

2022 PAPH Research Course

Natural Experiments

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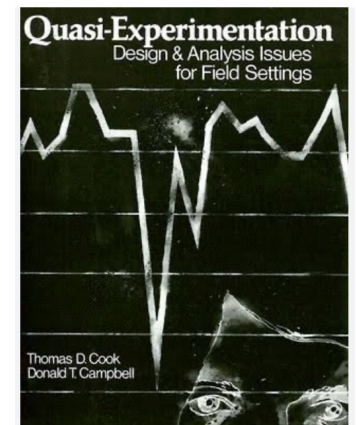
Behavioral Research Program
Division of Cancer Control and Population
Sciences

What is a natural experiment?

- “ways of evaluating interventions using unplanned variation in exposure to analyze impact” (UK Medical Research Council)
 - Intervention is not for research purposes
 - Attempt to achieve strong causal inference, ie “As if Randomized”
- For physical activity and public health, natural experiments are vital:
 - Many critical influences on PA cannot be explored with randomized studies
 - Helpful in understanding impacts of the built, economic, or policy environment
 - Can give insight into underlying mechanisms at multiple levels as well as serve as evaluation

History

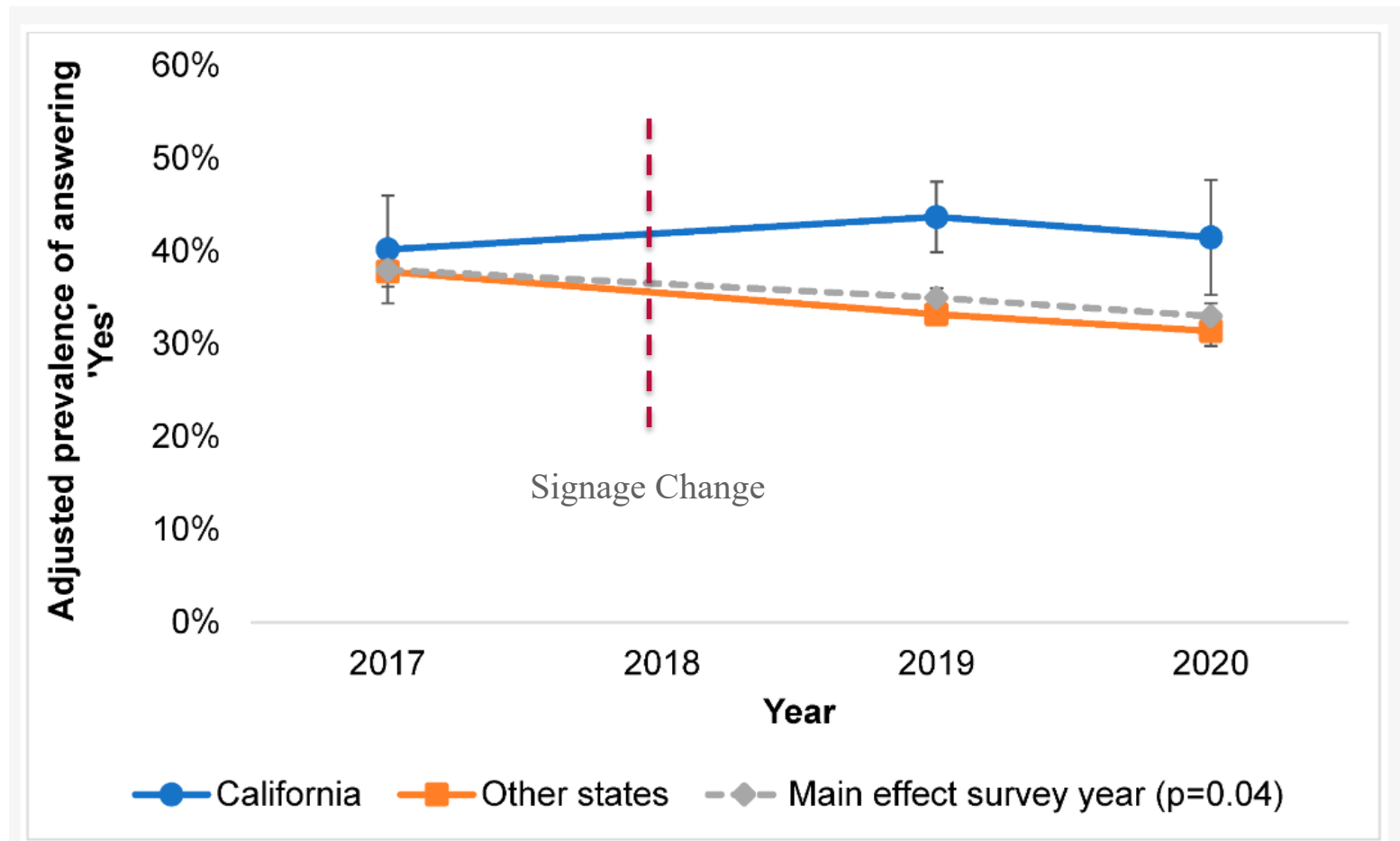
- Critical element of Public Health starting with Snow's pump handles
- But somewhat adopted/stolen 😊 by economists and political scientists despite important work by Cook, Campbell and others in the health and education settings
- [2021 Nobel prize](#):
 - “This year’s Laureates – **David Card, Joshua Angrist and Guido Imbens** – have shown that natural experiments can be used to answer central questions for society, such as how minimum wages and immigration affect the labour market. They have also clarified exactly which conclusions about cause and effect can be drawn using this research approach. Together, they have revolutionised empirical research in the economic sciences. “
- A useful text by Thad Dunning, 2016 “**Natural Experiments in the Social Sciences: A Design-Based Approach**”
- And from September 10th, 2023 NPR Planet Money



