Intergenerational Effects of Opioid Exposure and Child Health, Human Capital, and Well-being Using Linked Microdata

Jeff Hicks
(Toronto)

Gaëlle Simard-Duplain
(Carleton)

Jonathan Zhang
(Duke & NBER)

Angela Zheng
(McMaster)

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Disclaimer

The following material was developed as part of a project titled "Family and intergenerational impacts of poverty and income assistance" (University of British Columbia, University of Toronto, Carleton University, McMaster University), Province of British Columbia.

All inferences, opinions, and conclusions drawn in this paper are those of the authors, and do not reflect the opinions or policies of the Data Innovation Program or the Province of British Columbia.

Consequences of opioid crisis go beyond its impacts on drug users

- **Opioid crisis in North America** has reached unprecedented levels.

    - **US**: Over 800,000 deaths since 2000.

    - **British Columbia**: #1 cause of death for ages 10-59.

- Majority of research focuses on **direct costs** for drug users.

    - Less is known about consequences for **future generations**.

    - **Data barriers**: linking health and non-health data, and across generations.

- Opioid and drug abuse **during pregnancy is also rising**.

    - "*Hidden epidemic*" for the next generation.

    - **Total societal costs** are likely much larger and longer-lived.

This project

1. Construct **new measures** of in utero exposure to opioid use.

   - Prevalence **up to 10× greater** vs. convential measure.

2. Document **negative correlation** between exposure and children's outcomes.

   - Health, human capital and well-being.

   - From birth to age 17.

   - Robust to inclusion of controls.

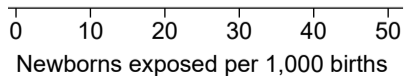3. Use **siblings design** to show correlation is not due to time-invariant unobserved heterogeneity.

Data: Over 900,000 births from 2000-2020

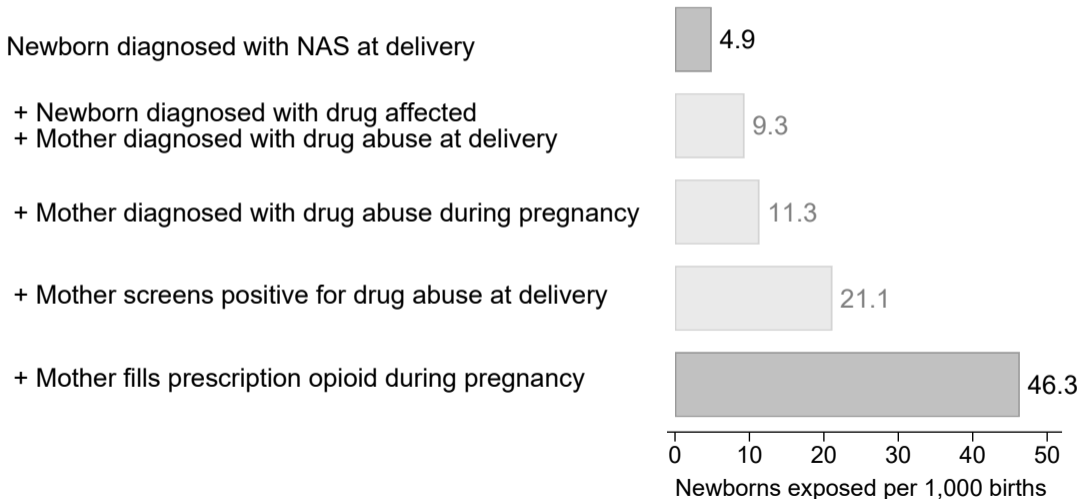British Columbia administrative data **linked at individual- and family-level**.

