Introduction

- What is a natural experiment?
  - "…any event [or intervention] not under the control of the researcher that divides a population into exposed and unexposed groups." Craig et al., 2017, MRC
  - Combines features of RCT and observational studies Albers et al., 2023
- Under-utilized in behavioral sciences
  - Most literature focuses on shorter time frames and individual outcomes Crane et al., 2020
  - Complex policy/systems/environment interventions cannot always be evaluated with an RCT Albers et al., 2023
- Study design and outcomes can be difficult.

Introduction

- Advantages
  - Ability to evaluate large-scale implications of policies, systems, and environments – RCT designs are not always possible
  - Generalizability of interventions is high
- Disadvantages
  - Lack of control with intervention implementation
  - Comparison groups
  - Recruitment and retention
  - Length of exposure

Presentations

- **A Natural Experiment in Active Transportation: Lessons Learned from the Houston Travel-Related Activity In Neighborhoods (TRAIN) Project**
  - Abiodun Oluyomi, PhD, Baylor College of Medicine
- **Lessons Learned from Conducting a Natural Experiment of the Effects of Urban Cycling Infrastructure Expansion on Active Travel Behaviors in Mexico City: The Good, The Bad, and The Ugly**
  - Deborah Salvo, PhD, The University of Texas at Austin
- **Taking it to the STREETS: Lessons Learned from Evaluating Infrastructure to Increase Active Commuting to Schools**
  - Leigh Ann Ganzar, DrPH, MPH, Professional Data Analysts

A Natural Experiment in Active Transportation: Lessons Learned from the Houston Travel-Related Activity In Neighborhoods (TRAIN) Project.

Abiodun Oluyomi, PhD

Baylor College of Medicine, USA

The TRAIN Study

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Texas A&M Transportation Institute

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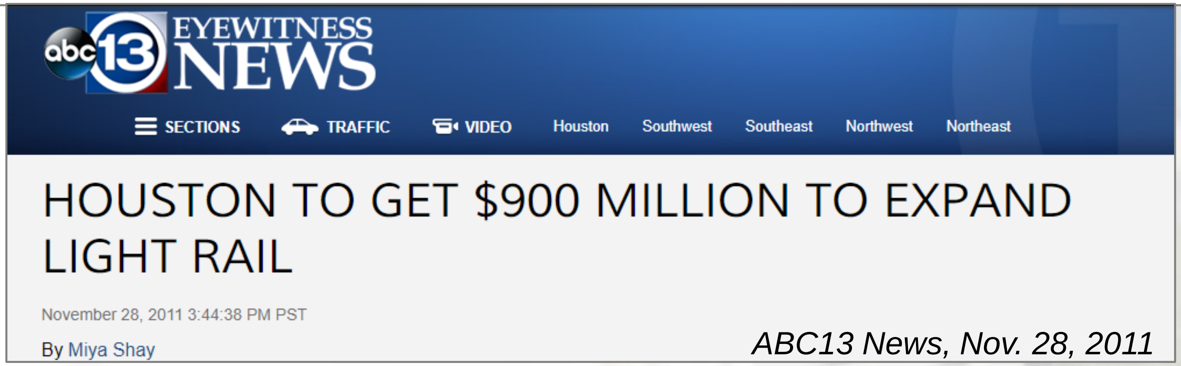
The TRAIN Study


EYEWITNESS NEWS

SECTIONS TRAFFIC VIDEO Houston Southwest Southeast Northwest Northeast

HOUSTON TO GET $900 MILLION TO EXPAND LIGHT RAIL

November 28, 2011 3:44:38 PM PST

By Miya Shay

ABC13 News, Nov. 28, 2011

Can we leverage this for physical activity research?

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The Rationale/Significance

Literature/Gap

- Suboptimal physical activity in US adults
- Mass transit use correlated with increased physical activity
- Promoting mass transit may help incorporate physical activity into daily life
- Much remains unknown about the transit use-physical activity association

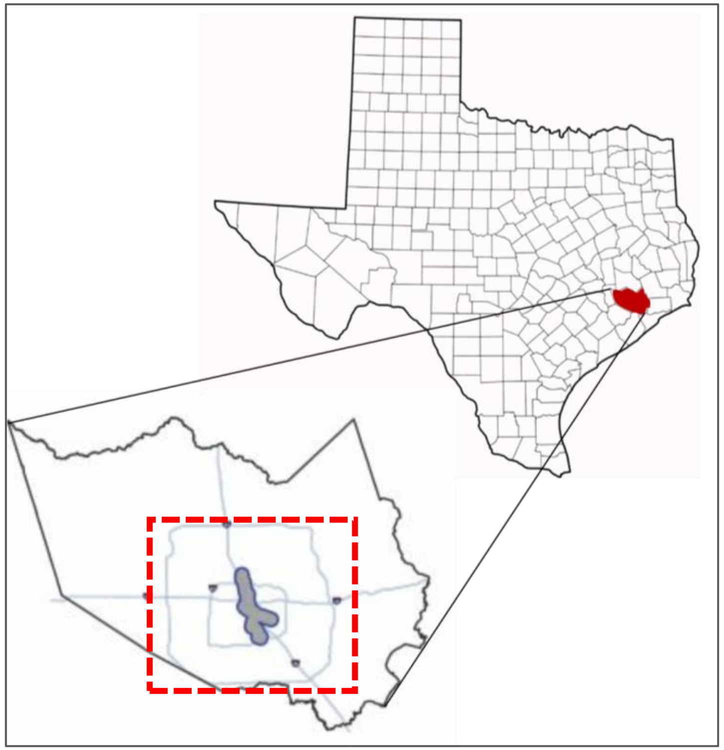
What We Proposed

Conduct a **natural experiment** to answer these questions:

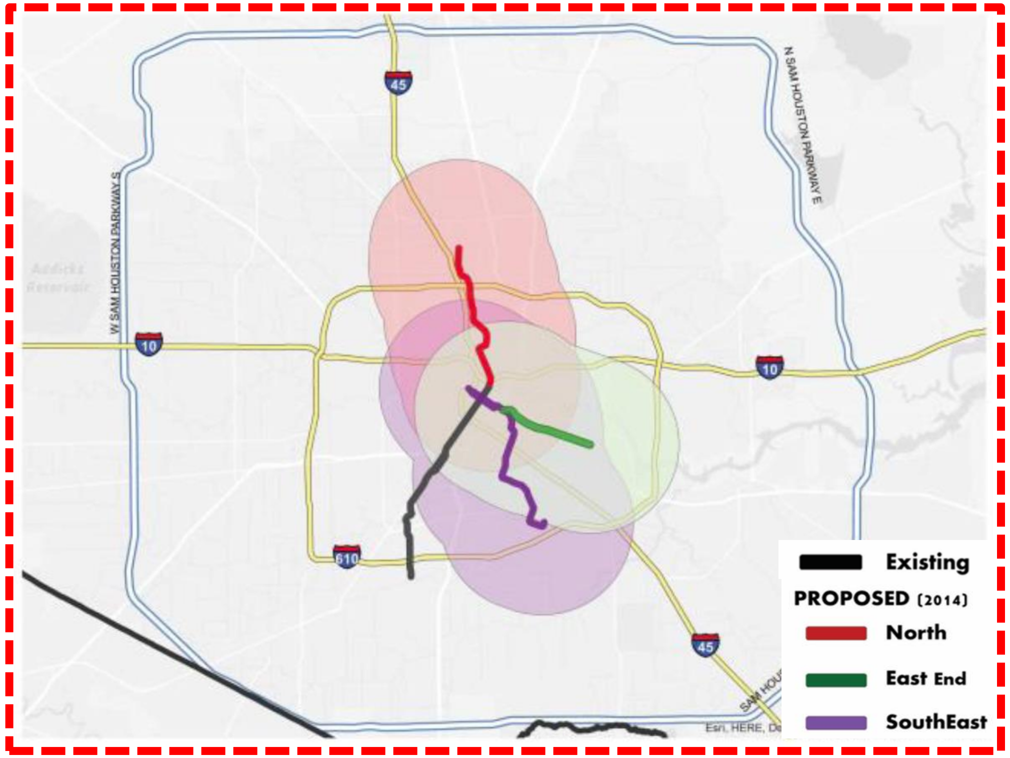
1. Will light rail availability influence transit use?
2. Will transit use influence overall physical activity?
3. What will make transit-related physical activity likely?
4. Will there be differences by population subgroups?

