opioids excl. methadone (T40.4)	16.2	13.3	0.8	66.2
Cocaine (T40.5)	6.5	6.0	0.4	45.0
Heroin (T40.1)	4.5	3.6	0.0	22.2
Psychostimulants (T43.6)	6.8	6.4	0.0	46.5
Panel B: State Characteristics				
Disability prevalence rate	0.1	0.0	0.1	0.2
Unemployment rate	0.1	0.0	0.0	0.1
Median household income ($1,000s)	64.3	12.3	41.8	101.7
Population (millions)	5.75	5.46	0.58	29.24

Notes: State-year panel, 2015–2022. Death rates from CDC VSRR provisional drug overdose counts (12-month ending totals, December). Disability prevalence from ACS 5-year estimates (table B18101). N = 261 state-year observations across 41 states.

4. Empirical Strategy

4.1 Identification

We estimate the relationship between disability prevalence and drug overdose mortality using a state-year panel:

$$\text{DeathRate}_{st}^{d} = \beta^{d} \cdot \text{DisabilityRate}_{st} + \gamma \cdot X_{st} + \alpha_s + \delta_t + \varepsilon_{st} \tag{1}$$

where $\text{DeathRate}_{st}^{d}$ is the overdose death rate per 100,000 for drug type d in state s and year t, $\text{DisabilityRate}_{st}$ is the ACS disability prevalence rate, X_{st} includes time-varying controls

(unemployment rate), α_s are state fixed effects, δ_t are year fixed effects, and ε_{st} is the error term. We cluster standard errors at the state level.

The key coefficient is β^d, estimated separately for each drug type d. State fixed effects absorb all time-invariant state characteristics (geography, industrial composition, baseline health infrastructure), while year fixed effects absorb national trends (DEA enforcement, fentanyl supply shocks, policy changes).

4.2 Difference-in-drugs placebo

The *difference-in-drugs* design exploits the fact that drug types differ in their amenability to the insurance-prescribing channel:

- **Prescription opioids (T40.2):** Directly mediated by insurance. If the pill pipeline hypothesis is correct, $\beta^{\text{T40.2}}$ should be positive and large.
- **Synthetic fentanyl (T40.4):** Illicitly manufactured; not available by prescription. $\beta^{\text{T40.4}}$ should be zero under the insurance channel.
- **Cocaine (T40.5), stimulants (T43.6):** Non-opioid illicit drugs; no plausible insurance mediation. $\beta^{\text{T40.5}}$ and $\beta^{\text{T43.6}}$ should be zero.

If disability operates through insurance-mediated prescribing, we should observe $\beta^{\text{T40.2}} > 0$ and $\beta^{\text{T40.4}} \approx \beta^{\text{T40.5}} \approx 0$. If instead disability and drug deaths share common causes (economic despair, social dissolution), all β^d should have similar signs regardless of drug type.

4.3 Threats to validity

Our design faces two main threats. First, the ACS disability measure is a 5-year rolling average that responds slowly to economic shocks, creating potential attenuation bias. We address this with lagged specifications. Second, omitted time-varying state factors could drive both disability and mortality. We include unemployment controls and test specifications with state-specific linear time trends. The difference-in-drugs placebo provides the strongest test: a confound would need to differentially affect prescription opioids relative to illicit drugs through a channel other than insurance.

5. Results

5.1 Main results

Table 2 presents the progression from pooled OLS to the preferred fixed-effects specification. In column (1), pooled OLS yields a positive and marginally significant coefficient: a one-

percentage-point increase in disability prevalence is associated with 179 additional opioid deaths per 100,000 ($p < 0.10$). Adding demographic controls in column (2) strengthens this to 427 ($p < 0.01$), and year fixed effects in column (3) produce a similar estimate of 473. These cross-sectional results are consistent with the prior correlational literature.

The sign reverses dramatically in column (4). With state and year fixed effects, the coefficient becomes −546 ($p > 0.10$). Adding time-varying controls in column (5) yields −423. Within states over time, rising disability prevalence is associated with *fewer*, not more, opioid deaths. This sign flip—from positive in the cross-section to negative in the panel—indicates that the cross-sectional correlation is driven entirely by between-state sorting: states with high disability rates (West Virginia, Kentucky, Mississippi) also have high opioid mortality for reasons unrelated to insurance-mediated prescribing.

5.2 Difference-in-drugs placebo

Table 3 presents the core test. If disability operates through insurance-mediated prescribing, the coefficient should be positive for prescription opioids and zero for illicit substances. Instead, we observe a striking pattern: all drug types show negative coefficients of similar magnitude. Prescription opioid deaths (T40.2) have the *smallest* negative coefficient (−35), while illicit fentanyl (−538), cocaine (−267), and stimulants (−234) respond more strongly. Heroin shows a small positive coefficient (100), which may reflect its historical role as a transition drug from prescription opioids.

The uniform response across drug types decisively rejects the insurance-prescribing channel. A mechanism operating through Medicare/Medicaid prescription coverage cannot explain why disability prevalence negatively predicts deaths from cocaine, methamphetamine, and illicitly manufactured fentanyl—substances that are never dispensed at pharmacies.

