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Problems and solutions for co-occurring policies in research on the health effects of social policies

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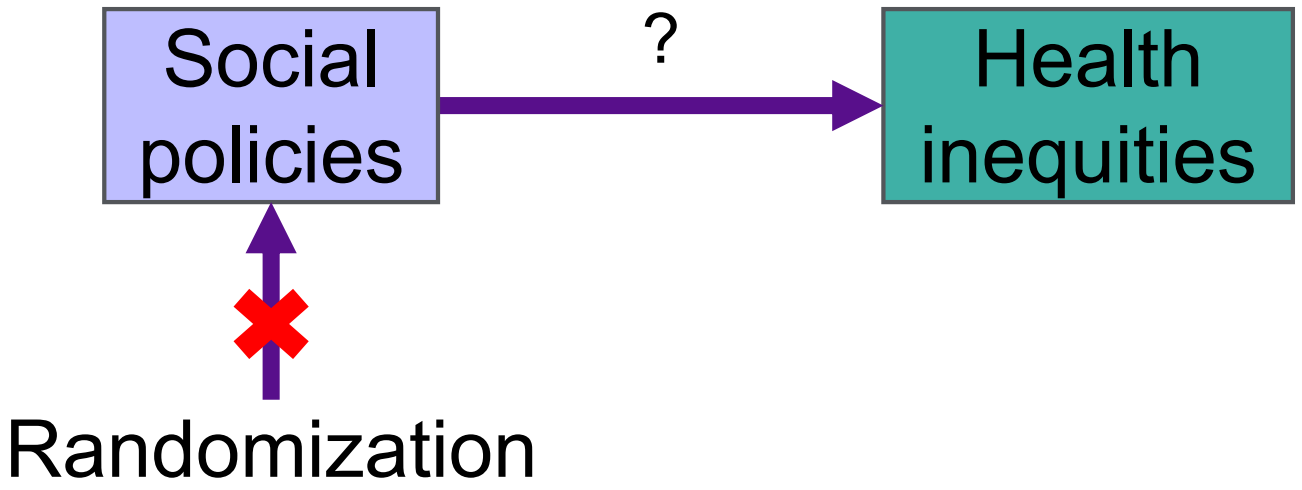
NYU Grossman School of Medicine

Overarching research goal: Which social policies should we be investing in to eliminate health inequities?

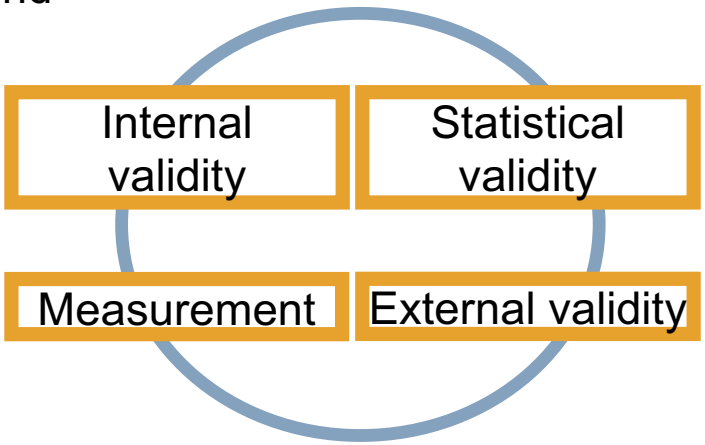
Methods matter.



Methodological challenges for research on the health effects of social policies

Strong confounding by correlated policies and phenomena

Inadequate precision to detect meaningful effects



Determining the relevant policy constructs

Sample diversity; Identifying heterogeneity in effects by population subgroup

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Matthay et al., *SSM – Population Health*, 2019

Methods matter.