The Study Area

Harris County, TX
Population: 4.455 million (2014)



Study Area
Study Area (zoomed in; 3-mile buffer)



Harris County, TX

Most populous county in Texas and the third-most populous county in the United States

Harris County: more population than 26 states

https://budget.harriscountytx.gov/doc/Budget/fy2019/FY19_Population_Report.pdf
https://en.wikipedia.org/wiki/Harris_County,_Texas#:~:text=Harris%20County%20is%20a%20county,county%20in%20the%20United%20States.

- **Three new light rail lines:**
  - 15 miles of track and
  - 27 new stations

Methods

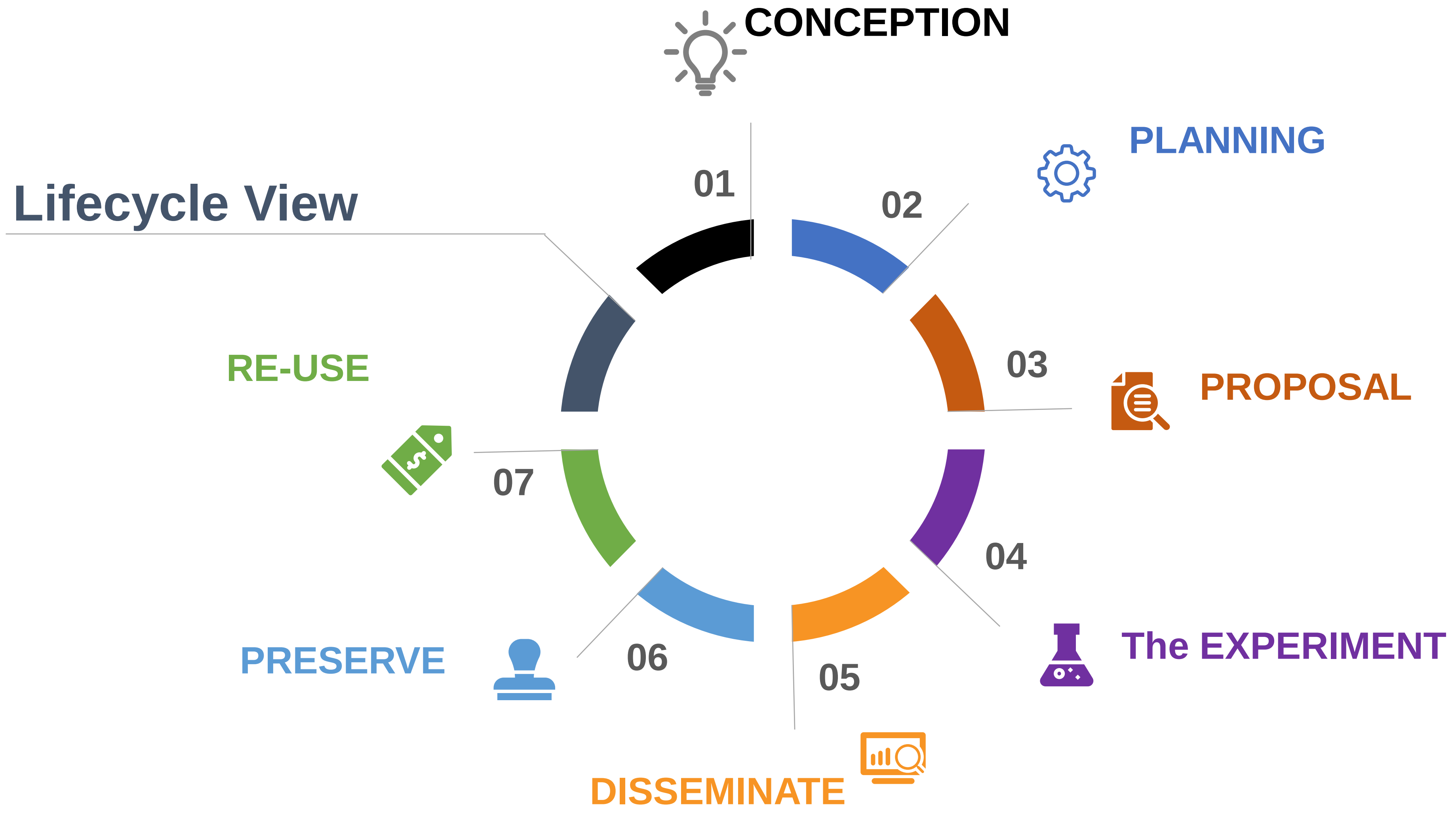
- Longitudinal cohort design, with four measurement waves over four years
- Participants recruited via telephone, print media ads, community outreach, door-to-door
- Adults (18+) residing within 3 miles of one of the new lines
- Survey administered via snail mail (proposed)

TRAIN Study Measures		
Level	Instrument	Measurement Purpose
Individual	Self-report questionnaire	• Perceived neighborhood characteristics • Transportation attitudes • Demographics • Physical activity
	7-day travel diary	Usual travel patterns and travel-related behavior
	Accelerometer	Physical activity
Environment	Neighborhood Audit (St. Louis Audit Tool; Analytic Version)	Micro-scale environmental attributes
	Geographic Information Systems (GIS)	Macro-scale environmental attributes

