

Mobile Crisis Response Teams Support Better Policing: Evidence from CAHOOTS

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Police as sole first responders: Is this the best approach?

Police officers are typically the first responders to a range of incidents, including:

- Violent crimes, such as assault and robbery
- Nonviolent crimes, such as theft and disorderly conduct

However, they also respond to non-criminal incidents and nuisances:

- Mental health crises
- Illegal camping/fires

Could some incidents be better managed by other professionals?

- Specific training and tools, better worker fit
- Expanding range of 911 responders could also allow police to focus on core responsibilities

This paper

Goal: Evaluate the impacts of Crisis Assistance Helping Out on the Streets (CAHOOTS)

- CAHOOTS addresses calls related to mental illness, substance abuse, and homelessness, functioning both as a **complement** and **substitute** to police
- Think welfare checks, intoxication, suicidal persons

Data: rich 911 call data, including outcomes such as arrests, involuntary holds, and crime reports

Research designs: Two complementary approaches

- ① IV difference-in-differences to analyze the effects of the introduction of CAHOOTS
- ② IV leveraging random variation in CAHOOTS workload (“busyness”)

Preview of results

Substitute or complement?

Primarily a **complement**: 55% of CRT responses are alongside police, 41% substitute, 4% service expansion. CRTs respond to 8% of calls.

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Cost-effective?

MVPF is ∞ at scale (cost-saving), large at margin (\$10 net cost per response).

Crisis Assistance Helping Out on the Streets (CAHOOTS)

- Eugene, Oregon, est. 1988
- Medic + crisis worker; unarmed, non-uniformed
- De-escalation, not arrest
- Responds **instead** or in **addition** to police



Model for police alternatives across the country (e.g., STAR in Denver [Dee and Pyne 2022](#), HEART in Durham [Ba et al. 2025](#))

Data and sample construction

911 call data from Eugene and Springfield Police Departments (2014-2021)

- Eugene: 200k calls
- Springfield: 60k calls
- All calls go through Lane County emergency communications center

For each call, rich details about

- time, exact location, and nature
- response (who and how fast)
- immediate outcome (arrest, type of arrest, use of force, medical intervention)

Analysis sample: all 911 calls

Mostly immediate crisis and mental illness incidents

	Count (1)	Response composition				Share Arrests (6)
		No response (2)	CAHOOTS only (3)	Police only (4)	Both (5)	
All calls	268,658	0.331	0.052	0.581	0.035	0.089
<i>Panel A: Top 5 most frequent CAHOOTS natures</i>						
Welfare check	16,083	0.214	0.353	0.369	0.065	0.023
Suicidal person	6,501	0.128	0.243	0.368	0.261	0.084
Traffic/driver issue	31,611	0.486	0.023	0.482	0.010	0.042
Disorderly subject	19,953	0.206	0.044	0.683	0.067	0.146
Intoxicated person	1,393	0.202	0.415	0.314	0.069	0.047
<i>Panel B: Top 5 least frequent natures for CAHOOTS responses</i>						
Robbery	865	0.091	0.001	0.881	0.027	0.338
Fight	1,680	0.092	0.000	0.893	0.015	0.138
Drunk driver	9,707	0.621	0.000	0.377	0.002	0.036
Armed subject	1,403	0.100	0.001	0.870	0.028	0.207
Warrant	1,445	0.001	0.000	0.971	0.028	0.988

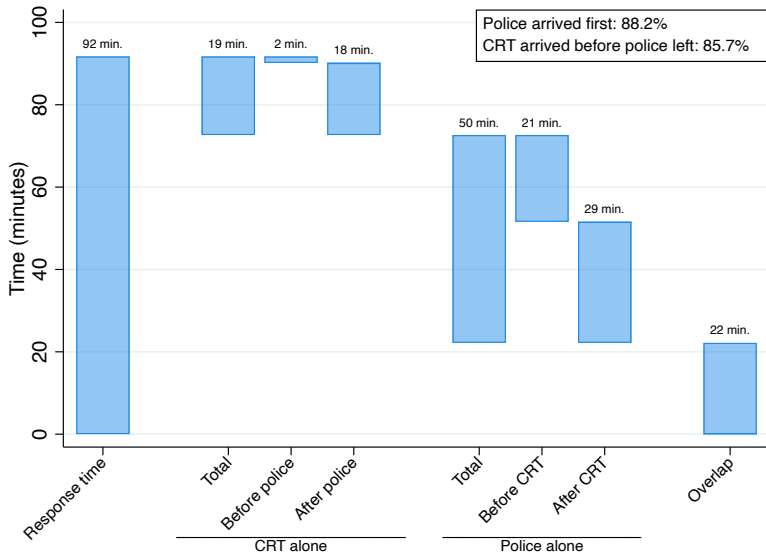
Not designed for all emergencies

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Overlap in the natures of calls involving police and CAHOOTS

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<i>Panel C: Top 5 most frequent police natures</i>						
Traffic/driver issue	31,611	0.486	0.023	0.482	0.010	0.042
Disorderly subject	19,953	0.206	0.044	0.683	0.067	0.146
Suspicious person	17,002	0.241	0.013	0.722	0.024	0.047
Mischief/trespassing	13,153	0.321	0.007	0.650	0.022	0.118
Burglary/theft	11,225	0.366	0.001	0.624	0.008	0.146
<i>Panel D: Top 5 most frequent natures with both police and CAHOOTS responding</i>						
Dispute	42,838	0.101	0.001	0.863	0.035	0.096
Disorderly subject	19,953	0.206	0.044	0.683	0.067	0.146
Welfare check	16,083	0.214	0.353	0.369	0.065	0.023
Suspicious person	17,002	0.241	0.013	0.722	0.024	0.047
Overdose	3,982	0.418	0.030	0.474	0.078	0.028