- Perinatal records

- Health records

  - Hospital and outpatient care

  - Prescriptions dispensed in outpatient pharmacies

- Education records

- Income assistance program

- Child protection services

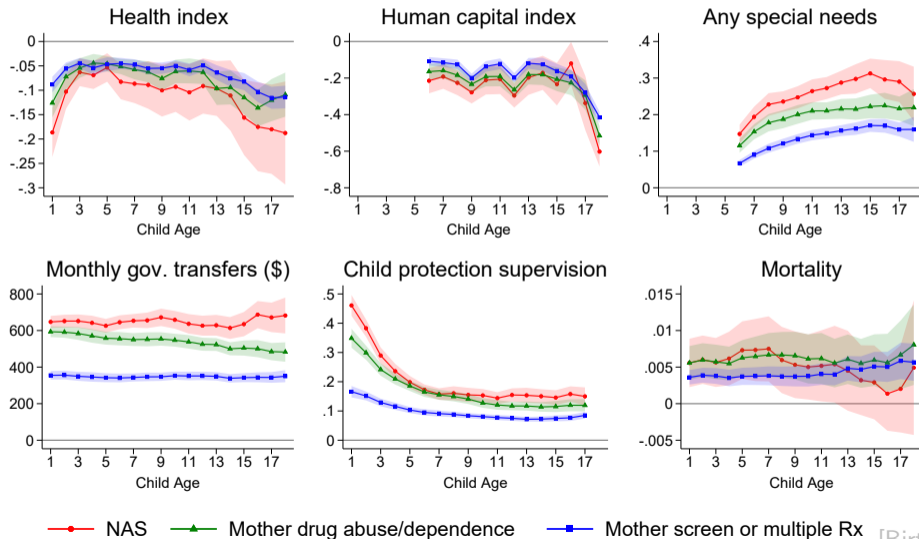## Finding 1: Potentially exposed newborns are significantly undercounted

Newborn diagnosed with NAS at delivery

4.9

0   10   20   30   40   50

Newborns exposed per 1,000 births

Finding 1: Potentially exposed newborns are significantly undercounted

Newborn diagnosed with NAS at delivery — 4.9

+ Newborn diagnosed with drug affected
+ Mother diagnosed with drug abuse at delivery — 9.3

+ Mother diagnosed with drug abuse during pregnancy — 11.3

+ Mother screens positive for drug abuse at delivery — 21.1

+ Mother fills prescription opioid during pregnancy — 46.3

Newborns exposed per 1,000 births

Finding 2: Exposure associated with negative and persistent LT outcomes

Finding 3: Siblings design suggests consequences may be causal

Table: Comparing Siblings Prenatally Exposed to Opioid Abuse to Not Exposed Siblings

	Dependent variable:							
	Newborn Health	Special Needs 6-12	Human Capital 6-12	Human Capital 13-18	Well-being 1-5	Well-being 6-12	Mortality 1	Mortality 12
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exposed	−0.225***	0.021***	−0.030*	−0.032	−0.062***	−0.016***	−0.0002	−0.001
	(0.014)	(0.005)	(0.016)	(0.027)	(0.005)	(0.005)	(0.001)	(0.001)
Mean (Non-Exposed):	-0.079	0.154	-0.254	-0.308	-0.412	-0.46	0.006	0.008
Observations	26,893	18,834	18,767	9,548	26,322	22,009	27,509	27,509

Notes: Newborn health is a predicted measure of one-year infant mortality using all two-way interactions of birthweight, APGAR, sex, labor induced, c-section, newborn length, head circumference, SGA, LGA, birth term, and newborn diagnoses, selected using LASSO. Health utilization, human capital, and well-being are aggregate measures.

- *Exposed*: Mother fills 3+ prescriptions during pregnancy, or more severe.

[Benchmark]

Conclusion

- Inform **broader societal costs** of opioid crisis.

  - Important for designing optimal opioid policies.

- Exploit rich **mother-child** administrative linkage.

  - As many as 46 newborns exposed per 1,000 births.

  - Even broad measure of exposure negatively associated with children's outcomes.

  - Comparisons across siblings yield similar findings.

    - **Ongoing work** exploiting birth order and timing.

- More research needed on policy solutions.

  - **Ongoing work** exploring timing in treatment of NAS.

Thank you!

gaelle.simardduplain@carleton.ca

Data source citations

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- British Columbia Ministry of Education [creator] (2021): K to 12 Student Demographics and Achievements V04. Data Innovation Program, Province of British Columbia [publisher]. Data extract. 2023.
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All exposure measures predict worse newborn health

Table: Different measures of in utero opioid exposure and newborn health outcomes

	Dependent variable:								
	Low Birthweight			Low Apgar			Small for Gestational Age		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
NAS diagnosis	0.133*** (0.007)			0.088*** (0.006)			0.108*** (0.007)		
Mother drug abuse pregnancy		0.123*** (0.006)			0.081*** (0.004)			0.085*** (0.005)	
Mother fills opioid prescription			0.040*** (0.003)			0.038*** (0.002)			0.027*** (0.002)
Mean (not exposed):	0.057			0.045			0.040		

Notes: Regressions include controls for year conceived, month conceived, 3 digit postal code (FSA), mother age bins, and parity. Robust standard errors are clustered at the FSA-level. Each entry is a separate regression comparing each measure versus mothers without any indication of opioid use (the comparison group).

Finding 2: Negative associations robust to inclusion of SES controls
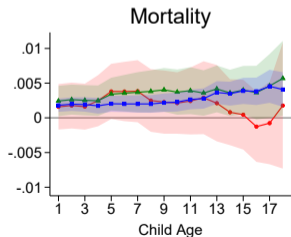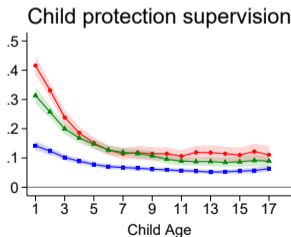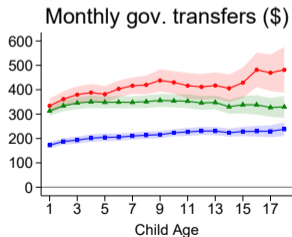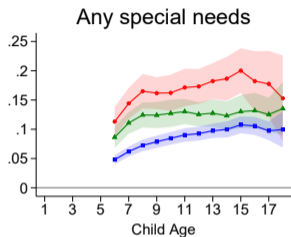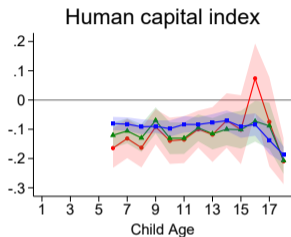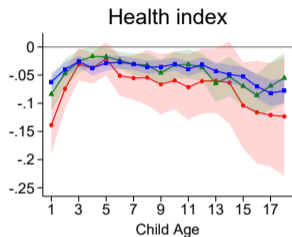
NAS — Mother drug abuse/dependence — Mother screen or multiple Rx

Benchmarking against early childhood policies

- How do the prenatal impacts on long-term outcomes compare to policies that improve outcomes?

	Opioid Abuse (Siblings Design) *reverse signed* (1)	+1Y Mother Educ (Currie & Moretti 2003) (2)	Head Start (Deming 2009, Bailey et al. 2021) (3)	$1,000 Infancy (Barr et al. 2022) (4)	1Y Medicaid (Goodman-Bacon 2021‡) (5)
LBW	−0.026	−0.010			
Test Scores	0.030		0.101	0.037	
HS Grad	0.014		0.086	0.023	0.013
Special Needs	0.021		0.059		
Earnings	≥ 0.029†		0.043	0.012	0.017

Notes: †: earnings effect implied by the impact of birthweight on earnings from Black et al. 2007.
‡: estimates are for white children receiving Medicaid between ages 0-10.

- Benefits of preventing prenatal exposure in newborns are comparable to benefits of successful child policies (highest MVPFs).
- Future work: What policies improve outcomes of exposed newborns (e.g., hospital screening/treatment)?