PART 2

Lessons Learned

Lessons Learned: 7-Stage Research Lifecycle

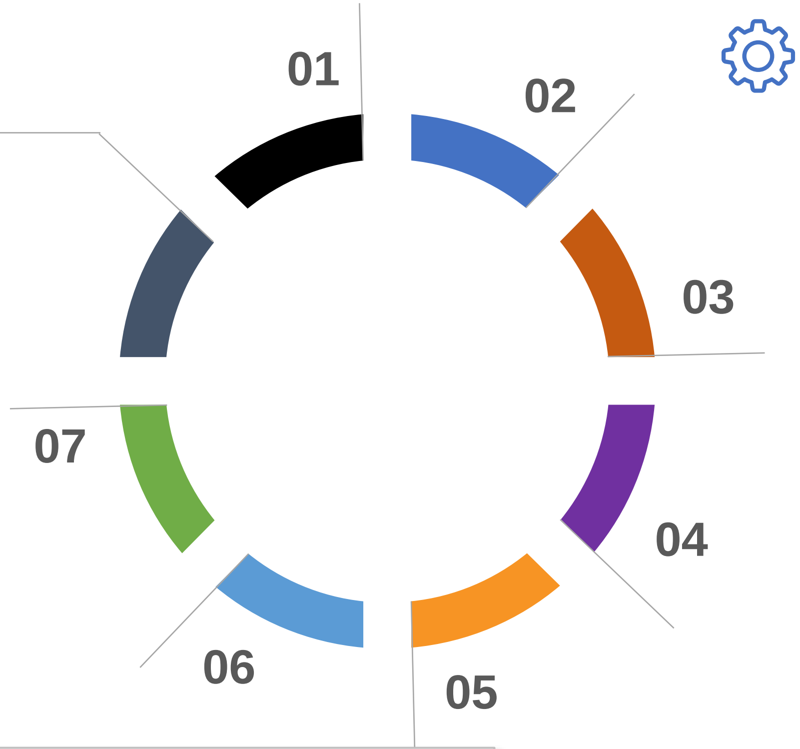


Lessons Learned: Conception & Planning

CONCEPTION
- Ideas
- Collaboration

PLANNING
- Networking
- Partnerships

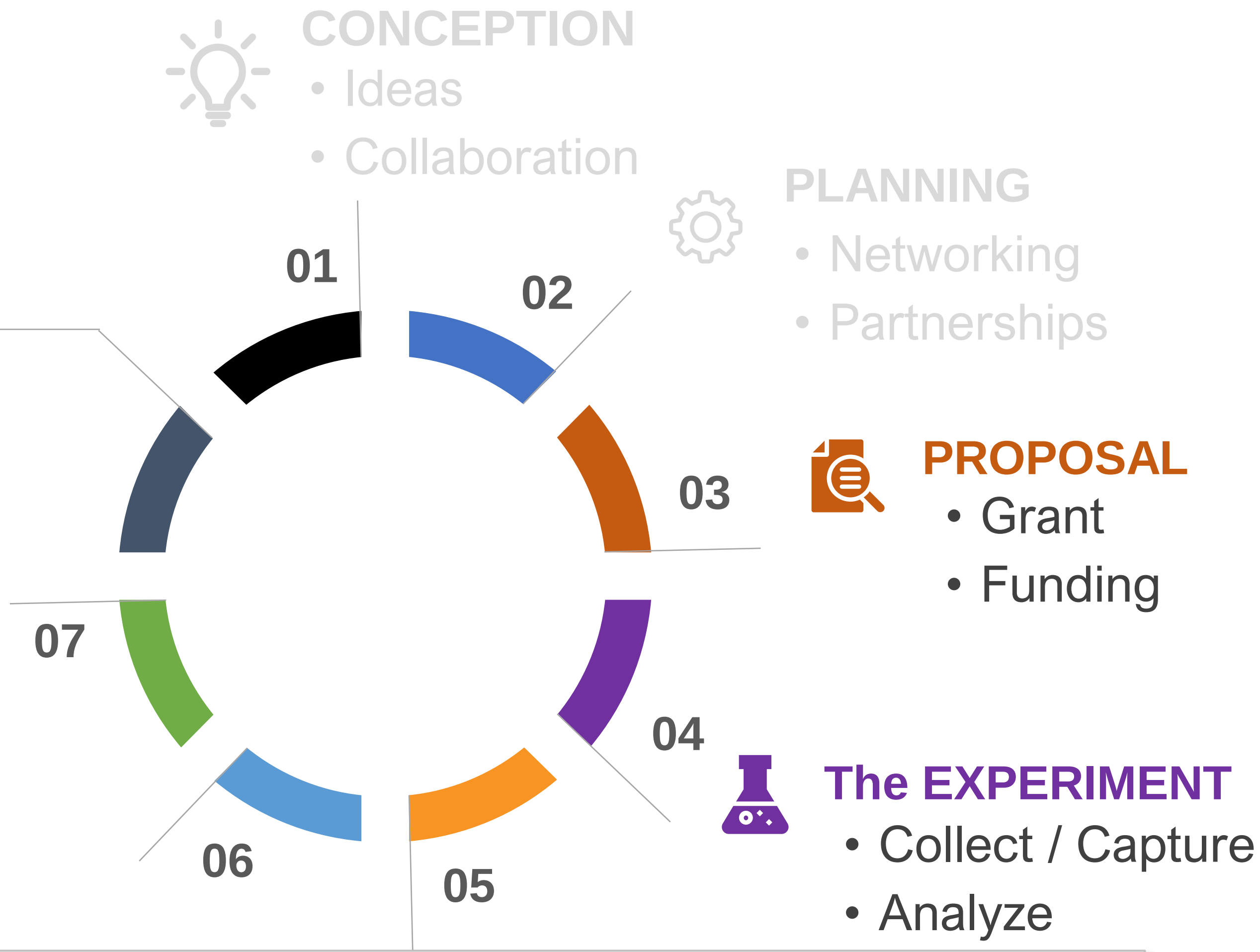
7-Stage Lifecycle



1. **Ideas tethered to the real-world processes**
2. **Limited options: collaborations/partners**
3. **Limited control over schedules: networking**

Lessons Learned: Proposal & The “Experiment”

7-Stage Lifecycle

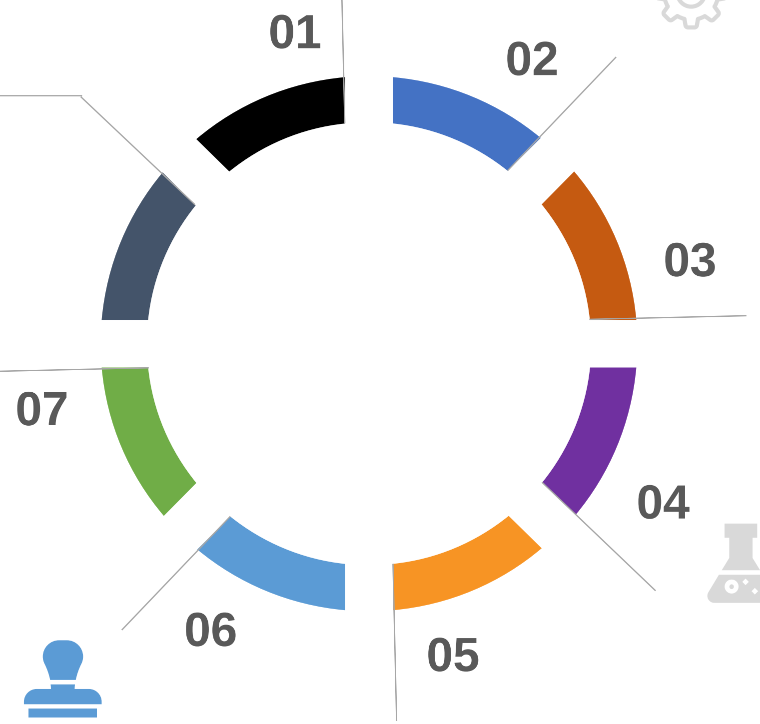


1. **Extra attention: partners’ different norms and processes**
2. **Recruitment plans versus what is feasible** (*too creative?*)
3. **Policy/govt. timeline | Natural / Human-made Hazards** *(Force majeure?)*

Lessons Learned: Dissemination & Preservation (Data)

7-Stage Lifecycle

1. **Sharing:** mindful of partners' policies, best practices
2. **Publishing:** permission or clearance may be needed
3. **Report back** considerations



CONCEPTION
- Ideas
- Collaboration

PLANNING
- Networking
- Partnerships

PROPOSAL
- Grant
- Funding

EXPERIMENT (RESEARCH)
- Collect / Capture
- Analyze

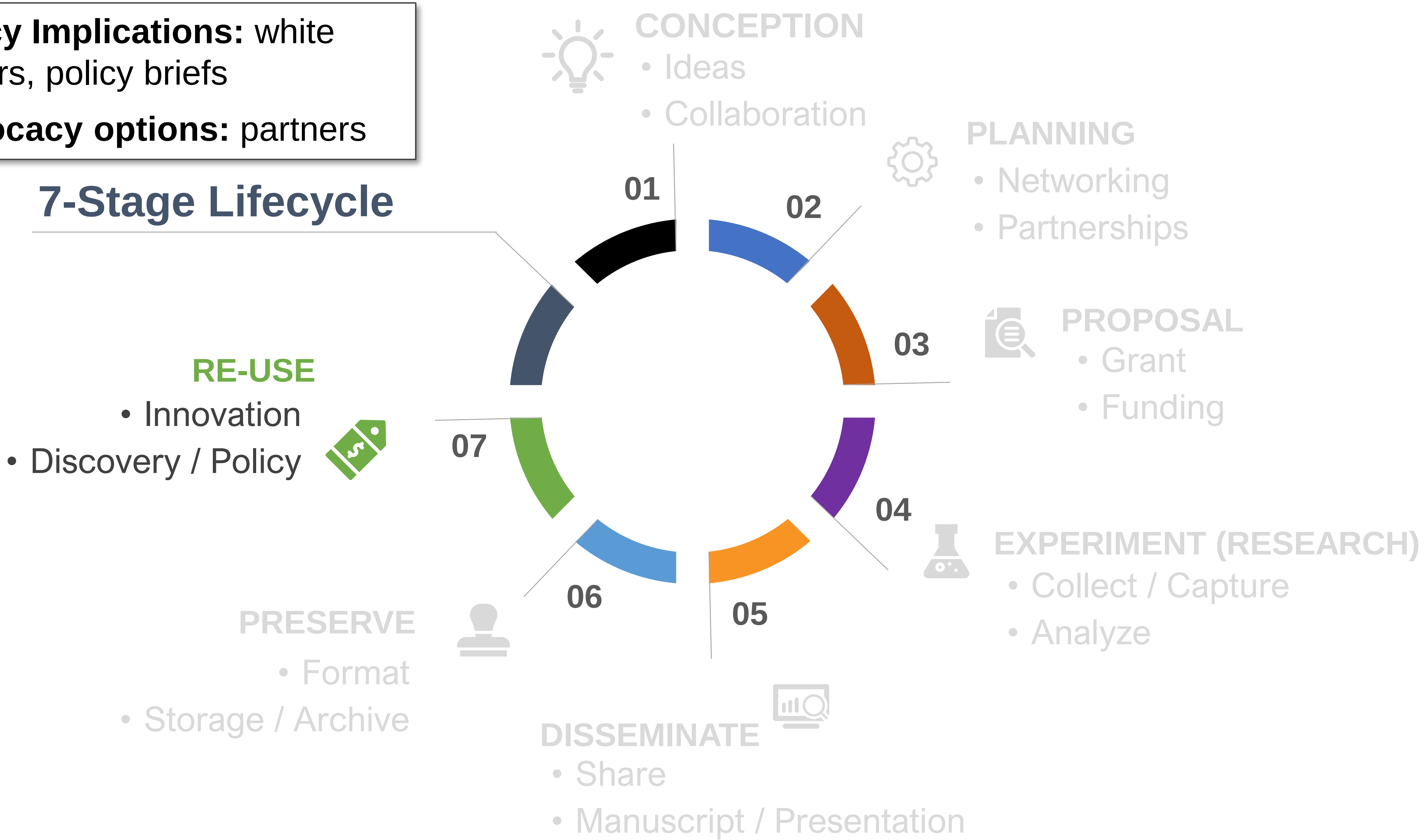
DISSEMINATE
- Share
- Manuscript / Presentation