Wrong estimates

Wrong conclusions

Wrong policies

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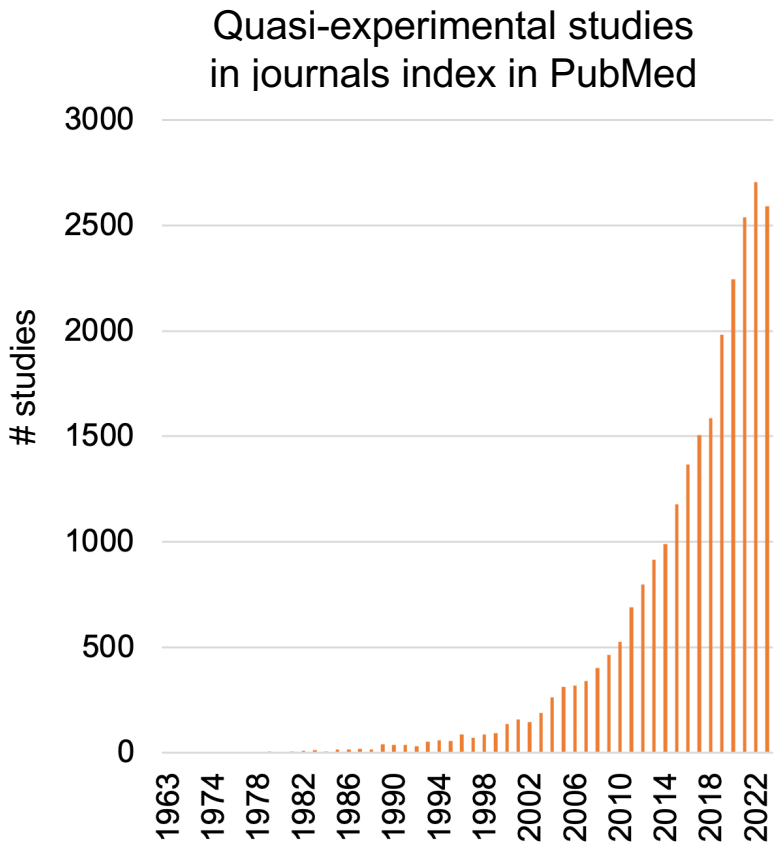
On quasi-experimental study designs

- Promising approach for studying social policies
- Increasing in health research
- Major challenge: new policies rarely adopted or implemented in isolation



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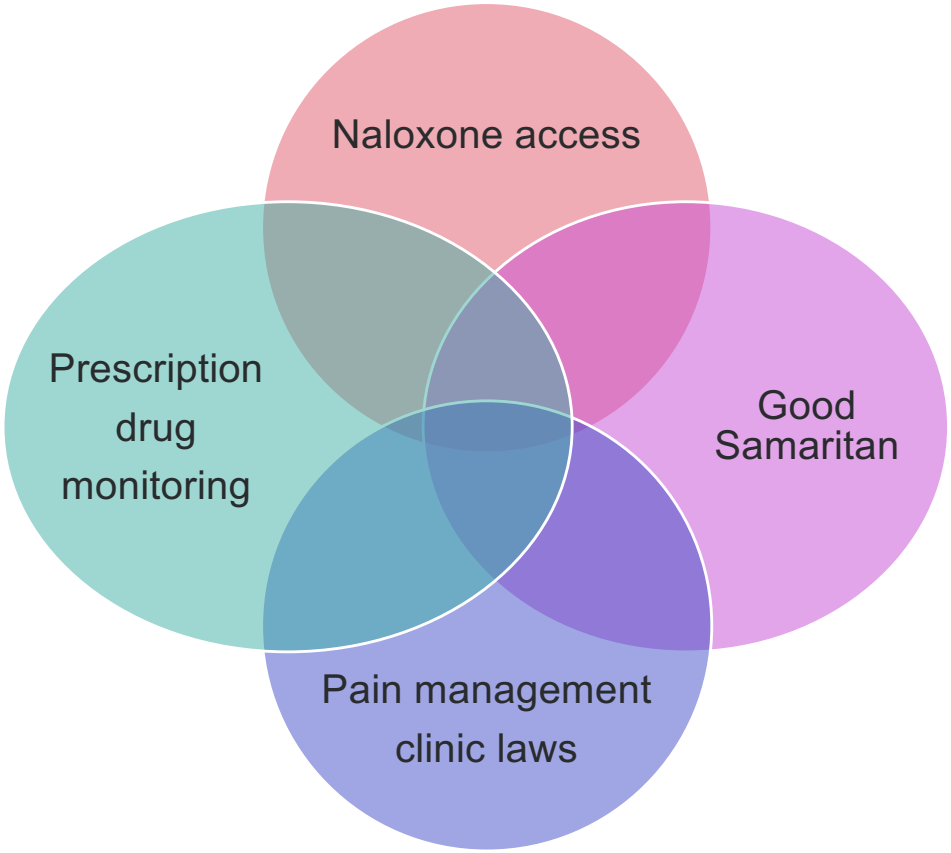
The problem of co-occurring policies