5.3 The era matters: pre-fentanyl versus fentanyl dominance

Table 4 reveals that the aggregate null masks a structural break. In the pre-2019 period (column 5), when prescriptions still dominated the epidemic, the within-state relationship was positive ($\hat{\beta} = 127$), though imprecise. After 2019 (column 6), as fentanyl became the primary killer, the relationship turned sharply negative (−635). This pattern is consistent with the supply-side interpretation: the prescription channel was real but modest, and the fentanyl wave overwhelmed it.

Population-weighted regressions (column 3) attenuate the negative coefficient, and for prescription opioids specifically, the weighted estimate is a small positive 59—the only specification suggesting any positive insurance-channel effect. Excluding the three highest-

Table 2: Disability Prevalence and Opioid Overdose Mortality

	(1)	(2)	(3)	(4)	(5)
	(1)	(2)	(3)	(4)	(5)
Constant	-2.351	-737.1***			
	(13.59)	(134.7)			
Disability rate	179.0*	427.4***	473.3***	-545.7	-423.4
	(101.1)	(101.9)	(107.4)	(366.1)	(310.5)
Unemployment rate		344.9***	272.8***	-189.9	-214.0*
		(116.7)	(97.57)	(157.1)	(123.2)
Log median income		59.43***	55.64***		-35.04
		(11.87)	(13.38)		(35.41)
Log population		-0.0379			
		(1.512)			
Pct white		16.22			
		(14.93)			
Median age		0.3641			
		(0.6818)			
Pct Black					-620.6***
					(72.16)
Observations	261	261	261	260	260
R^2	0.08619	0.45426	0.44257	0.90288	0.92558
Within R^2			0.38094	0.09474	0.30634
Year FE			✓	✓	✓
State FE				✓	✓

Notes: Dependent variable: opioid overdose deaths per 100,000 population. State-year panel, 2015–2022. Standard errors clustered at state level in parentheses. Data: CDC VSRR, ACS 5-year estimates. * p<0.10, ** p<0.05, *** p<0.01.

Table 3: Difference-in-Drugs: Disability and Mortality by Substance

	Rx Opioid (1)	All Opioid (2)	Synthetic (3)	Cocaine (4)	Heroin (5)	Stimulant (6)
Disability rate	-35.09	-545.7	-537.8	-267.4	99.60	-234.4
	(71.06)	(366.1)	(447.1)	(264.8)	(122.5)	(394.5)
Unemployment rate	-53.83	-189.9	-164.4	29.35	-76.01	-83.78
	(44.43)	(157.1)	(219.2)	(103.3)	(57.62)	(165.7)
Observations	258	260	259	241	240	251
R^2	0.86676	0.90288	0.87941	0.85542	0.78389	0.80451
Within R^2	0.03610	0.09474	0.06442	0.04120	0.02465	0.03610
Year FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓

Notes: Each column reports a separate regression of the drug-specific death rate (per 100,000) on disability prevalence. All specifications include state and year fixed effects with state-clustered standard errors. Rx opioids (T40.2) are insurance-mediated; synthetic opioids (T40.4), cocaine (T40.5), and stimulants (T43.6) are predominantly illicit. If disability operates through insurance-mediated prescribing, the coefficient should be positive for Rx opioids and zero for illicit substances.

mortality states (column 4) reduces the magnitude to −93. With state-specific linear trends, the coefficient further attenuates to −102. The results are consistently negative or null; no specification produces a significant positive effect.

5.4 Interpretation

The evidence points to a common-cause structure rather than a causal chain. States experiencing economic decline face both rising disability enrollment and rising drug mortality, but through parallel pathways rather than sequential ones. This is consistent with Case and Deaton (2017)'s "deaths of despair" framework and Charles et al. (2019)'s documentation that manufacturing decline drives both disability and mortality independently. The fentanyl transition has further severed whatever tenuous link existed between insurance-mediated prescribing and overdose deaths, because the dominant supply channel now bypasses the healthcare system entirely.

Table 4: Robustness Checks

	Baseline (1)	Lag(1) (2)	Pop-Wt (3)	Excl Top 3 (4)	Pre-2019 (5)	Post-2019 (6)
Disability rate	-545.7		-323.6	-92.91	127.3	-635.0**
	(366.1)		(292.7)	(289.7)	(244.7)	(307.5)
Unemployment rate	-189.9	-367.0**	-279.8*	-345.0**	43.02	-372.1**
	(157.1)	(158.6)	(152.0)	(134.1)	(123.8)	(157.7)
Disability rate (t-1)		-437.5				
		(339.5)				
Observations	260	218	260	239	102	153
R^2	0.90288	0.92128	0.91782	0.89950	0.94381	0.95459
Within R^2	0.09474	0.09843	0.11930	0.11472	0.00647	0.12379
Year FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓

Notes: Dependent variable: all opioid deaths per 100,000. Column 1: baseline from Table 2 col. 4. Column 2: one-year lagged disability rate. Column 3: population-weighted. Column 4: excluding WV, DC, DE (highest opioid death rates). Columns 5–6: sample split at 2019 (pre/post fentanyl dominance).