Characterizing responses with both police and CAHOOTS



Effects of expansions in CRT services

Difference-in-differences design: Eugene vs. Springfield

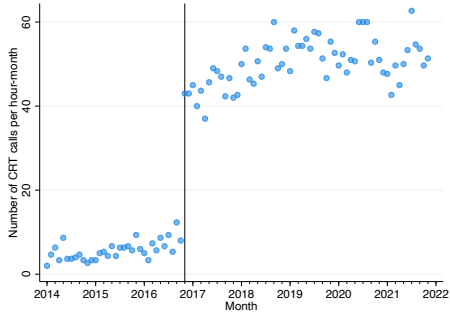
Variation: 5 expansions of CAHOOTS into areas and times previously without service

- In 2014, CAHOOTS operated in Eugene during the day
- Expanded into Springfield, then increased hours of daily coverage

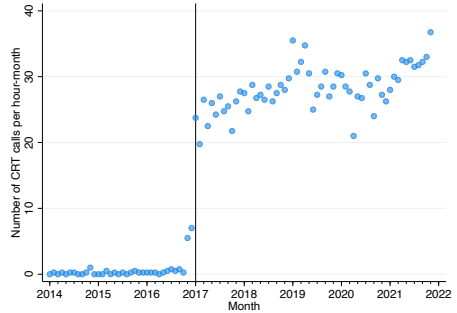
Comparison: Calls in Eugene and Springfield at identical times (e.g., 10-11 PM, Sunday, September 15, 2024), before vs. after an expansion.

Geographical similarity: Eugene and Springfield are contiguous, likely comparable in trends

CAHOOTS calls per hour-month over expansions in Eugene

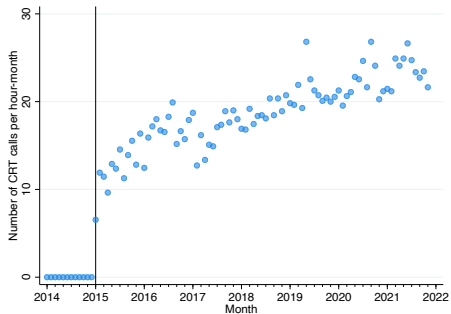


(a) 7-10 a.m.

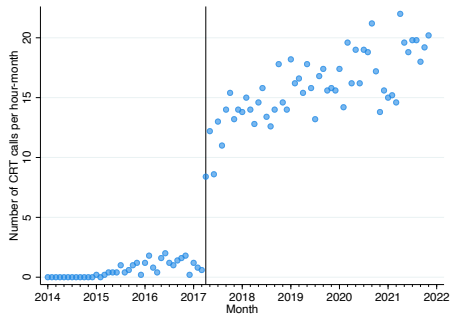


(b) 3-7 a.m.

CAHOOTS calls per hour-month over expansions in Springfield



(a) 12 p.m.-11 p.m.



(b) 9-11 a.m. and 11 p.m.-2 a.m.

Difference-in-differences specification

$$Y_i = \beta D_i + \psi_{t(i)}^1 + \gamma_{c(i)}^1 + u_{it} \quad (1)$$

$$D_i = \alpha \underbrace{Z_i}_{\text{Post expansion}} + \underbrace{\psi_{t(i)}^0 + \gamma_{c(i)}^0}_{\text{Calendar month \& city FEs}} + \varepsilon_{it} \quad (2)$$

- D_i is an indicator for a CAHOOTS response (either alone or with the police)
- Z_i is an indicator for the call coming in a time and geography following a CAHOOTS expansion (i.e., “*Post* × *Treatment*”)
- Control for calendar month (e.g., May 2023) effects $\psi_{t(i)}$ and city effects $\gamma_{c(i)}$

Stack all 5 designs and use each policy change as an IV

Stack specification

- Since some of the designs overlap, cluster SEs by call / control for other policy changes
- Equivalent to averaging design-specific effects with variance weights

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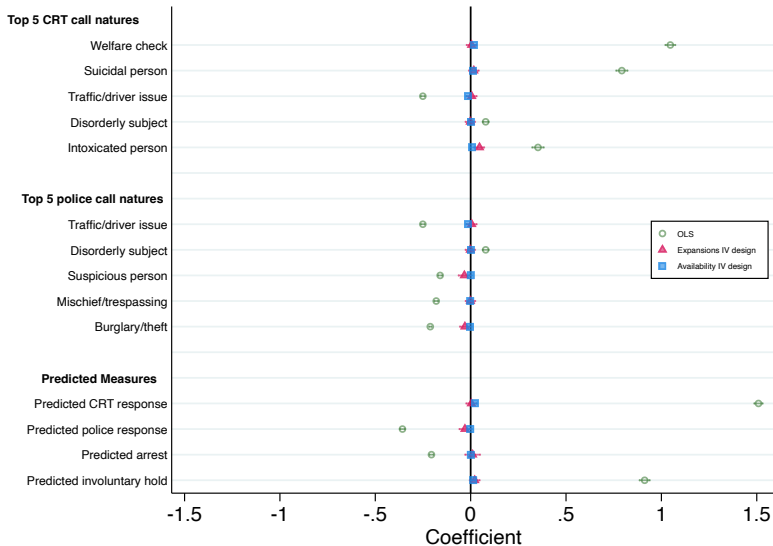
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Calls w/ and w/out CAHOOTS are different, but balance on instruments ✓



Reduced form: expansions $\uparrow$ CAHOOTS and $\downarrow$ police

$$Y_i = \underbrace{\eta}_{\text{Post expansion}} \underbrace{Z_i}_{\text{Calendar month \& city FEs}} + \underbrace{\psi_{t(i)}^0 + \gamma_{c(i)}^0}_{\text{Calendar month \& city FEs}} + \varepsilon_{it}$$