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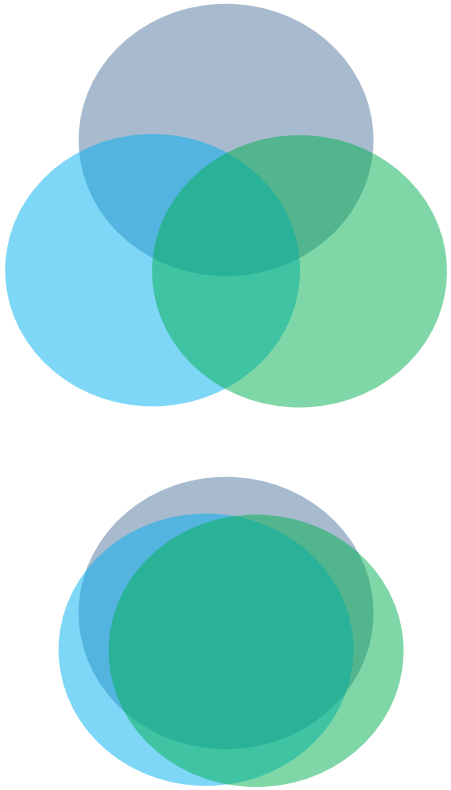
The problem of co-occurring policies



No adjustment → confounding bias

Adjustment → data sparsity, imprecise or unstable estimates, bias, positivity violation

Consequences: low statistical power, incorrect inferences

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How pervasive are co-occurring social policies?

What consequences do co-occurring policies have for estimation of the health effects of social policies?

Matthay et al., *Epidemiologic Reviews,* 2021
"The revolution will be hard to evaluate:
How co-occurring policy changes affect
research on the health effects of social policies"

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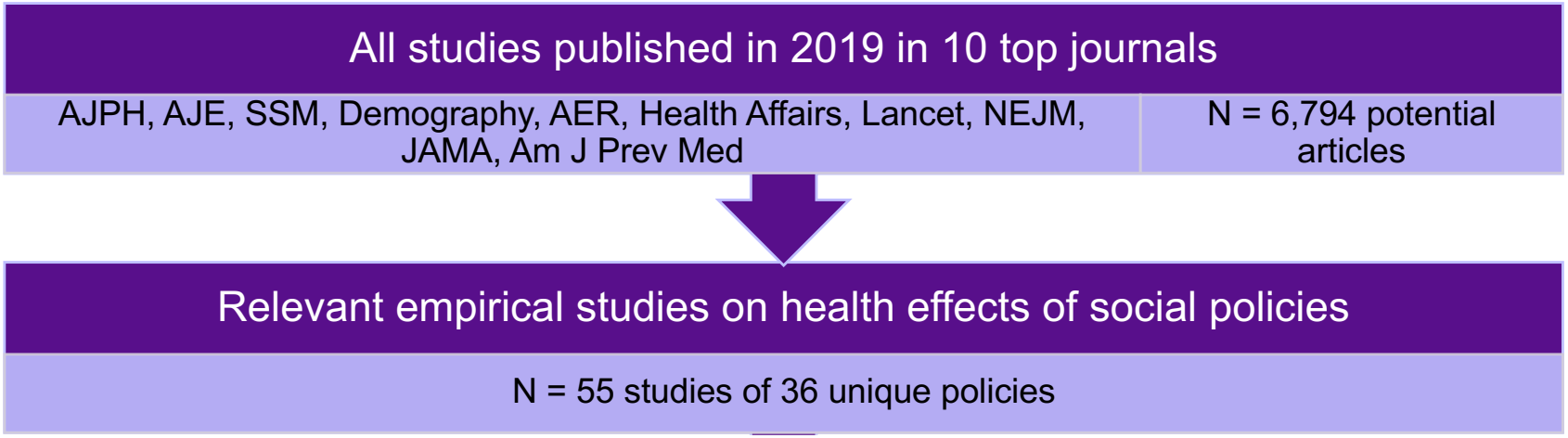
Methods