A Natural Experiment Analysis

- Budenz Berrigan, 2022 **“Awareness of Alcohol and Cancer Risk and the California Proposition 65 Warning Sign Updates: A Natural Experiment”**
IJERPH
- California has had point of sale warnings that alcohol increases risk of cancer since 1986
- In 2018, these signs were updated to include an informational P65 website link, and the update was associated with media coverage and increased enforcement of warning requirements
- Coincidentally, the NCI HINTS survey asked questions about awareness of the link between alcohol and cancer before and after the update
- So we were able to compare such awareness before and after this updated signage

Change in Awareness of Link between Alcohol and Cancer in California vs the rest of the US



Weaknesses of this study

- A single time point for baseline data
- Survey not designed to be representative at the State level
- Survey items changed from 2019 to 2020, so two follow-ups differed
- No assessment of actual exposure
- A very weak intervention
- No control for alcohol use status
- Initiated in 2016, mandatory in 2018 – so not clear when it all happened
- Non response bias related to HINTS survey response
- California differs from all other states in many ways

So does this meet the “As if randomized” goal?

A Natural Experiment in My Neighborhood

- Newly installed $\frac{1}{2}$ mile of sidewalk
- Three year process.
- Lawsuits!
- Press!
- Outcomes?



Further challenges for evaluating natural experiments

- Natural experiment design challenges:
 - Selective exposure, confounding factors, lack of randomization, choosing an appropriate control group
 - May be **time-sensitive** and need to collect baseline data for pre/post study designs
- Nevertheless, understanding natural experiment evaluation can:
 - Generate solutions to address common obstacles
 - Help researchers to tailor and improve study design
 - Strengthen evaluation of natural experiments

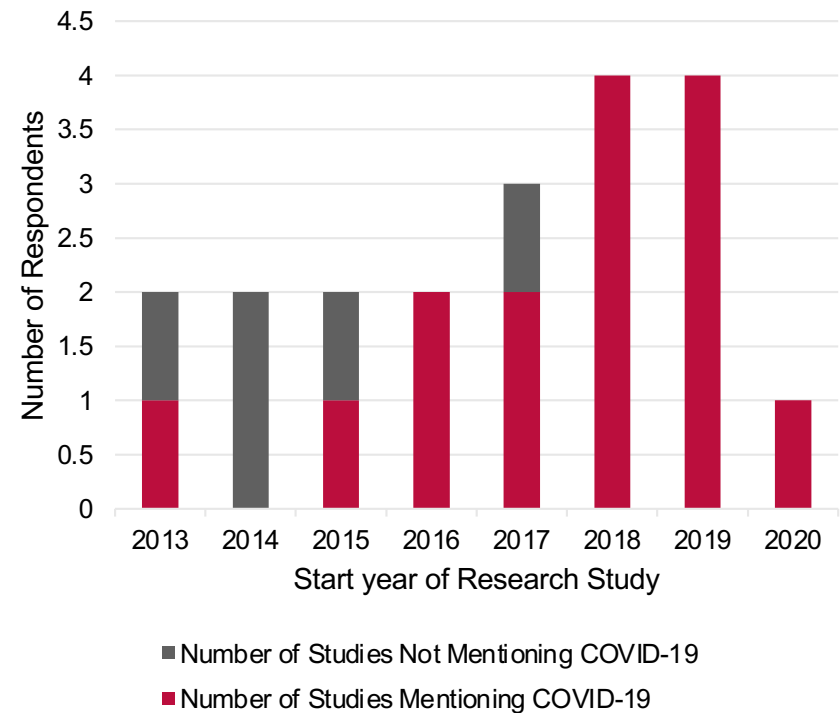
NOFOs for Natural Experiments

- [PAR-21-305](#): Time-Sensitive Obesity Policy and Program Evaluation (R01 Clinical Trial Not Allowed) – NIDDK, NCI, NHLBI
- [PAR-22-233](#): Time-Sensitive Opportunities for Health Research (R61/R33 Clinical Trial Not Allowed) – Many IC's
- [PAR-22-027](#): Mechanism for Time-Sensitive Drug Abuse Research (R21 Clinical Trial Optional) - R21's - NIDA
- [RFA-ES-23-004](#): Time-Sensitive Research Opportunities in Environmental Health Sciences (R21 Clinical Trial Not Allowed) – R21's – NIEHS
- Parent and a scattering of Policy related NOFO's are also potential funding Targets when time is not so critical