	CAHOOTS	Police	Any response
Post expansion	0.075*** (0.003)	-0.031*** (0.006)	0.003 (0.006)
Untreated mean	0.005	0.722	0.724

- F-statistic = **173**
- In $\approx 60\%$ of the calls CAHOOTS is dispatched alongside the police
- No impacts on the likelihood of response

2SLS shows CAHOOTS reduces arrests (but large OVB in OLS)

	Arrest (1)	Invol. hold (2)	Detox (3)	Warrant (4)
<i>Panel A: 2SLS estimates of effect of CAHOOTS</i>				
CAHOOTS	-0.243*** (0.062)	-0.151*** (0.023)	-0.052*** (0.013)	0.022 (0.026)
Control complier mean	0.321	0.173	0.055	-0.010
<i>Panel B: OLS estimates of effect of CAHOOTS response</i>				
CAHOOTS	-0.037*** (0.002)	0.010*** (0.001)	0.001*** (0.000)	-0.013*** (0.001)
Untreated mean	0.092	0.006	0.002	0.018
Observations	291,599	291,599	291,599	291,599

Placebo expansions

Event studies

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CRT reduces arrests by **24 pp** (75% of baseline), mostly via mental health holds.

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OLS: **-3.7 pp** vs. IV: **-24.3 pp** $\Rightarrow$ OLS understates effect by **6.5x**. Large omitted variable bias.

Placebo expansions

Event studies

Effects of marginal CRT responses

Effect of CAHOOTS for marginal calls

Exploit quasi-random variation in CAHOOTS availability arising from the number of 911 calls that are *unresolved* at the time of the focal 911 call, after CAHOOTS expansion

Use number of open CAHOOTS calls as instrument for CAHOOTS response to focal call

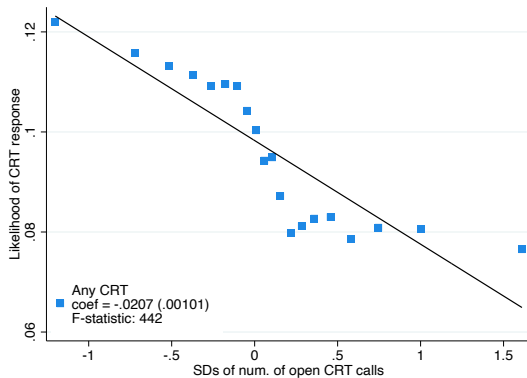
- Normalize instrument to be mean zero and SD of one

Everything conditional on city-month-day of week-hour of day FEs

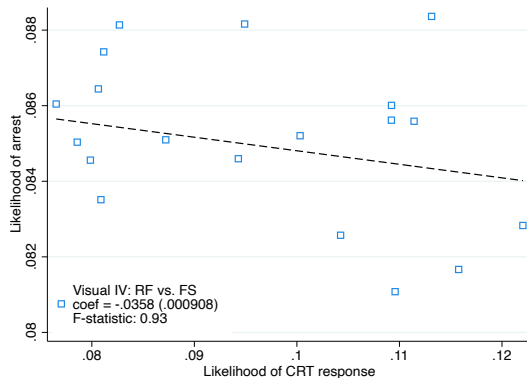
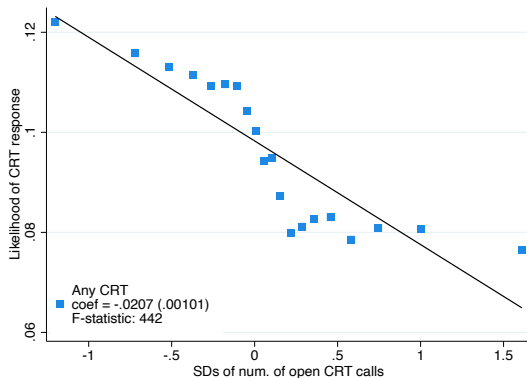
- Control for police busyness

Validate design using characteristics of the geographic location (tract) the call originated from

Busyness IV first-stage ✓



But marginal increases in capacity have limited effects on arrests



Insignificant reduction of 4.5 pp in arrests (2SLS, F-stat = 523)

2SLS effects of marginal CAHOOTS responses

- Large effects on whether there is a response
- CAHOOTS effects on arrests are smaller

Effects of CRT on call response and arrest using availability design

	Call responses		Call outcomes			
	Police (1)	Any response (2)	Arrest (3)	Invol. hold (4)	Detox (5)	Warrant (6)
CRT	-0.228*** (0.071)	0.497*** (0.067)	-0.045 (0.041)	-0.004 (0.011)	0.012** (0.005)	-0.020 (0.018)
Control complier mean	0.503	0.503	0.080	0.025	-0.006	0.017
First-stage F-stat	522.67	522.67	522.67	522.67	522.67	522.67
Observations	236,534	236,534	236,534	236,534	236,534	236,534

Heterogeneity: causal channels and program scope

Reconciling results across designs

Marginal CAHOOTS response in busyness design would often otherwise be not responded to

- Smaller reduction in police-only calls
- Also smaller reduction in arrests

Natural to think that these things are related

- Simple LATE framework to clarify substitution/complementarity channels

Until now have defined treatment as a CAHOOTS response indicator. Can also think of as:

- no response (n)
- only CAHOOTS respond (c)
- only the police respond (p)
- both CAHOOTS and the police respond (b)

Instrument response types and identifying restrictions

		$Z_i = 1$			
		n	c	p	b
$Z_i = 0$	n	π_{nn}	π_{nc}	π_{cp}	π_{nb}
	c	π_{cn}	π_{cc}	π_{cb}	π_{cb}
	p	π_{pn}	π_{pc}	π_{pp}	π_{pb}
	b	π_{bn}	π_{bc}	π_{bp}	π_{bb}