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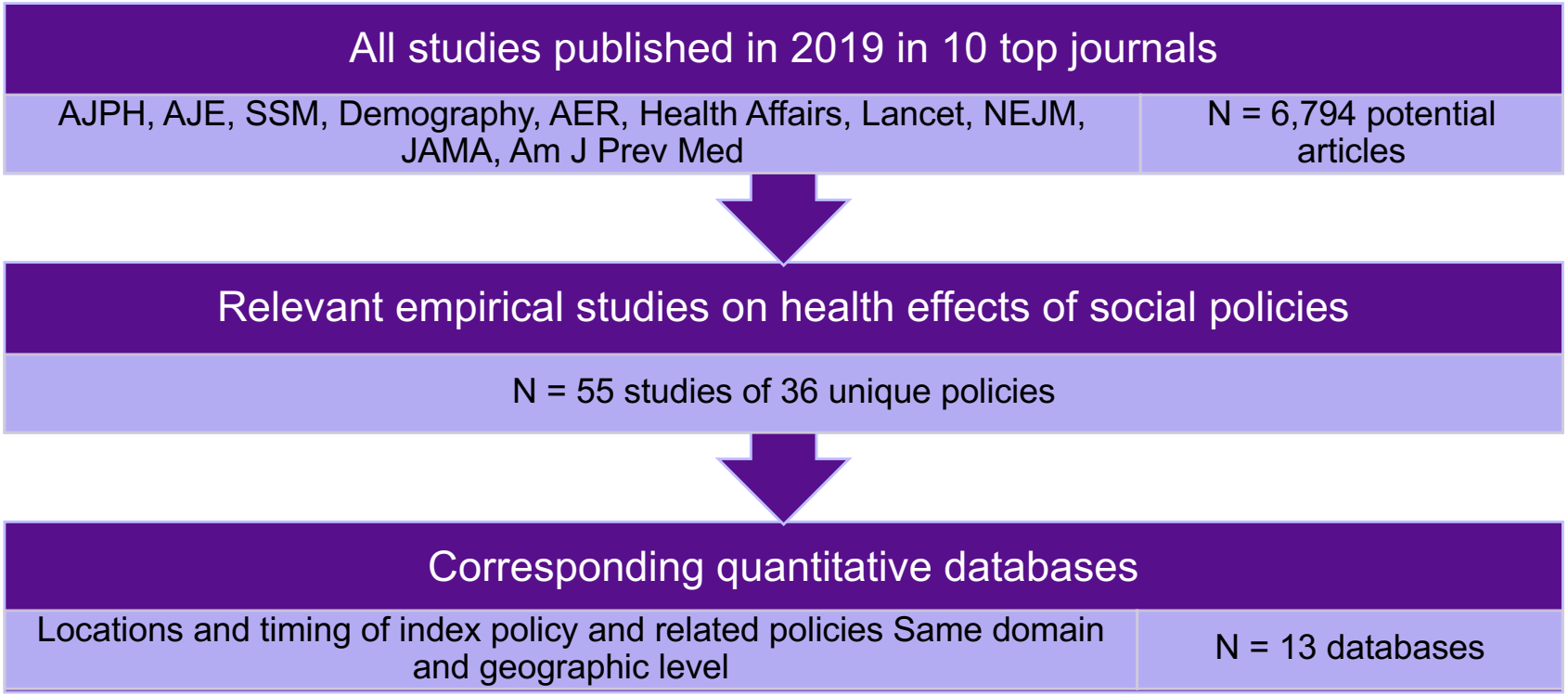
Methods



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Methods

Example study: Impacts of changes in level and duration of paid maternity leave on infant mortality across 18 African and Asian countries

Corresponding database: country-level paid leave policies

Country	Year	Paid maternity leave	Weeks of maternity leave	Paid sick leave
Botswana	2003	Yes	6	No
Botswana	2004	Yes	6	No
Botswana	2005	Yes	10	Yes
Colombia	2003	Yes	4	Yes