Time-Sensitive Obesity Policy Program and Evaluation (TSOPPE)

- NIDDK-led PAR with NCI and NICHD Participation: [PAR-21-305](#)
 - Primary contacts: [Mary Evans](#) (NIDDK), [Layla Esposito](#) (NICHD), [Marissa Shams-White](#) (NCI), [David Berrigan](#) (NCI)
- Investigating public policies (organizational, local, state, national) and their impact on obesity related behaviors (physical activity, diet, etc.)
- Grants are time-sensitive and require minimum delay for beginning data collection
- 22 total grants from 2013 to 2020
 - 20 survey responses
 - 15 mentioned COVID-19 impacts

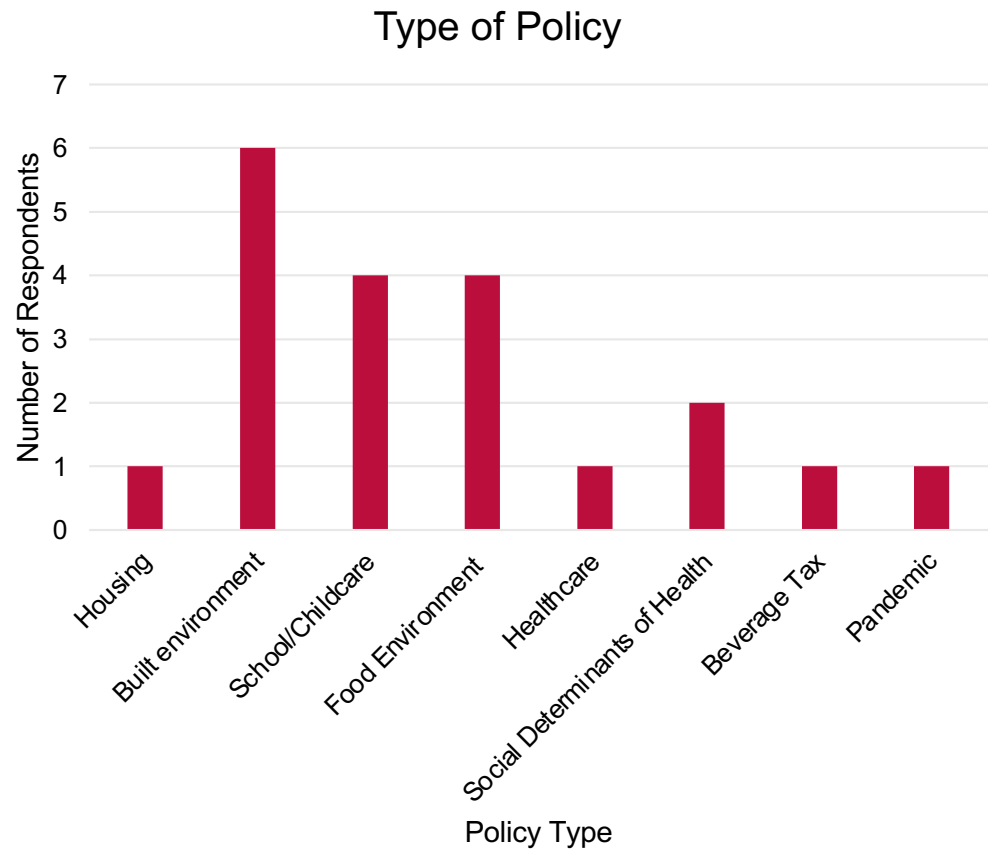
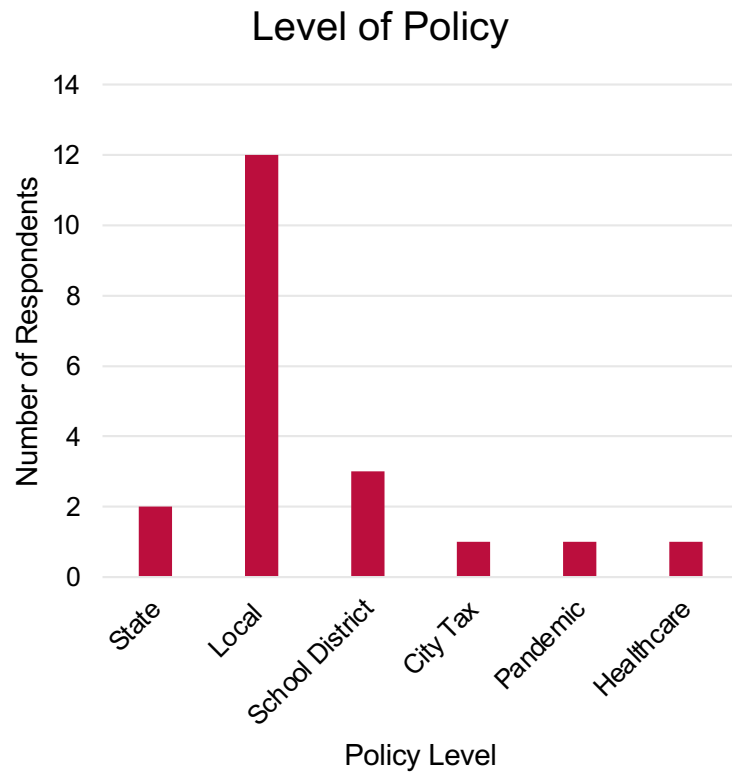
Mention of COVID-19 Impact vs. Study Start Year