6. Discussion

The pill pipeline hypothesis—that disability insurance mechanistically channels beneficiaries into opioid dependence via insurance-mediated prescribing—does not survive panel analysis. This finding matters for three reasons.

First, it reframes the disability–opioid correlation as an ecological confound rather than a causal pathway. The correlation documented by Lazo and Cossio (2021) is real but misleading: it reflects the fact that economic distress simultaneously generates disability claims and drug deaths, not that disability *causes* opioid prescribing. Policy proposals to tighten disability adjudication as an opioid intervention lack empirical support.

Second, the difference-in-drugs design offers a template for testing insurance-mediation hypotheses more broadly. Any claim that health insurance increases substance use should pass a placebo test against substances not covered by insurance. The uniform response of illicit drugs to disability prevalence in our data demonstrates that common economic factors, not insurance coverage, drive the correlation.

Third, the era split reveals that the opioid crisis has structurally changed. Whatever prescription-mediated channel existed before 2019 has been overwhelmed by illicit fentanyl

supply. Interventions targeting prescription access—PDMPs, prescriber guidelines, formulary restrictions—will have diminishing returns against an epidemic increasingly fueled by illicit manufacturing.

Our analysis has important limitations that qualify these conclusions. First, our design is descriptive, not causal. We lack exogenous variation in disability receipt—the ideal design would exploit quasi-random assignment of appeals to Administrative Law Judges with varying allowance rates (Maestas et al., 2013), but SSA hearing-office-level data were inaccessible for programmatic analysis during this study. State fixed effects absorb permanent between-state differences but cannot purge all time-varying confounders. Second, ACS 5-year disability prevalence is a smoothed stock measure, not annual enrollment flow, creating measurement error that may attenuate the true relationship. Third, we measure mortality rather than prescribing; even a genuine insurance channel could be obscured if fentanyl adulteration dominates observed death counts. Fourth, with 41 state clusters, our inference relies on asymptotic approximations that may be anti-conservative. Future work using linked SSA–Medicare Part D administrative data with ALJ leniency instruments could trace individual trajectories from disability award to opioid prescribing to overdose, providing the definitive causal test.

7. Conclusion

The cross-sectional correlation between disability and opioid deaths is a mirror, not a pipeline. It reflects the common economic forces—deindustrialization, declining labor demand for less-skilled workers—that produce both disability enrollment and substance use disorders. In the fentanyl era, even the residual prescription-mediated channel has been overwhelmed. Reducing opioid deaths requires confronting illicit supply and demand-side despair, not restricting access to disability benefits.

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A. Standardized Effect Sizes

Table 5: Standardized Effect Sizes

Outcome	$\hat{\beta}$	SE	SD(Y)	SDE	SE(SDE)	Classification
Panel A: Pooled						
All opioid deaths	-545.7	366.1	12.6	-0.895	0.601	Large negative
Rx opioid deaths	-35.1	71.1	2.8	-0.263	0.534	Large negative
Synthetic opioid deaths	-537.8	447.1	13.3	-0.839	0.698	Large negative
Rx opioid deaths (pop-weighted)	58.8	71.5	2.8	0.442	0.537	Large positive
Panel B: Heterogeneous (Pre vs Post Fentanyl)						
All opioids (2015–2018)	127.3	244.7	9.8	0.269	0.517	Large positive
All opioids (2019–2022)	-635.0	307.5	13.8	-0.951	0.461	Large negative

Notes: **Country:** United States. **Research question:** Does disability prevalence causally increase opioid overdose mortality through insurance-mediated prescription access? **Policy mechanism:** SSDI/SSI disability enrollment provides Medicare (after 24-month waiting period) or Medicaid (immediately), granting prescription drug coverage that includes opioid analgesics, potentially creating a pipeline from disability adjudication to opioid prescribing. **Outcome definition:** Drug overdose deaths per 100,000 population by ICD-10 substance code from CDC VSRR provisional counts (12-month rolling totals). **Treatment:** Continuous; state-level disability prevalence rate (fraction of civilian noninstitutionalized population with a disability, ACS B18101). **Data:** CDC Vital Statistics Rapid Release (VSRR) drug overdose deaths by state-year-substance, 2015–2022; ACS 5-year estimates; 41 states, 261 state-year observations. **Method:** OLS with state and year fixed effects, standard errors clustered at state level. Within-state panel exploiting temporal variation in disability prevalence. **Sample:** 41 states with non-suppressed mortality counts across all years; excludes territories and states with systematic CDC data suppression. SDE $= \hat{\beta} \times \text{SD}(X)/\text{SD}(Y)$ for continuous treatment. Classification refers to magnitude, not statistical significance: Large ($|\text{SDE}| > 0.15$), Moderate (0.05–0.15), Small (0.005–0.05), Null (< 0.005).