Analysis

1. **Visualize policy co-occurrence**

   Heatmaps of pairwise correlations between policy variables

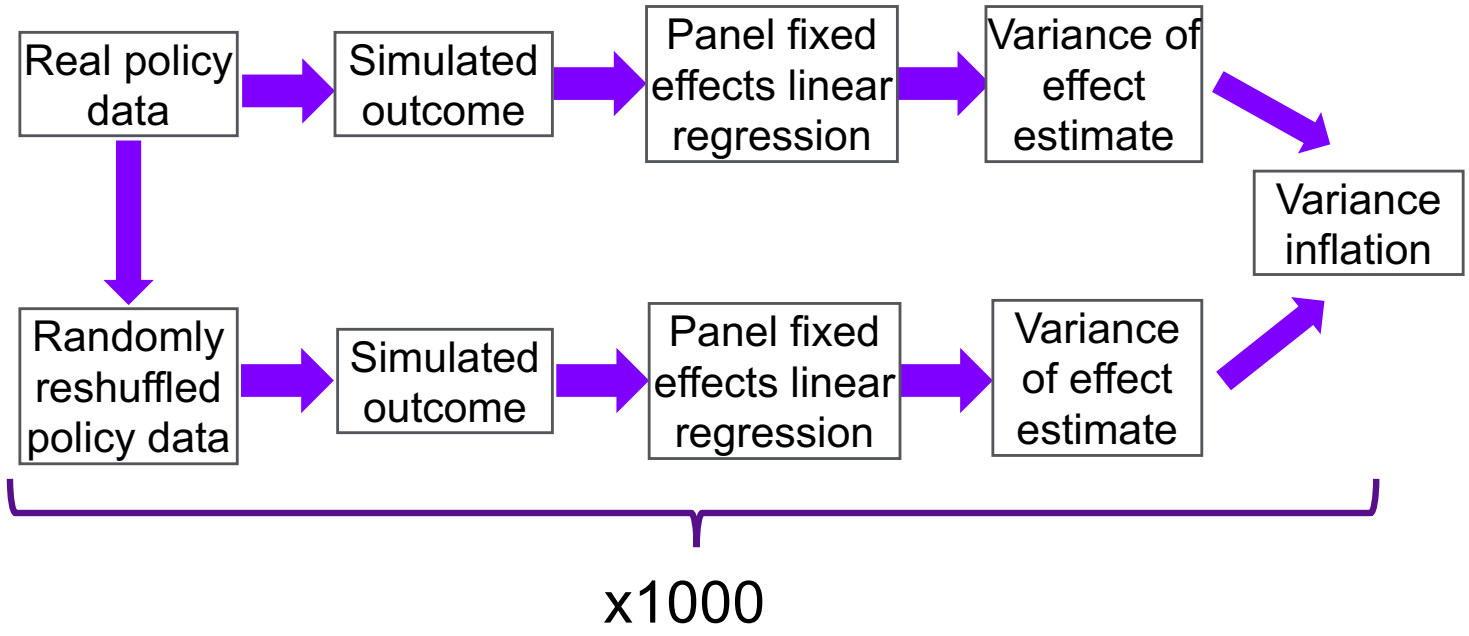
2. **Quantify policy co-occurrence**

   Regression: Index policy ~ remaining policies in same database

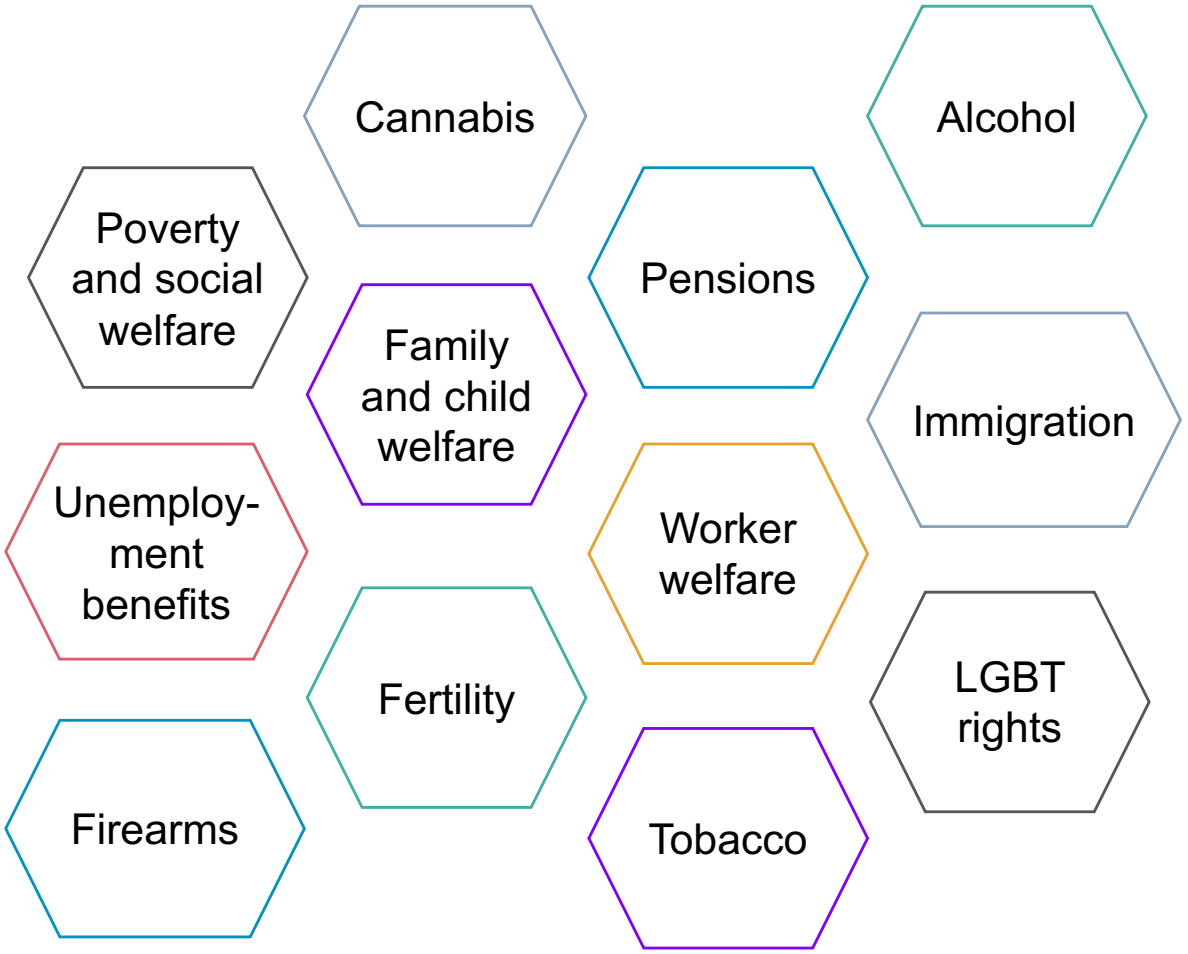
   1 - R^2 = unique variation left to study index policy

Analysis

3. Estimate impacts of policy co-occurrence on precision using simulations



Databases



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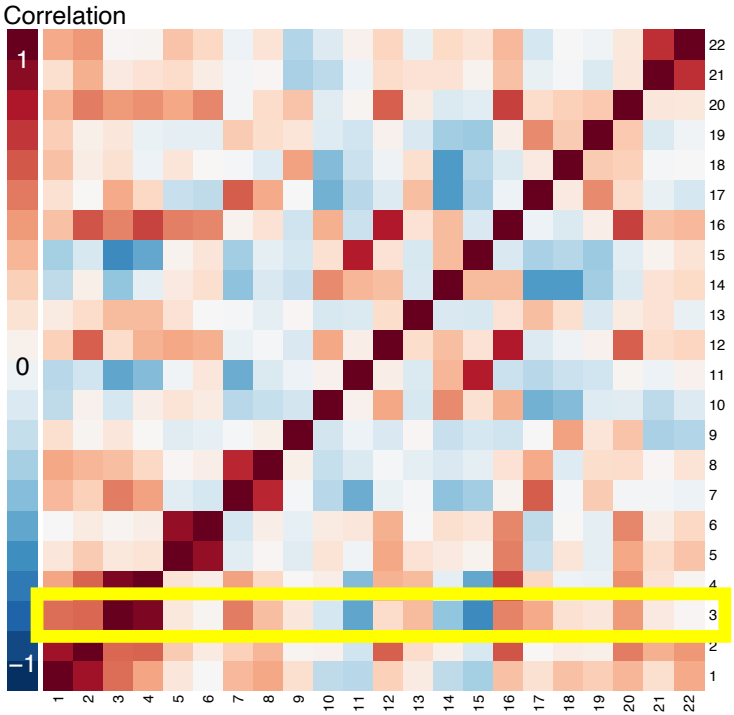
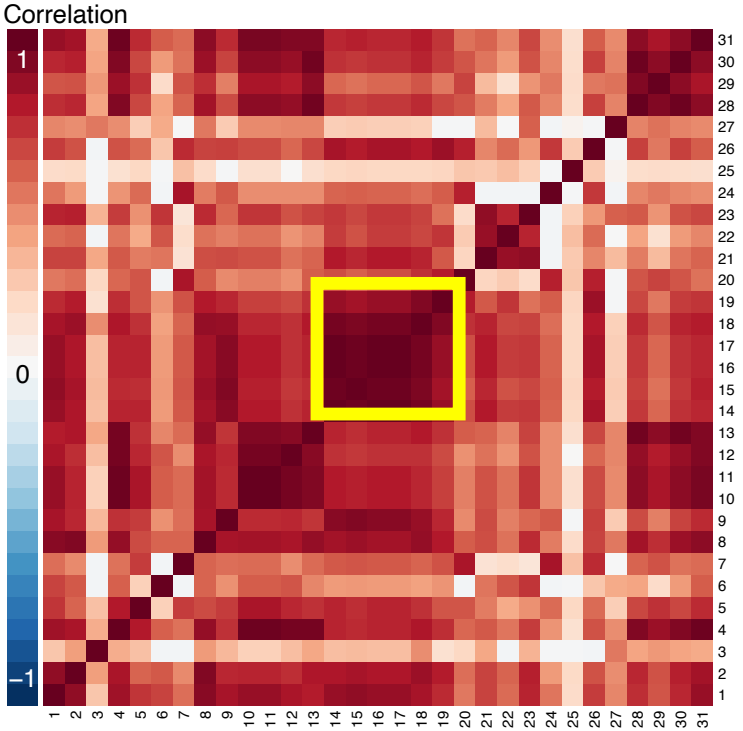
Results: visualizing policy co-occurrence

Unemployment, sick leave, and pension benefits policies, 22 countries,1971-2010



Recreational cannabis policies, 50 states, Jan 2009 – Dec 2017



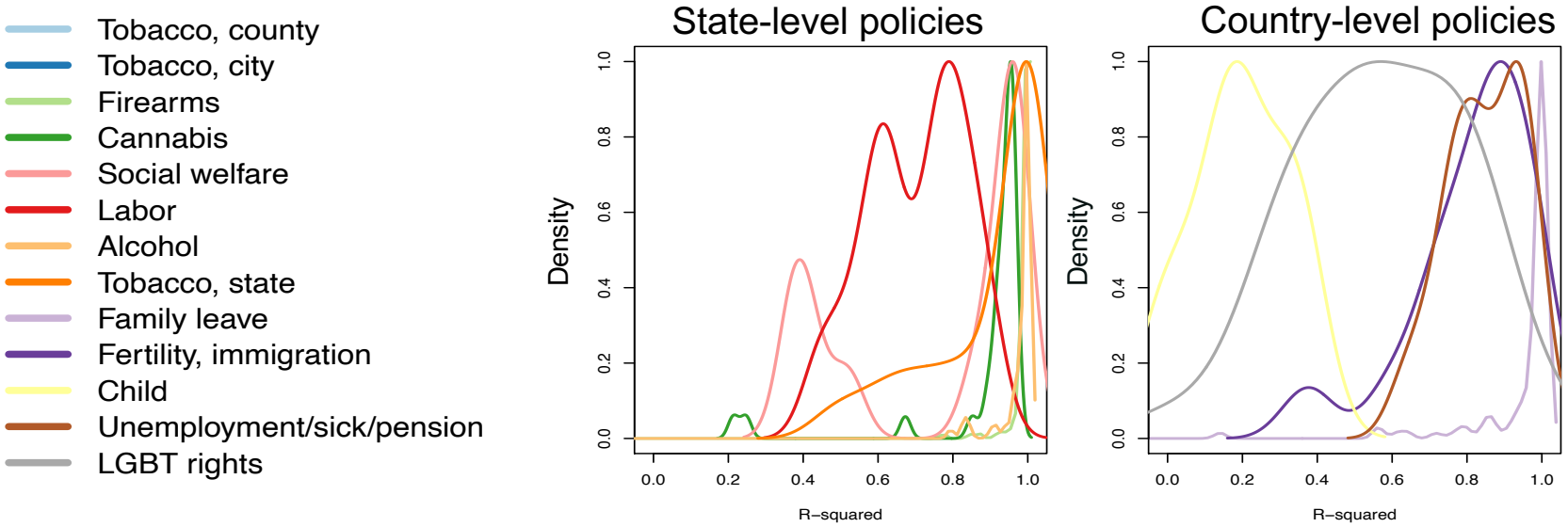
Results: quantifying policy co-occurrence

Little independent variation remaining after adjustment

Of 500+ policies, 65% with $R^2 > 0.90$

Substantial variance inflation

Across simulations, databases and policies, median variance inflation: 57-fold



Summary & interpretation

High degrees of co-occurrence are the norm

Adequate control for co-occurring policies → extreme variance inflation

Likely an underestimate of the problem

Exacerbated for subgroup analyses that are critical to evaluating equity impacts of social policies

Casts doubt on existing social policy studies

Need plausibly like-random or arbitrary variation

What approaches help to address policy co-occurrence?

How often are they used in practice?

Matthay et al., *Epidemiologic Reviews,* 2021
"What to do when everything happens at once: Analytic approaches to estimate the health effects of co-occurring social policies"

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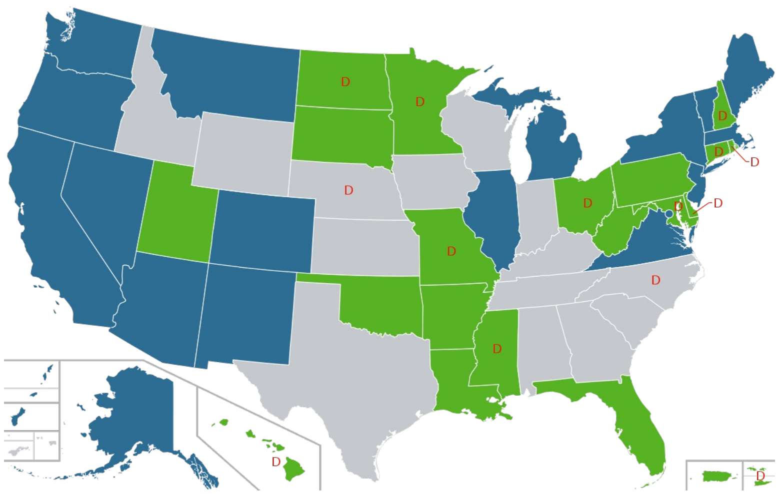
Analytic solutions to policy co-occurrence

	Approach	Studies
	Used at least one approach	35 (64%)
Disentangle	1. Adjust for clustered policies	18 (33%)
Disentangle	2. Restrict the study sample to the region of common support	2 (4%)
Disentangle	3. Define the outcome on subpopulations likely to be affected by the index policy but not other clustered policies	14 (25%)
Disentangle	4. Select a less correlated measure of policy exposure	7 (13%)
Disentangle	5. Use Bayesian methods	0 (0%)
Cluster	6. Identify and evaluate the impacts of policy clusters	4 (7%)
Cluster	7. Use an overall policy stringency or generosity score	3 (5%)
	Approaches not identified a priori	0 (0%)

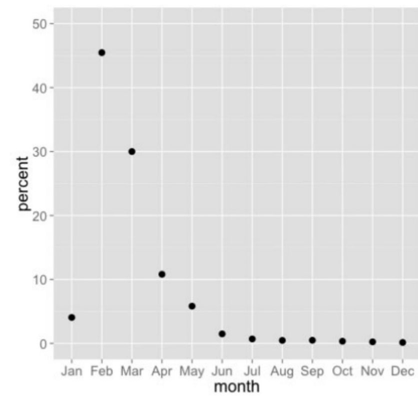
Ways forward



Legality of cannabis in the United States

- Legal for recreational use
- Legal for medical use
- Illegal
- D Decriminalized

Earned income tax credit disbursement



Short-term health outcomes

Overall diet	Cardiovascular
Vegetables	Systolic pressure
Fruit	Diastolic pressure
Meat	Forced Expiratory volume
Dairy	Pulse rate
Sodium	Metabolic
Saturated fat	HDL cholesterol
Diet variety	LDL cholesterol
Food security	Trigylcerides
Not enough food[a]	Haemoglobin A1c
No money for food[a]	Glucose
Health behaviours	Infection & immunity
Smoking[a]	C-reactive protein
Not try lose weight[a]	Lymphocytes
Cotinine	Illness[a]
Marijuana[a]	Respiratory infection[a]
Alcohol	Cold[a]
Not walk mile/week[a]	

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https://en.wikipedia.org/wiki/Legality_of_cannabis_by_U.S._jurisdiction . Rehkopf et al, IJE, 2014

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Thank you

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