Assumptions

- No restrictions
- + Monotonicity (Imbens and Angrist 1994)
- + No Effect on Police except for substitution

⇒ 2SLS identifies *interpretable* effects for compliers and π s are *estimable*

Estimating eq'ns

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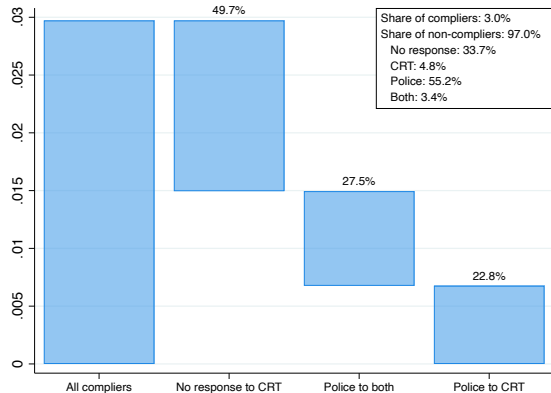
Estimating eq'ns

What does 2SLS recover?

$$\beta = s_{pb} \underbrace{\Delta_{p \rightarrow b}}_{\text{Adding CAHOOTS to police}} + s_{pc} \underbrace{\Delta_{p \rightarrow c}}_{\text{Substituting police for CAHOOTS}} + s_{nc} \underbrace{\Delta_{n \rightarrow c}}_{\text{New CAHOOTS response}}$$

- $\Delta_{x \rightarrow y} \equiv E[Y(y) - E(x) | x \rightarrow y]$ is the effect of treatment y versus x for those compliers
- $s_{xy} \equiv \pi_{xy} / (\pi_{pb} + \pi_{pc} + \pi_{nc})$ is the identifiable complier share
- $n \rightarrow c$ effect is necessarily zero for arrest outcomes

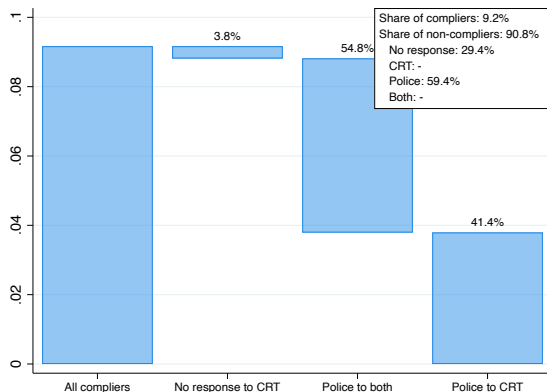
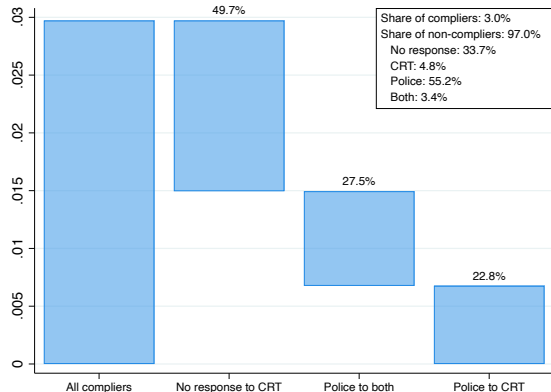
CAHOOTS expansion and marginal $\uparrow$ lead to different responses



Availability: 50% of marginal responses go to *previously unanswered* calls.

Complier shares by design

CAHOOTS expansion and marginal $\uparrow$ lead to different responses



Expansions: nearly all responses replace or supplement police. **Availability:** half go to unanswered calls $\Rightarrow$ explains smaller arrest effects (?)

Complier shares by design

Re-scaled effects are different although complier types are similar

- Can easily rescale so estimates reflect only $p \rightarrow c$ and $p \rightarrow b$
- Re-scaled estimates show larger arrest reducing effects for the availability instrument
- Complier shares are similar, but re-scaled effects are different across designs

	Instruments	
	Availability (1)	Expansions (2)
CAHOOTS effect ($s_{pc}\Delta_{pc} + s_{pb}\Delta_{pb} + s_{nc}\Delta_{nc}$)	-0.045 (0.041)	-0.243*** (0.062)
Rescaled effect ($\frac{s_{pc}}{s_{pc}+s_{pb}}\Delta_{pc} + \frac{s_{pb}}{s_{pc}+s_{pb}}\Delta_{pb}$)	-0.089 (0.077)	-0.246*** (0.064)

Recasting objective in terms of potential outcomes

Define $E[Y(p) \mid p \rightarrow b]$ as the expected potential outcome under p for the $p \rightarrow b$ compliers

- For arrest outcomes, $Y(n) = Y(c) = 0$
- Define $s_{xy} \equiv \pi_{xy} / (\pi_{pb} + \pi_{pc} + \pi_{nc})$ as the share of compliers going from x to y

The IV estimand can be decomposed:

$$\beta = \underbrace{s_{pb}E[Y(b) - Y(p) \mid p \rightarrow b]}_{\text{Adding CAHOOTS to police}} + \underbrace{s_{pc}E[Y(c) - Y(p) \mid p \rightarrow c]}_{\text{Substituting police for CAHOOTS}} + \underbrace{s_{nc}E[Y(c) - Y(n) \mid n \rightarrow c]}_{\text{New CAHOOTS response}}$$

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- Aim is to identify the three mean potential outcomes

Identifying the potential outcomes

Start with the Wald complier-mean estimands for the four treatments d

$$\theta^d \equiv \frac{E[Y \mathbb{1}[D=d] | Z=1] - E[Y \mathbb{1}[D=d] | Z=0]}{E[\mathbb{1}[D=d] | Z=1] - E[\mathbb{1}[D=d] | Z=0]}$$

For the arrest outcomes, simplifies to:

$$\theta^b = E[Y(b) | p \rightarrow b]$$

$$\theta^p = \frac{s_{pb}}{s_{pb} + s_{pc}} E[Y(p) | p \rightarrow b] + \frac{s_{pc}}{s_{pb} + s_{pc}} E[Y(p) | p \rightarrow c]$$

- Left hand side and s are data
- Can directly estimate $E[Y(b) | p \rightarrow b]$
- Identifies only a weighted average of the p complier mean across $p \rightarrow c$ and $p \rightarrow b$ groups

Identifying the potential outcomes

Start with the Wald complier-mean estimands for the four treatments d

$$\theta^d \equiv \frac{E[Y \mathbb{1}[D=d] | Z=1] - E[Y \mathbb{1}[D=d] | Z=0]}{E[\mathbb{1}[D=d] | Z=1] - E[\mathbb{1}[D=d] | Z=0]}$$

For the arrest outcomes, simplifies to:

$$\theta^b = E[Y(b) | p \rightarrow b]$$

$$\theta^p = \frac{s_{pb}}{s_{pb} + s_{pc}} E[Y(p) | p \rightarrow b] + \frac{s_{pb}}{s_{pb} + s_{pc}} E[Y(p) | p \rightarrow c]$$

- Left hand side and s are data
- Can directly estimate $E[Y(b) | p \rightarrow b]$
- Identifies only a weighted average of the p complier mean across $p \rightarrow c$ and $p \rightarrow b$ groups

Evidence of heterogeneity across designs

	Design	
	Availability (1)	Diff-in-diff (2)
<i>Panel A: Comparing $E[Y(b)]$ among $p \rightarrow b$ compliers</i>		
$E[Y(b) \mid p \rightarrow b]$	0.138*** (0.032)	0.136*** (0.015)
p -value of equality		0.948
<i>J test of overidentification</i>		
χ^2 statistic		0.530
p -value		0.971
<i>Panel B: Comparing $E[Y(p)]$ among $p \rightarrow b$ and $p \rightarrow c$ compliers</i>		
$\frac{s_{pb}}{s_{pc} + s_{pb}} E[Y(p) \mid p \rightarrow b] + \frac{s_{pc}}{s_{pc} + s_{pb}} E[Y(p) \mid p \rightarrow c]$	0.169*** (0.081)	0.315*** (0.063)
p -value of equality		0.154
$s_{pb} / (s_{pc} + s_{pb})$	0.623	0.590
$s_{pc} / (s_{pc} + s_{pb})$	0.377	0.410

Identifying treatment effects

Identifying $E[Y(p)|p \rightarrow c]$ and $E[Y(p)|p \rightarrow b]$

- Construct moments θ_j^d for each of five designs j
- Assume mean potential outcomes are constant across j

$$\theta_j^b = E[Y(b) \mid p \rightarrow b]$$

$$\theta_j^p = \frac{s_{pb}^j}{s_{pb}^j + s_{pc}^j} E[Y(p) \mid p \rightarrow b] + \frac{s_{pc}^j}{s_{pb}^j + s_{pc}^j} E[Y(p) \mid p \rightarrow c]$$

- Then have 10 equations and 3 unknowns
- Estimate $E[Y(d) \mid g]$ using minimum distance

Complier group-specific treatment effects for arrests

	(1)
<i>Panel A: Complier means</i>	
$E[Y(b) \mid p \rightarrow b]$	0.133*** (0.013)
$E[Y(p) \mid p \rightarrow b]$	0.496*** (0.163)
$E[Y(p) \mid p \rightarrow c]$	0.089 (0.189)
<i>Panel B: subLATEs</i>	
Police $\rightarrow$ both	-0.363** (0.164)
Police $\rightarrow$ CAHOOTS	-0.0890 (0.189)

Complier group-specific treatment effects for arrests

Counterfactual arrest risk differs dramatically:

50% for $p \rightarrow b$ calls vs. **9%** for $p \rightarrow c$

Visual IV

(1)	
<i>Panel A: Complier means</i>	
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Complier group-specific treatment effects for arrests

Counterfactual arrest risk differs dramatically:

50% for $p \rightarrow b$ calls vs. **9%** for $p \rightarrow c$

Adding CRT to police reduces arrests by **36**

pp. Substituting police with CRT: smaller, insignificant

⇒ Most arrest-reducing benefit comes from CRT working *with* police, not replacing them

Visual IV

	(1)
<i>Panel A: Complier means</i>	
$E[Y(b) \mid p \rightarrow b]$	0.133*** (0.013)
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<i>Panel B: subLATEs</i>	
Police → both	-0.363** (0.164)
Police → CAHOOTS	-0.0890 (0.189)

CRTs and public safety

Does reducing arrests compromise public safety?

Could the reduction in arrests compromise public safety?