PRESERVE
- Format
- Storage / Archive

Lessons Learned: Re-Use (Impact)

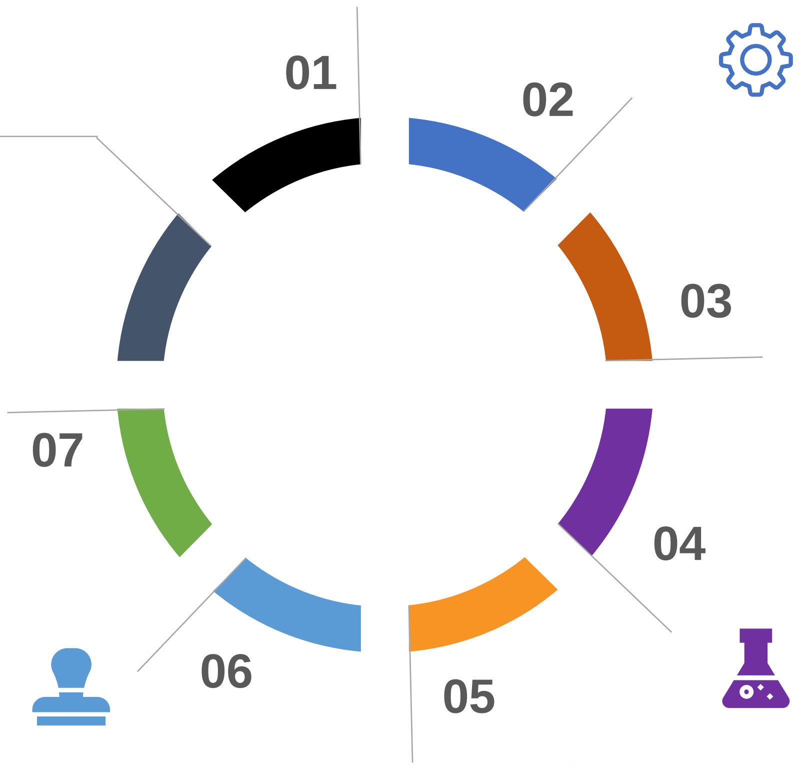
1. **Policy Implications:** white papers, policy briefs
2. **Advocacy options:** partners

7-Stage Lifecycle



Lessons Learned: 7-Stage Research Lifecycle

Lifecycle View



CONCEPTION
- Ideas
- Collaboration

PLANNING
- Networking
- Partnerships

PROPOSAL
- Grant
- Funding

EXPERIMENT (RESEARCH)
- Collect / Capture
- Analyze

DISSEMINATE
- Share
- Manuscript / Presentation

PRESERVE
- Format
- Storage / Archive

RE-USE
- Innovation
- Discovery / Policy

Acknowledgments

Houston TRAIN Study Team

- Harold “Bill” Kohl, PhD (PI)
- Casey P. Durand, PhD
- Kelley Pettee Gabriel, PhD
- Ipek Sener, PhD
- Deanna Hoelscher, PhD
- Deborah Salvo, PhD
- Anna Porter, PhD
- Xioahui Tang, PhD
- Marlon Armstrong
- Sam Kreis, MPH
- Ho Han, PhD
- Michael Robertson, MPH
- *And so on…*

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- R01; NIDDK (Kohl, PI)
- UTHealth Houston - Michael & Susan Dell Center for Healthy Living

TRAIN Study
Travel Related Activity In Neighborhoods

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The University of Texas
Health Science Center at Houston
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Lesson from a natural experiment of urban cycling infrastructure expansion on active travel behaviors in Mexico City: *the good, the bad, & the ugly*

DEBORAH SALVO, EUGEN RESENDIZ, ALEJANDRA JAUREGUI

People, Health & Place Lab

The University of Texas at Austin
Kinesiology and Health Education
College of Education

OUR TEAM & FUNDERS

Deborah Salvo

Eugen Resendiz

Alejandra Jauregui

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Instituto Nacional de Salud Pública

This project was funded by Drexel University's Urban Health Collaborative, through the SALURBAL (Salud Urbana en America Latina) Collaborative – sponsored by The Wellcome Trust (UK).

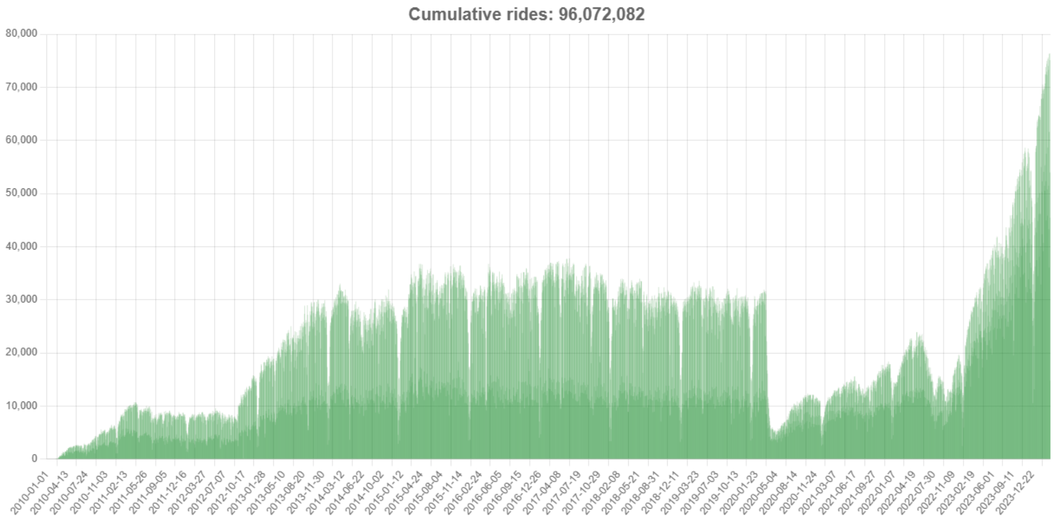
BACKGROUND

- Most research examining urban design elements linked with active travel behaviors has focused on **walking behaviors**; and stems from **high-income countries**.

- ***Cycling for transport*** is a promising source of physical activity as it provides a **healthy and sustainable travel** option that enables longer trips than walking.

MEXICO CITY’S PUBLIC BICYCLING-SHARING PROGRAM: *ECOBICI*

- Launched in 2009
- Originally ran by the **Ministry of the Environment**
  → now by the **Ministry of Urban Mobility**.
- 2019:
  - >480 stations
  - >4500 bicycles
  - >30,000 average daily trips



Plan A: The Ecobici Expansion Evaluation Study in Mexico City

Aim:

- To assess the effect of EcoBici program expansions on ***cycling for transportation***, ***total active transport***, & ***overall physical activity***.

Plan A: The Ecobici Expansion Evaluation Study in Mexico City

Component 1

Area-level quasi-experimental study

- To measure longitudinal trends in **bicycle ridership** across three areas of the city (original EcoBici service area, EcoBici expansion area, and control area), before and after the implementation of Ecobici expansions.

Component 2

Individual cross-sectional study

- To investigate **which transportation modes are substituted** when transitioning to Ecobici
- To test differences in overall and **transport-related physical activity** between Ecobici users, other cases of bicycle riders and non-bicycle users.

