# Midlife Exposures to Social and Health Policies and Cognitive Impairment

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August 29, 2024

# Goal

Identify social and health interventions that can be delivered in different points in the life course to modify cognitive impairment/dementia risk.

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# Current toolkit

- Increasing number of longitudinal survey datasets with rich outcome measures (incl. biomarkers)
- Growing use of administrative dataset, linked across individuals-generations
- Causal inference methods (successfully applied to literature marking early life shocks)

# Challenges

- Available longitudinal data relatively small → little power identify meaningful effect sizes)
- Administrative data rarely collect cognition-related outcomes or life histories
- Causal inference toolkit challenged with multiple exposures that may substitute or complement each other, differential timing of effects

# The dream data infrastructure?

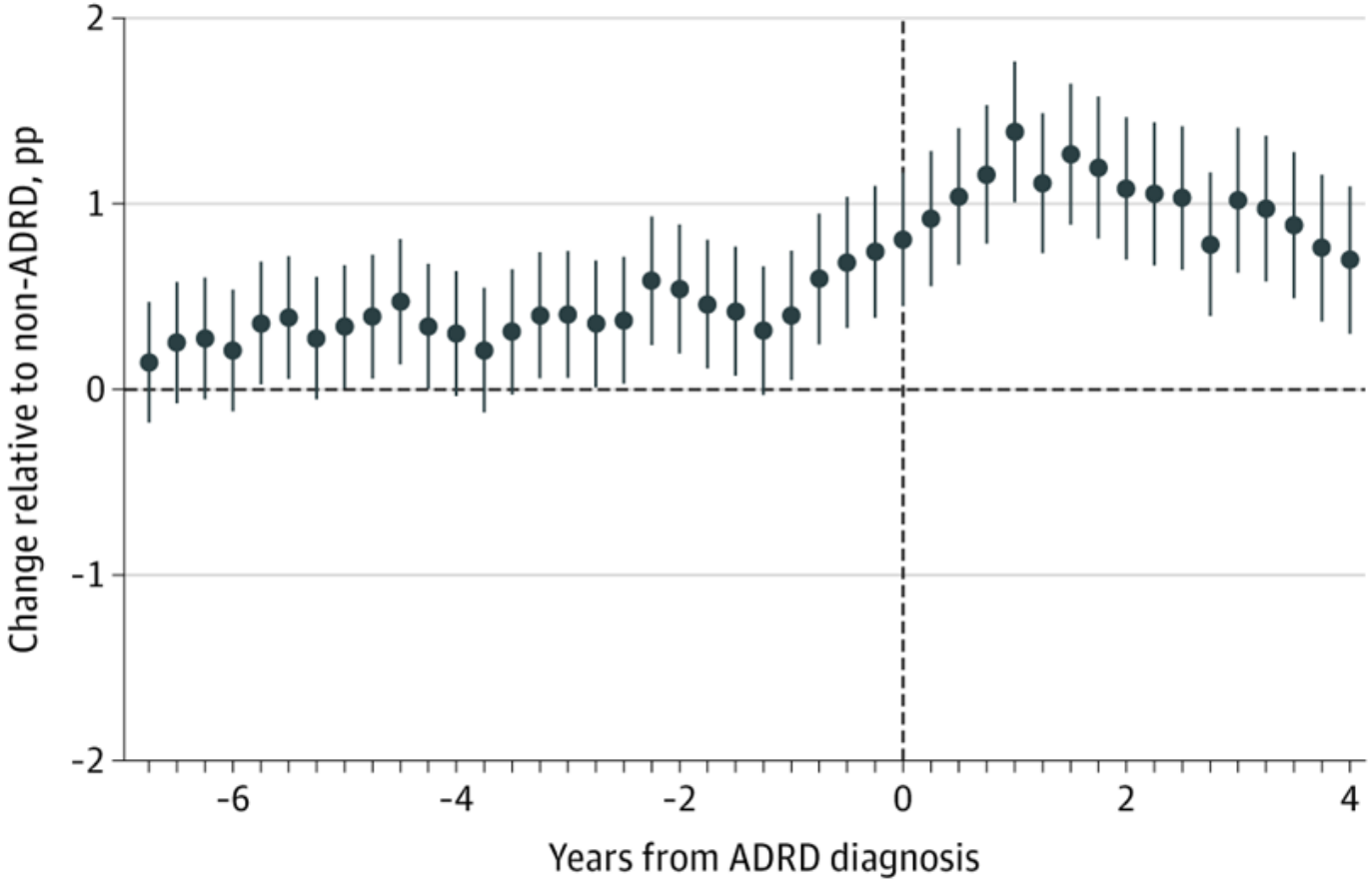
- VERY large, multi-year cohort infrastructure with retrospective and prospective components
  - Complete SES, migration, health, survey-based cognitive batteries
  - Deep dive samples for biomarkers, genetic information
  - Integration with administrative samples (e.g., tax records, Medicare claims, Census, Credit Scores)