Two complementary analyses:

- ① Effects on crime reports (police-filed incident reports)
 - Pro: natural measure of crime and victimization
 - Con: captures only crimes *reported* to police — may be mechanically affected by reduced police presence
- ② Effects on future 911 calls from same address
 - Pro: independent of police reporting behavior
 - Interpret call back as indication that problem was not resolved

Effects on crime reports

	Any report (1)	Non-criminal		Criminal			
		Mental health (2)	Overdose (3)	Any (4)	Violent (5)	Drug (6)	Property (7)
Post expansion	-0.012** (0.006)	-0.01*** (0.002)	-0.00288** (0.001)	-0.00756 (0.005)	-0.00267 (0.003)	-0.00244** (0.001)	-0.00165 (0.003)
Untreated mean	0.225	0.021	0.007	0.149	0.029	0.006	0.045
Observations	291,599	291,599	291,599	291,599	291,599	291,599	291,599
Binary CRT availability	-0.00165 (0.002)	-0.0000305 (0.000)	0.000147 (0.000)	-0.00189 (0.001)	-0.000377 (0.001)	0.000408* (0.000)	0.0000608 (0.001)
Untreated mean	0.167	0.008	0.003	0.125	0.029	0.003	0.029
Observations	236,534	236,534	236,534	236,534	236,534	236,534	236,534

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Expansions reduce mental health reports (58%) and overdose reports (40%).

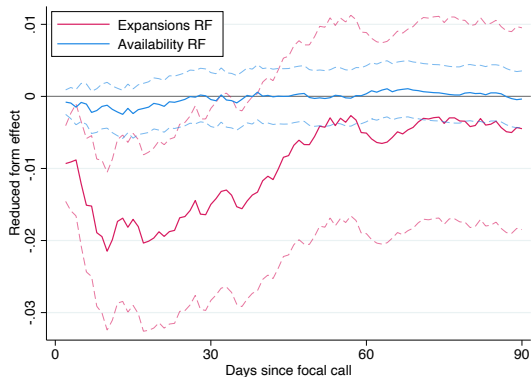
Caveat: Reports filed only by police — declines may partly reflect reduced police presence rather than changes in crime.

Effects on crime reports

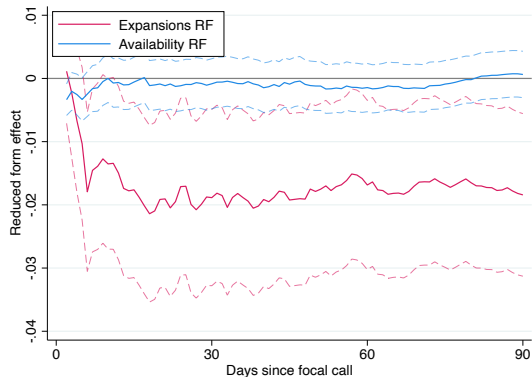
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Null effects on violent or property crime.

No evidence of adverse effects on future 911 calls from same address



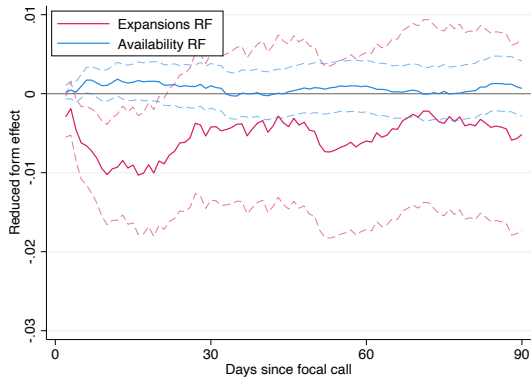
(a) Future 911 calls



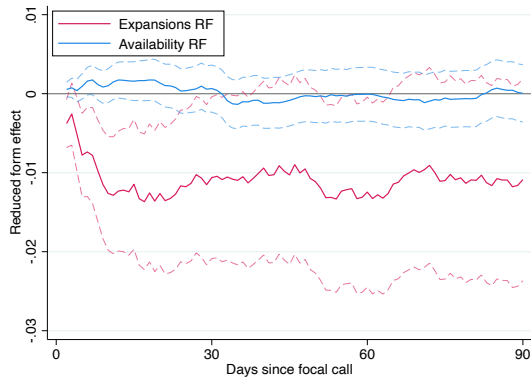
(b) Future non-emergency calls

No public places

Null or reductions in future violent and serious calls



(a) Future violent calls



(b) Future serious calls

Welfare and cost trade-offs

Marginal Value of Public Funds

Cost per response: \$254

	Average Response at Scale	Marginal Expansion
Average cost per response	\$254	\$254
Total cost	\$759,854	\$759,854
Number of CAHOOTS responses	2,993	2,993
Substitution (Δ Police Response $\times$ 931)	-\$385	-\$212
Fewer arrests (Δ Arrests $\times$ 707)	-\$172	-\$32
Fiscal externality	-\$557	-\$244
Cost + fiscal externalities	-\$303	\$10
Fiscal ext. from crime reductions	-\$392	-\$46
Cost + all fiscal externalities	-\$695	-\$36
Per-adult Δ in victim costs	-\$23	-\$3
<i>Full cost + base fiscal externalities</i>		
Per-adult WTP is \$1	∞	5
Per-adult WTP is \$69 (Ba et al. 2025)	∞	351
<i>Assume marginal response \$10 cheaper than average response</i>		
Per-adult WTP is positive	∞	∞
<i>Incorporating crime reductions</i>		
Per-adult WTP is $-\Delta$ victim costs	∞	∞

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- **-\$303** at scale $\Rightarrow$ **cost-saving**
- **\$10** marginal $\Rightarrow$ **near break-even**

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$\Rightarrow$ **MVPF is ∞ at scale, large at margin**

Conclusion

CRTs reduce arrests — 24 pp reduction (75% of baseline), driven by mental health holds

- Benefits arise mostly from CRTs working *with* police, not replacing them
- No adverse effects on public safety; fewer future 911 calls

Scope for substitution is present but limited

- 41% substitute, 55% complement, 4% service expansion
- At the margin, most additional responses go to previously unanswered calls

Highly cost-effective — MVPF is ∞ at scale, large at margin

Postscript: CAHOOTS collapsed in Eugene on April 2025. ~100 new CRT programs have launched since 2020; Eugene is now soliciting proposals for a replacement.

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Thank you!