Example time-sensitive Natural Experiment grants with PA themes

- The Impact of Improvements in Built- and Social-Environments and Housing on Obesity in Public Housing Residents: Evidence from a Natural Experiment in South Los Angeles (Datar, USC)
- Evaluating the Implementation of the Diabetes Prevention Program in an Integrated Health System (Fitzpatrick, Kaiser)
- Health and Economic Effects of Light Rail Lines: A Natural Experiment (Fortmann, Kaiser)
- Evaluating the Effects of Municipal Funding of Safe Routes to School Infrastructure on Child Physical Activity: A Natural Experiment (Hoelscher, UTHSC)
- Impact of Park Renovations on Physical Activity and Community Health in NYC (Huang, CUNY)
- Physical Activity Impacts of a Planned Activity-Friendly Community: The What, Where, When and Why of Environmental Approaches to Obesity Prevention (Ory et al. TAMU)
- Impact of ecological park restoration on health in low-income neighborhoods: A natural experiment (Pearson, MSU)
- Impacts of Later High School Start Times on Adolescent Weight and Weight-Related Behavior (START) (Windome, U. Minn.)

Policy Level and Type



Materials and Methods

- Survey components:
 - 1) Summary of award and progress
 - 2) List of publications
 - 3) Implementation barriers**
 - 4) Successes, challenges and lessons learned**
 - 5) COVID-19 related challenges and opportunities**
- Qualitative content analysis:
 - Themes were coded from 6 categories found in 3 of the questionnaire questions
 - Theme frequency tabulated
 - Exemplary quotes were extracted

Lessons and Adjustments

Lesson/Adjustment	Example
Data Collection Methods	"A lesson learned is to collect emails as a form of contact since people don't normally change email addresses."
Recruitment and Retention Methods	"Other adaptations we made to the recruitment and retention strategy included the addition of four study sites and recruitment of a supplemental sample cohort to account for baseline participants moving out of the area."
Study Design	"I might also have sought to construct a synthetic control rather than a single similar but not too distant city to minimize potential contamination"
Community Rapport	"building good relationships with our study participants and communities is critical to the successful completion of this study."
Staff	"Hiring local, professional interviewers was key"

Some top line findings

- Continuing attention to participant recruitment and retention methods and data collection methods can help to strengthen natural experiment evaluation
 - Flexible methods may increase evaluation resiliency
- Good community rapport was a frequently mentioned success and crucial component for studies
- Disruptions like the COVID-19 pandemic may pose unique challenges and create unique opportunities
 - As expected, COVID-19 restricted in-person events, thereby delaying evaluation of participants and exacerbating staffing challenges

More tidbits

- Funding of these natural experiment grants is comparable to the NCI pay line, but they demand excellent grantsmanship
- What does it mean to strive for “as if randomized”
- Control groups a challenge
- Natural Experiment thinking and Policy
Implementation/Disimplementation Science could be better integrated
- Aging but still useful material from the ODP P2P [Methods for Evaluating Natural Experiments in Obesity](#) Workshop and associated summary paper by Emmons et al.
<https://www.acpjournals.org/doi/10.7326/M18-0501>
- Consider some work like this to increase the influence of your research

Questions and Discussion

- Ask away.
- Can you share some policy and built environment topics that are poorly evaluated?
- Anything happening in your community or state?



Thank You!

**Feel free to contact me with
questions:**

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