- Flexible to perform:
  - Observational studies
  - Randomized-controlled trials (biomedical and social science)
  - Fusion design studies: validate survey-based cognitive questions to biomarkers (in levels and trends) to support population-based inferences

- "Aging moonshot"
  - Requires multiple-payers, data agreements, and unified assessment of returns to investment in both biomedical and social interventions

# Interim strategies: invest in proxies

- Idea: identify correlates cognitive decline that can be found or scaled up to large populations (bill payments, credit scores)
- Alternatively, can work with multiple measures of cognition (levels and trends) in fusion designs




Nicholas et al *JAMA IM* 2020

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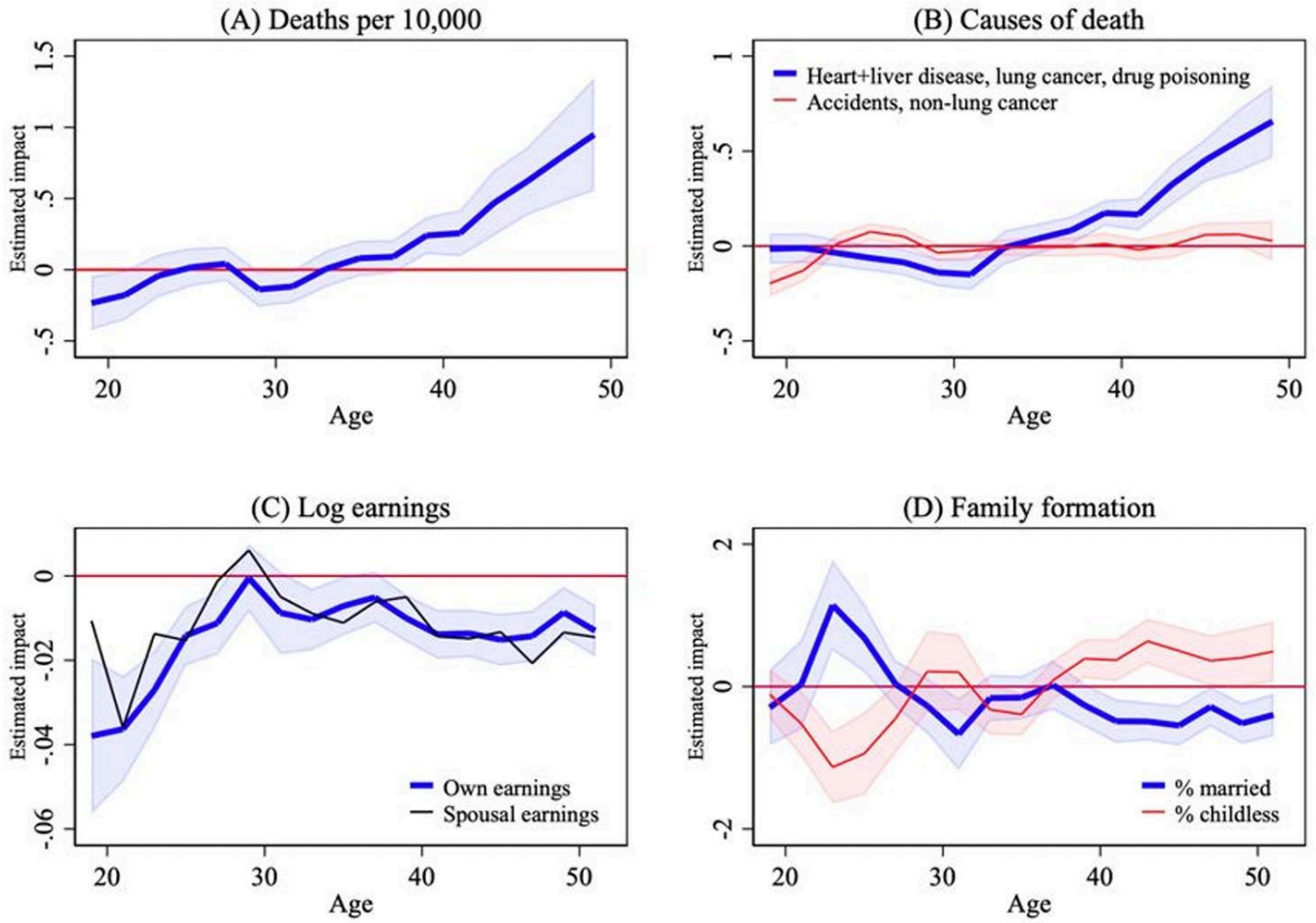
# Interim strategies: synthetic cohorts