Component 3

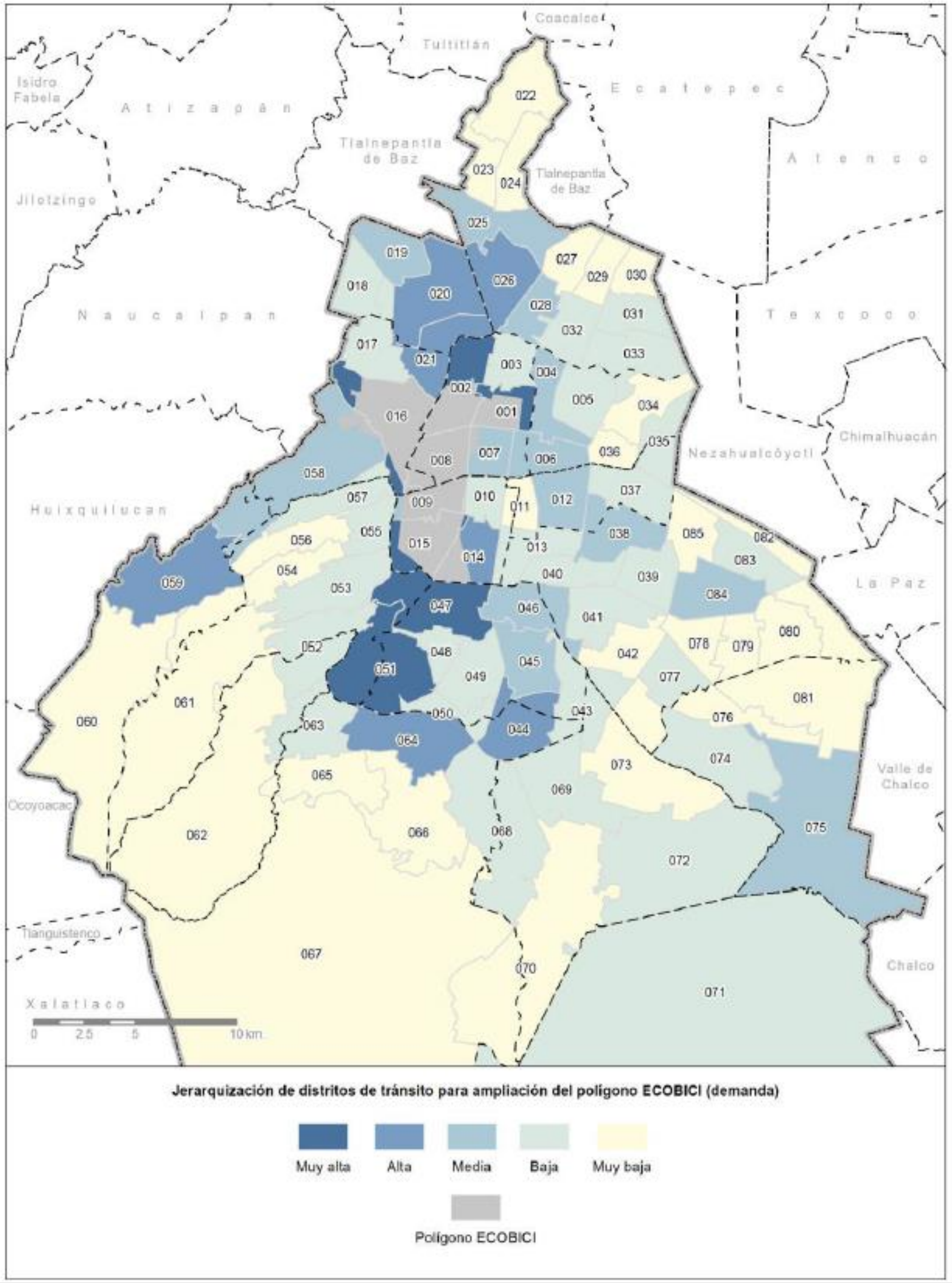
Secondary data analysis

- To explore longitudinal variations in the demographics of Ecobici users, travel information and the contribution of Ecobici to meeting the PA recommendations among users.

I. Area-level quasiexperimental study

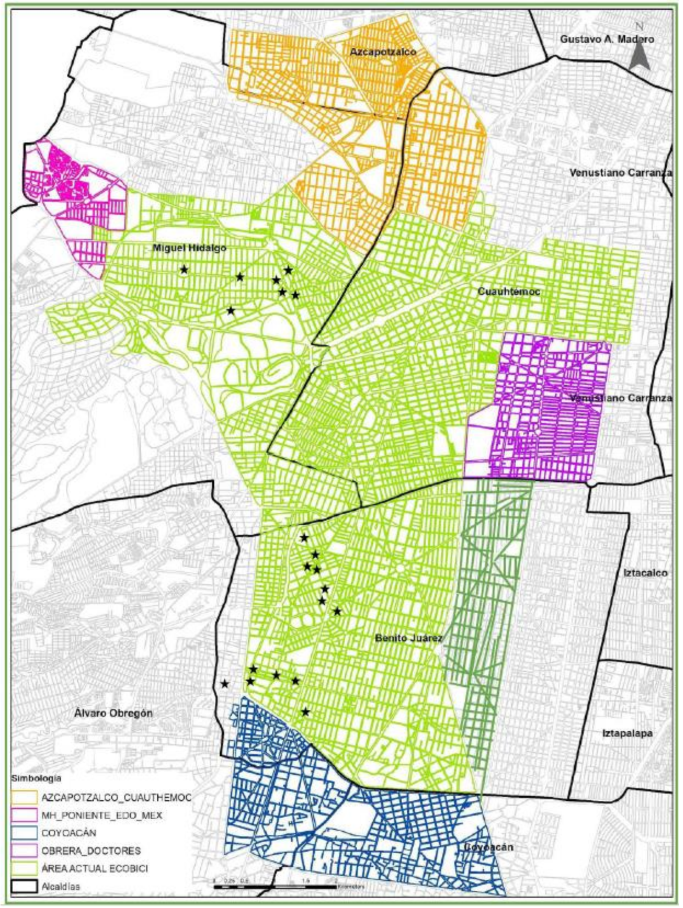
To measure longitudinal trends in <u>**bicycle ridership**</u> across three areas of the city

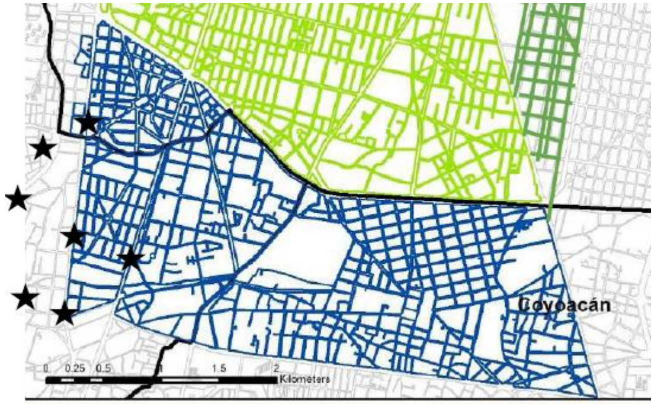
1. Ecobici area
2. Priority areas for Ecobici expansion
3. Comparison areas (i.e. where Ecobici expansions are not being considered).



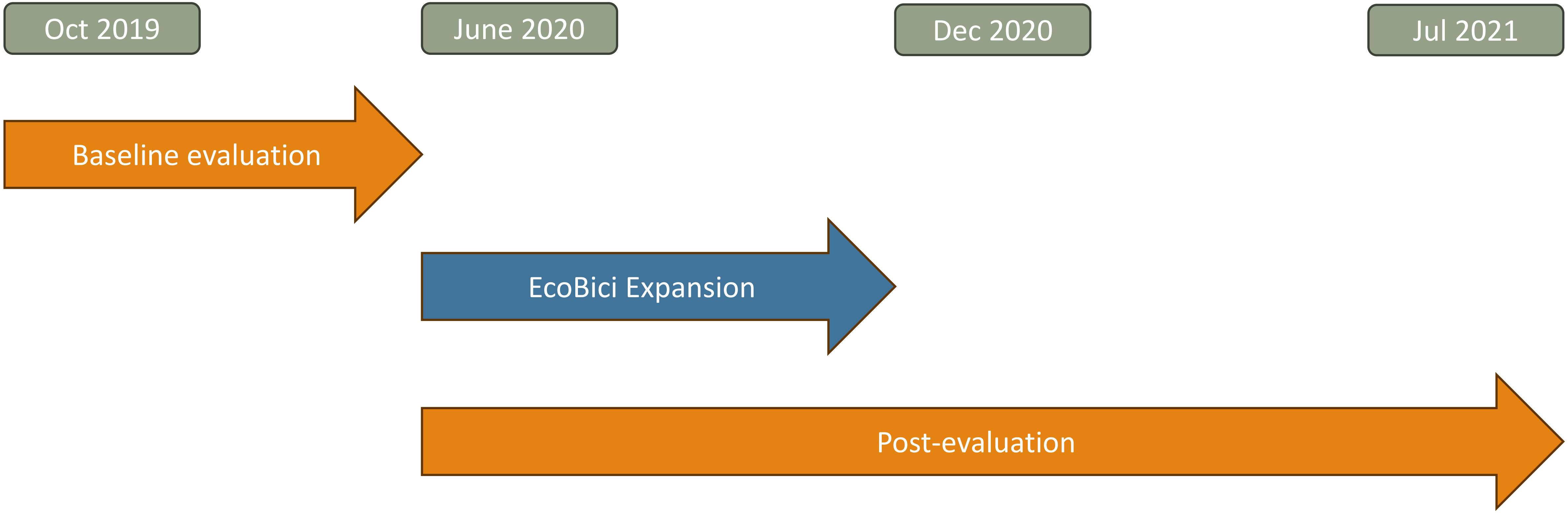
Plan A: Sampling

- ➢ Using GIS shapefiles for the road and cycle networks, we selected aerial clusters of road segments for direct observation:
  - ✓ In existing EcoBici service area
  - ✓ In priority areas for expansion
  - ✓ In control neighborhoods
- ➢ We developed & validated a new direct observation tool (**SOTRAVEL**) – adapted from SOPARC