References

-  Ba, Bocar A. et al. (2025). "What is the Best Response? Examining the Impact of Police and Their Alternatives". In: *NBER Working Paper Series* 34344.
-  Dee, Thomas S. and Jaymes Pyne (2022). "A community response approach to mental health and substance abuse crises reduced crime". In: *Science Advances* 8.23, pp. 1–9. DOI: 10.1126/sciadv.abm2106. eprint: <https://www.science.org/doi/pdf/10.1126/sciadv.abm2106>. URL: <https://www.science.org/doi/abs/10.1126/sciadv.abm2106>.
-  Imbens, Guido W. and Joshua D. Angrist (1994). "Identification and Estimation of Local Average Treatment Effects". In: *Econometrica* 62.2, pp. 467–475.

Difference-in-differences specification [Back](#)

$$Y_{ij} = \beta D_{ij} + \phi_{d(j)t} + \theta_{d(j)c(i)} + \sum_{j' \neq j} \pi_{jj'} Z_{ij'} + u_{it} \quad (3)$$

$$D_{ij} = \alpha_j Z_{ij} + \psi_{d(j)t} + \gamma_{d(j)c(i)} + \sum_{j' \neq j} \alpha_{jj'} Z_{ij'} + \varepsilon_{it} \quad (4)$$

- Stack designs and use each policy change as an IV. Since some of the designs overlap
- Y_{ij} is an outcome such as a recorded use of force on call i
- D_{ij} is an indicator for a CAHOOTS response
- Z_{ij} is an indicator for the call coming in a time and geography following the j^{th} expansion
- Control for design-month effects $\psi_{d(j)t}$ and design-city effects $\gamma_{d(j)c(i)}$
- Inference clustered by call

Response types for CAHOOTS and police busyness IVs Back

		$Z_i^c = 1$			
		n	c	p	b
$Z_i^c = 0$	n	$\pi_{n,n}$	$\pi_{n,c}$	-	-
	c	-	$\pi_{c,c}$	-	-
	p	-	$\pi_{p,c}$	$\pi_{p,p}$	$\pi_{p,b}$
	b	-	-	-	$\pi_{b,b}$

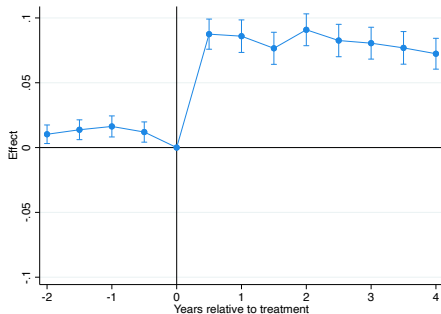
		$Z_i^p = 1$			
		n	c	p	b
$Z_i^p = 0$	n	$\pi_{n,n}$	-	$\pi_{n,p}$	-
	c	-	$\pi_{c,c}$	$\pi_{c,p}$	$\pi_{c,b}$
	p	-	-	$\pi_{p,p}$	-
	b	-	-	-	$\pi_{b,b}$

A. Instrument that increases CAHOOTS (Z_i^c)

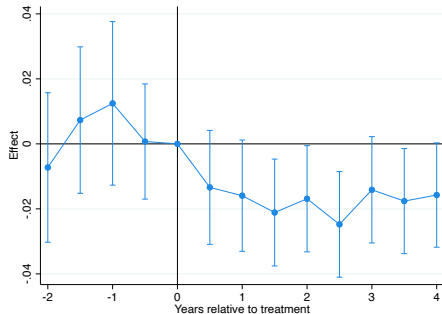
B. Instrument that increases police (Z_i^p)

Assumptions

- + Monotonicity (Imbens and Angrist 1994)
- + 'No Cross Effects'



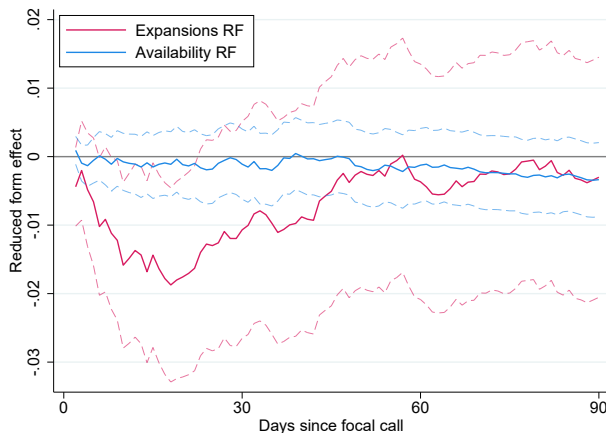
(a) CAHOOTS response



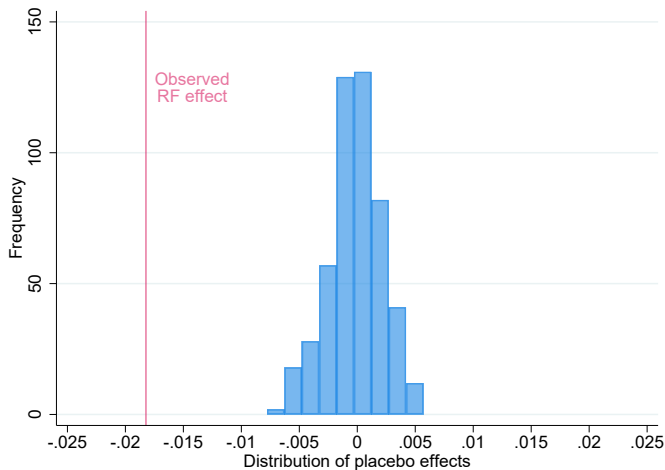
(b) Arrest

Excluding intersections/blocks/high call volume addresses

Effect of CAHOOTS response on whether new call from same address before day t



Distribution of reduced form effects under placebo policy changes



Estimating complier type shares

Under choice model, can identify complier shares from across- Z comparisons of particular outcomes:

$$\pi_{pb} = E[\mathbb{1}[D_i=b] \mid Z_i=1] - E[\mathbb{1}[D_i=b] \mid Z_i=0],$$

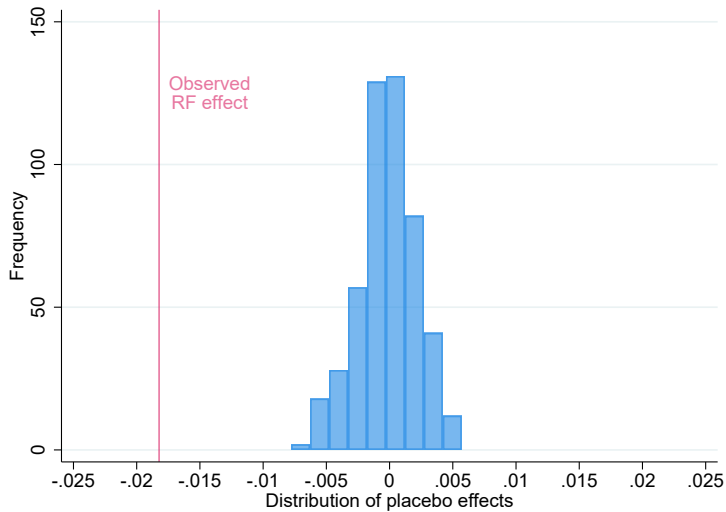
$$\pi_{pc} = E[\mathbb{1}[D_i \in \{n, c\}] \mid Z_i=1] - E[\mathbb{1}[D_i \in \{n, c\}] \mid Z_i=0],$$

$$\pi_{nc} = E[\mathbb{1}[D_i \in \{c, p, b\}] \mid Z_i=1] - E[\mathbb{1}[D_i \in \{c, p, b\}] \mid Z_i=0].$$

Implement via reduced-form regression for each design

- e.g. to identify $p \rightarrow b$ share in DD, regress $\mathbb{1}[D_i=b]$ on post-treatment indicator plus fixed effects

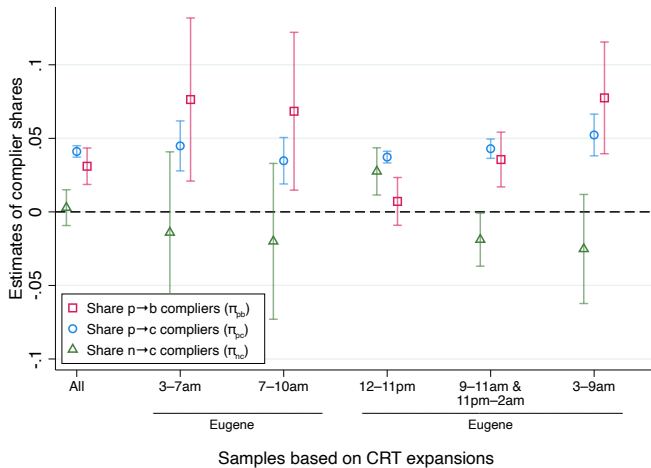
Placebo expansion dates show no effects ✓



Complier shares positive in each design

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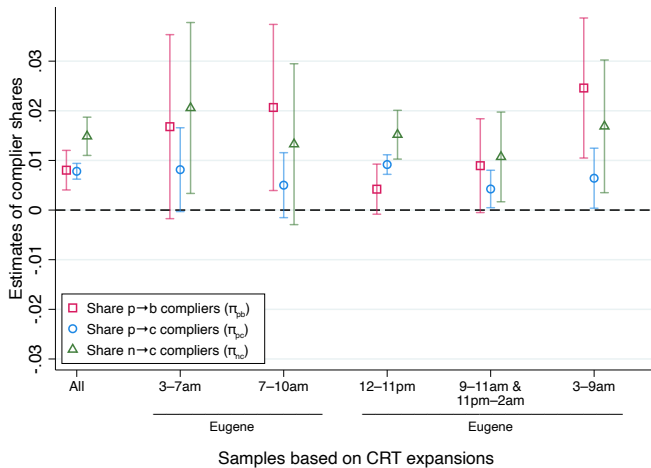
Expansions design



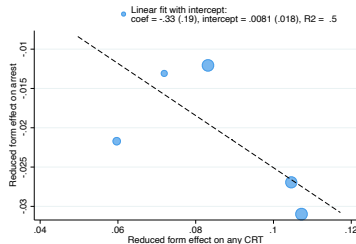
Complier shares positive in each design

[Back](#)

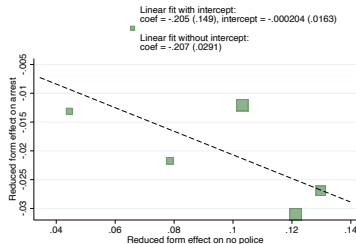
Busyness design



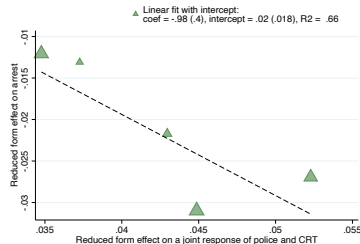
Visual IV: cross-expansion variation identifies sub-LATEs

[Back](#)

(a) Any CRT response



(b) CRT-only ($p \rightarrow c$)



(c) Both ($p \rightarrow b$)

Variation in $p \rightarrow b$ responses much more predictive of arrest reductions than $p \rightarrow c$ responses ($R^2 \approx 3\times$ larger).