- Idea: for specific birth location-year cohorts, estimate average migration trajectories, allowing assignment of policy exposure to average individual in a particular cell




Deaton *J Econometrics* 1985; Schwandt and von Wachter *NBER WP* 2023

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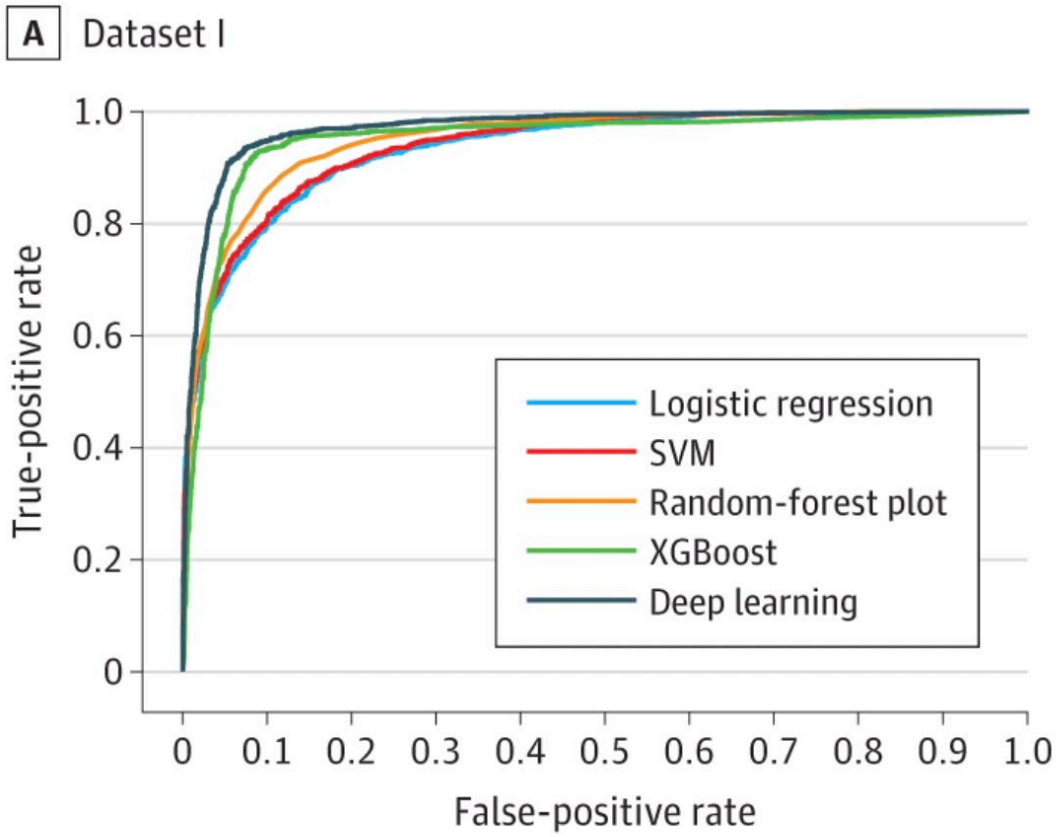
# Interim strategies: make the most of EHRs

- Idea: EHR data include rich free-text and differences in observation frequency which can be used to predict onset of dementia or cognitive decline




Wang et al *JAMA NO* 2021

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# Interim strategies: life course models

- Biological and epidemiologic insights to build parsimonious model of cognitive decline → scaffolding for analyses with imperfect data
  - Example: applying model of selection and scarring (Lleras-Muney and Moreau *Demography* 2022) to study of cumulative effects of pollution (Deryugina and Reif *NBER WP* 2023)

- Causal machine learning methods for heterogeneous treatment effects (across units and over time?) and interactions between exposures

# Thank you

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