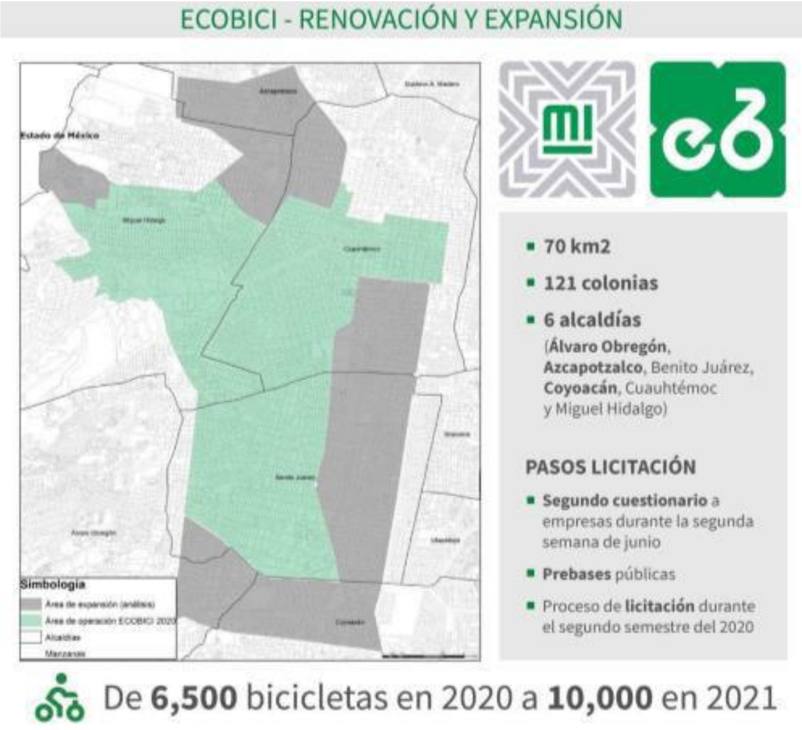


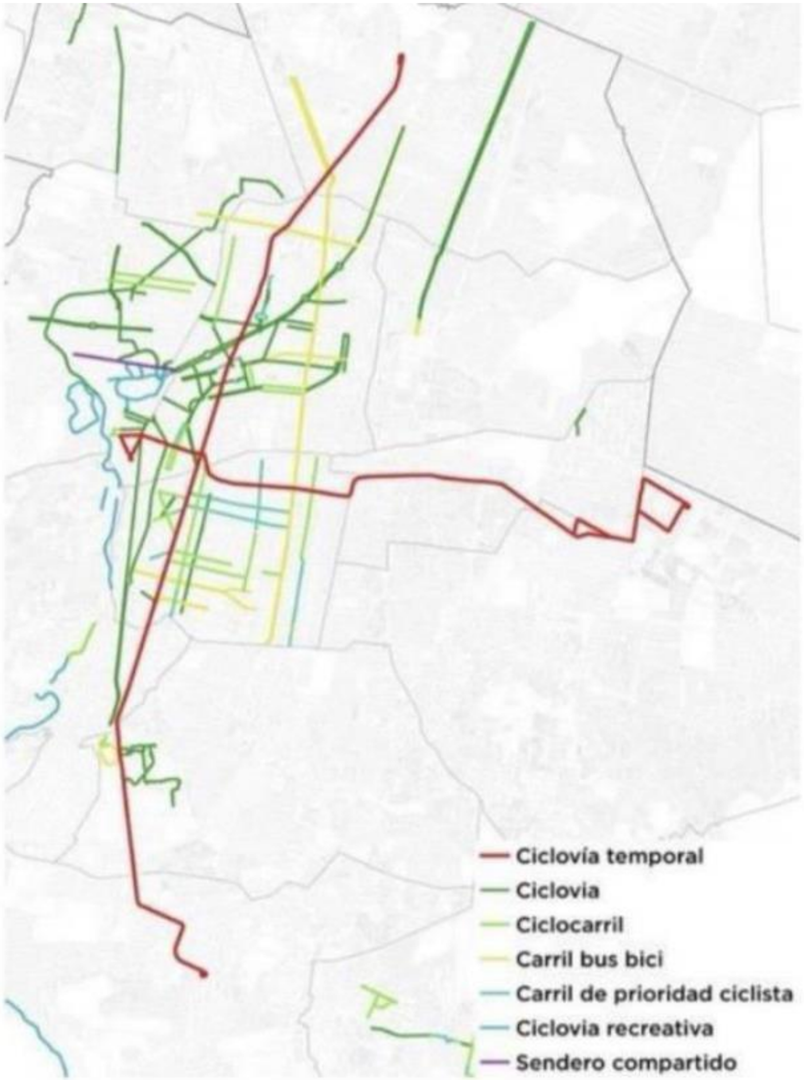
Plan B: Timeline



A natural experiment within a natural experiment (COVID-19)

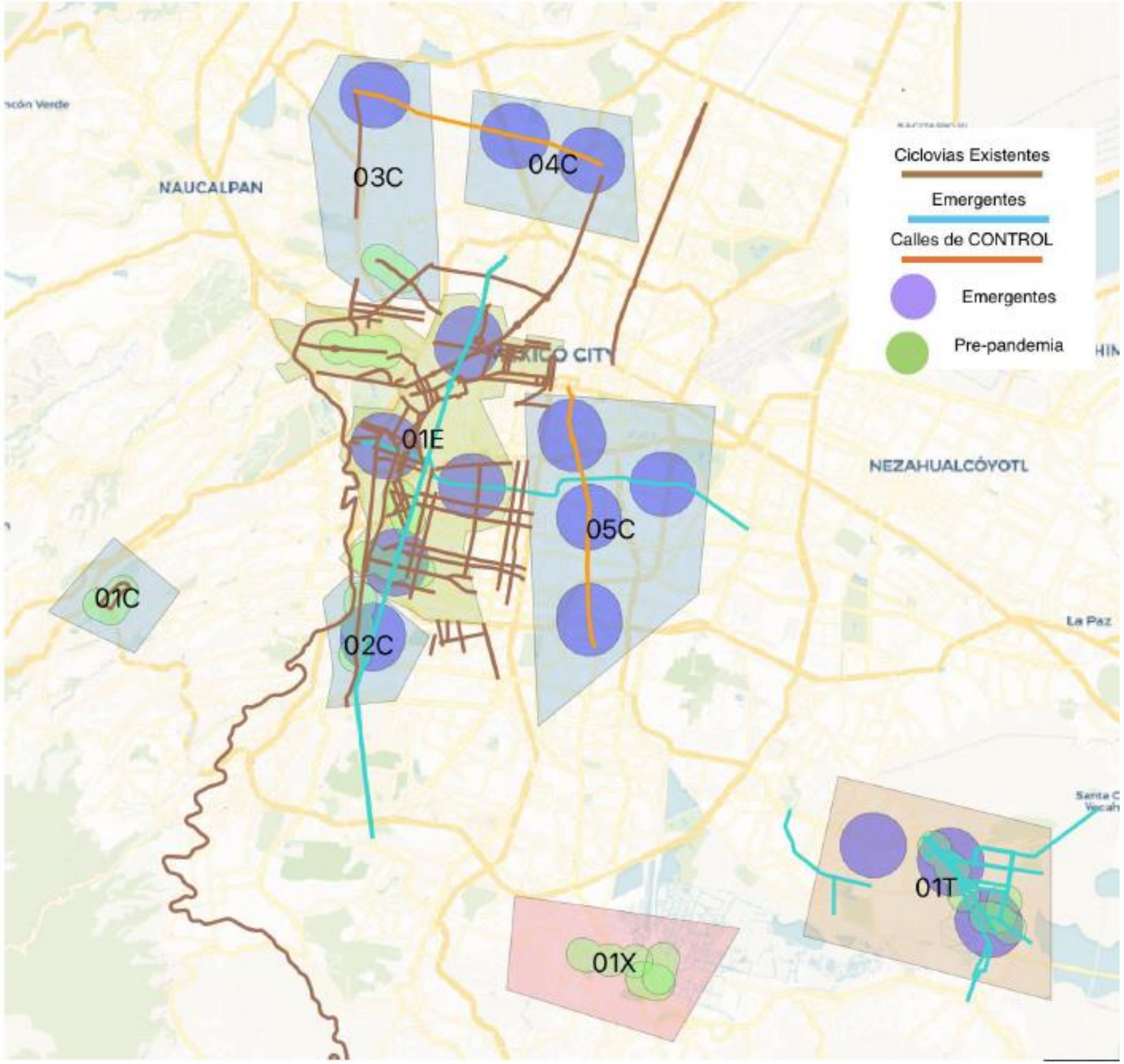
- In March 2020, the EcoBici expansion plans were halted due to the **COVID-19 pandemic**
- In June 2020, the City announced that the expansion plans would continue in **June 2021**
- >60% of all trips in Mexico City are not by car; during the pandemic…
  - ✓ Mass transit operations were heavily reduced
  - ✓ The City announced a plan to roll out **temporary, high quality bicycle lanes throughout the city, with priority for high capacity roads**



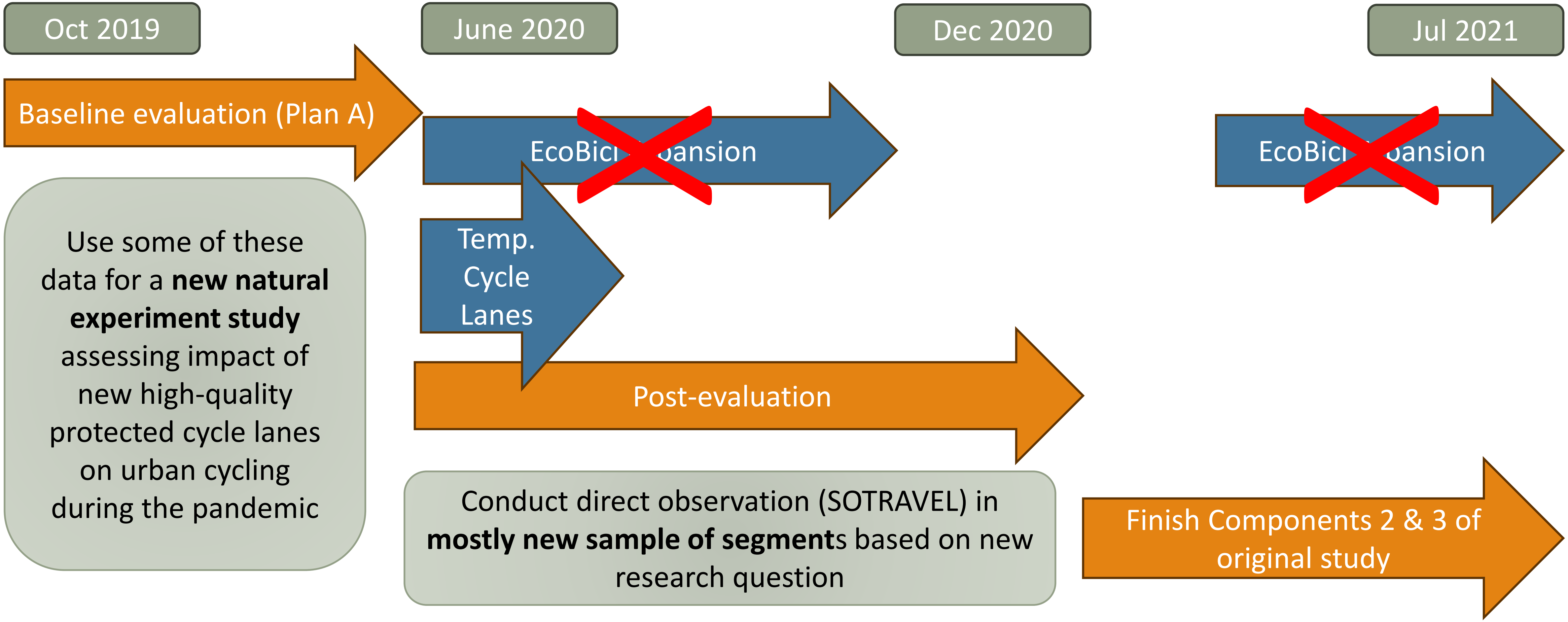


1. Temporary bike lanes
    1. High-capacity roads
    2. Neighborhood roads
2. Regular bikelanes
    1. High-capacity roads
    2. Neighborhood roads
3. No bikelanes
    1. High-capacity roads
    2. Neighborhood roads

Things got a little complicated…



Plan B: Timeline



Preliminary results and other outcomes

- Preliminary results suggest that temporary cycle lanes:
  - Prevented declines in cycling during COVID-19 among pre-pandemic cyclists.
  - Possibly attracted new urban cyclists (substituting public transit use)

- Temporary bicycle lanes in high-capacity roads became so popular that **the public organized to request this infrastructure to become permanent** (post-pandemic).


THE LANCET

This journal Journals Publish Clinical Global health Multimedia Events

COMMENT | VOLUME 398, ISSUE 10298, P370-372, JULY 31, 2021 Download Full Issue

Scaling up urban infrastructure for physical activity in the COVID-19 pandemic and beyond

Alejandra Jáuregui • Estelle Victoria Lambert • Jenna Panter • Clover Moore • Deborah Salvo

Published: July 21, 2021 • DOI: https://doi.org/10.1016/S0140-6736(21)01599-3 • Check for updates

Key Lessons

- Working with **funders** that support work assessing the general research topic, but who can be flexible in modifying the specifics, is key.
- **Planning for "the unexpected"** and adding sufficient time (and some more!) for post-evaluation measures is recommended.
- Building and maintaining close **partnerships with key city actors** that can provide accurate and timely information of moving targets, priorities, and build dates is critical.
- **Scientific rigor must prevail!** However…our definition of rigor should be adapted for natural experiments.

¡ GRACIAS !

dsalvo@austin.utexas.edu

Taking it to the STREETS: Lessons Learned from Evaluating Infrastructure to Increase Active Commuting to Schools

Leigh Ann Ganzar, DrPH MPH

Deborah Salvo, PhD; Sarah Bentley, MPH; Deanna Hoelscher, PhD, RDN, LN, CNS, FISBNPA

UTHealth
The University of Texas
Health Science Center at Houston
School of Public Health

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SHARE THE ROAD

STREETS

SAFE TRAVEL ENVIRONMENT EVALUATION IN TEXAS SCHOOLS

1. STREETS study overview
2. Strengths and challenges of study
3. Lessons learned

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STREETS Study Aims

To evaluate the effects of $27.5 million USD allocated to Safe Routes to School infrastructure in Austin, Texas, USA.

Aim 1

Determine effects of SRTS infrastructure changes on **child physical activity**.

Aim 2

Determine effects of SRTS infrastructure changes on **active commuting to school**.

Aim 3

Examine the **cost effectiveness** of SRTS infrastructure changes on child physical activity levels.

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Overview of quasi-experimental study design

Serial cross-sectional study

Sample

70 Austin schools with SRTS improvements
30 comparison schools

Measurements

- ✓ Active commuting to school tally
- ✓ School policy survey
- ✓ School demographics
- ✓ GIS measures of built environment

Cohort study

Sample

Subset of 30 Austin schools (3 schools per city council district)
Subset of 15 comparison schools

Measurements

- ✓ Accelerometer and GPS
- ✓ Child survey
- ✓ Parent survey
- ✓ MAPS-SRTS environmental audit

STREETS strengths, challenges, and lessons learned

Based on four basic design elements of research studies.[1]

- Intervention
- Observations/measurements
- Groups
- Time

1. Trochim, W., & Land, D. (1982). Designing designs for research. The Researcher, 1, 1–6.

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Intervention

Strengths

Close partnership with the City of Austin Safe Routes to School

- Communication
- Access to intervention data
  - Walk audits
  - Cost
  - Project dates and details

Challenges

Assessing exposure

- Variation in SRTS infrastructure projects
- Range of costs per school = [$4,123 - $2,765,412]
- Implementation score

Multiple interventions occurring at the same time

Observations/measurements

Strengths

Working with schools allowed for measurement of all children at school

Multiple pre/post measures to control for secular changes

Measurement of multiple potential confounders and combinations of methods to address different sources of bias

Observations/measurements

Challenges

Working with schools required principal and district approval

COVID school closures impacted measurement methods and timeline

Construction timeline impacted measurements

Proposed measurements

	Year 1 (2018 – 2019)		Year 2 (2019 – 2020)		Year 3 (2020 – 2021)		Year 4 (2021 – 2022)		Year 5 (2022 – 2023)	
Serial cross-sectional study	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 7	Wave 8	Wave 9	Wave 10
Cohort study	3rd Grade		4th grade		5th grade	5th grade				

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Actual measurements

	Year 1 (2018 – 2019)	Year 2 (2019 – 2020)	Year 3 (2020 – 2021)	Year 4 (2021 – 2022)	Year 5 (2022 – 2023)	Year 6 (2023 – 2024)
Serial cross-sectional study	Wave 1	Wave 2, Wave 3	Wave 4, Wave 5 (Missed due to COVID)	Wave 6, Wave 7	Wave 8, Wave 9	Wave 10, Wave 11
Cohort study — Schools in council districts 1 & 10	3rd Grade	4th grade	5th grade, 5th grade (Biased by COVID)			
Schools in council districts 2 – 9 and comparison		3rd Grade	4th grade	5th grade, 5th grade		
Re-recruit and schools missed due to COVID				3rd Grade	4th grade	5th grade, 5th grade

Groups

Challenges

Original proposal had San Antonio schools as **comparison groups**

- Recruitment challenges required that we use Austin-area schools as original schools didn’t see benefit of participating

Ongoing recruitment of schools

Attrition over time of schools

Time

Strengths

Flexibility in funding

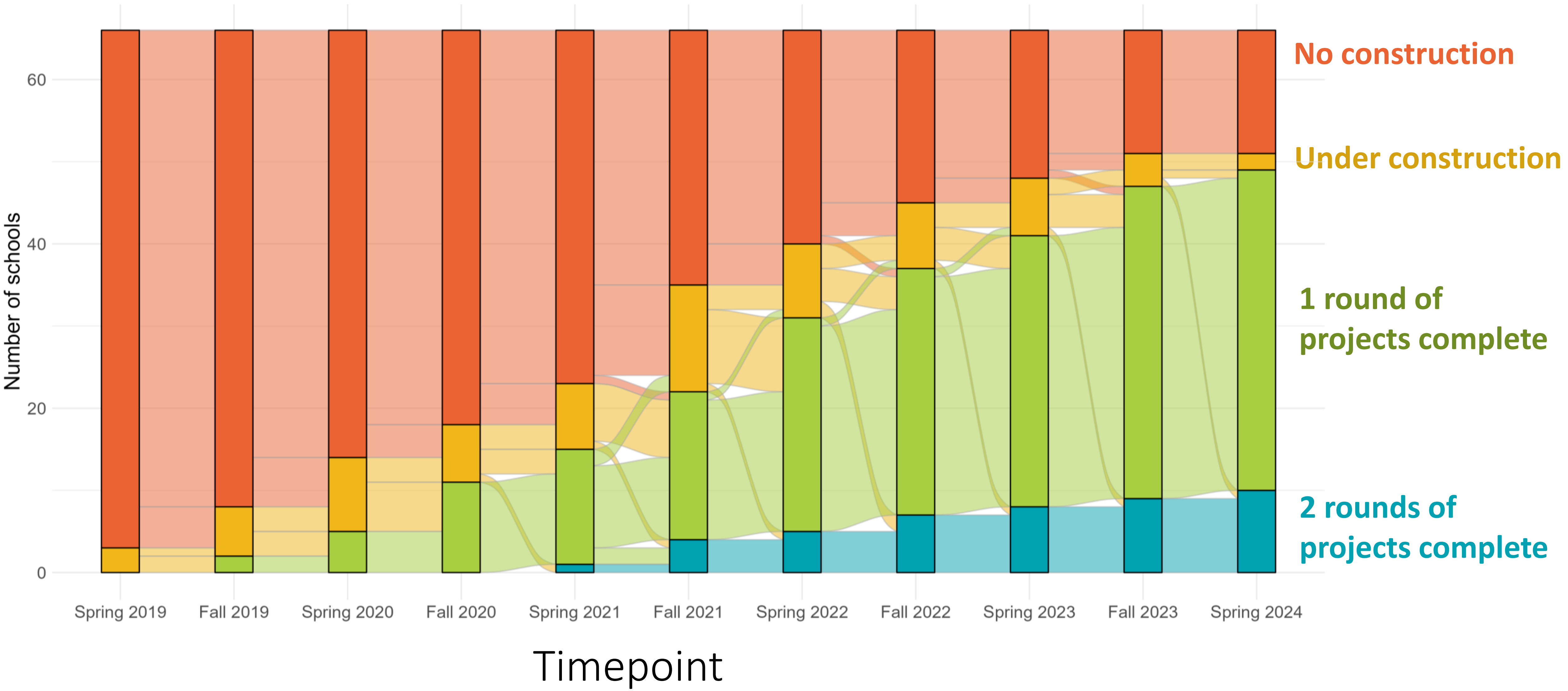
- 6 years of data with a no-cost extension

Challenges

Generational effects of built environment intervention

Construction delays and timelines

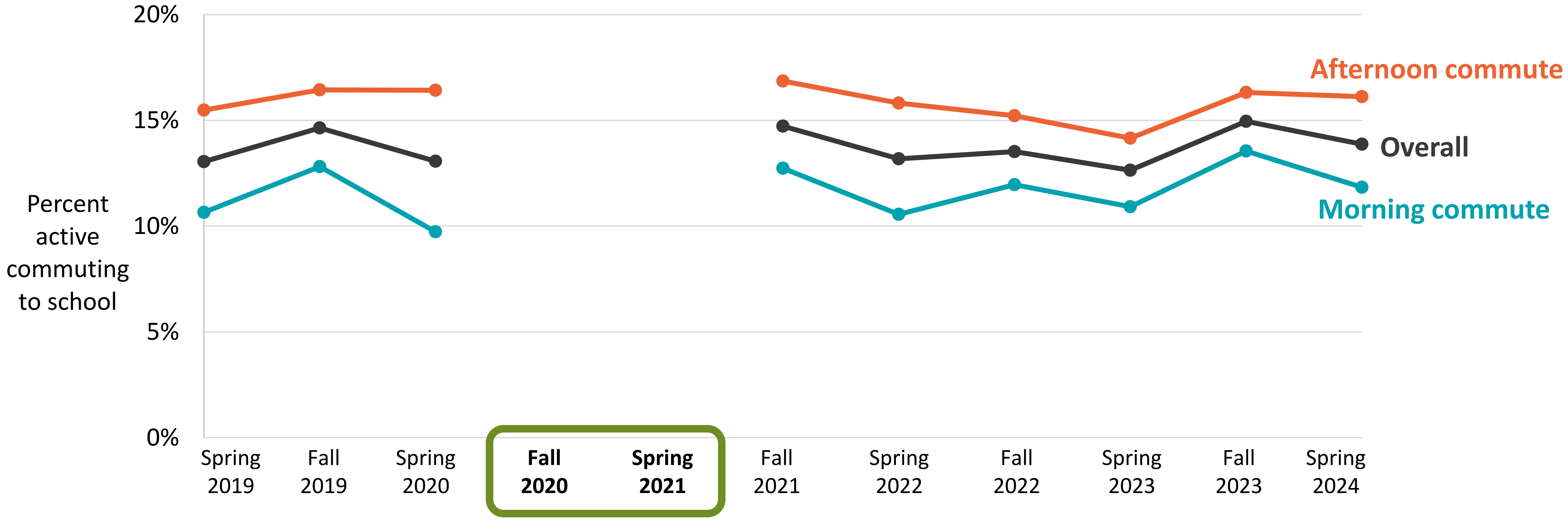
Austin SRTS infrastructure school status



Next steps

- Measurements are complete
- Analysis

School-level Active Commuting to School in Central Texas, 2019-2024



Summary of lessons learned

Importance of partners (COA, school districts)

- Importance of shared data with partners

Flexibility in study design

Flexibility in research questions

- COVID

Flexibility in funding and timeline

Measuring dose

- Graded implementation score

Preparing for intervention timing issues

- Construction delays
- Delayed effects

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STREETS Principal Investigator: Dr. Deanna Hoelscher

STREETS co-investigators

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- Dr. Adriana Perez
- Dr. Shelton Brown
- Dr. Bill Kohl
- Dr. Kevin Lanza
- Dr. Casey Durand

Study Staff

- Sarah Bentley, Dr. Yuzi Zhang, Dr. Katie Burford, Brooklyn Baker, Martha Diaz

School district, campus, and study participants

UTHealth
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School of Public Health

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Thank you!

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Email: lganzar@pdastats.com

More info on STREETS: