

TRANSPORTATION RESEARCH
CIRCULAR

Number E-C264

July 2020

**Conference on
Health and Active
Transportation**

December 11–12, 2019
Washington, D.C.

The National Academies of
SCIENCES • ENGINEERING • MEDICINE



TRANSPORTATION RESEARCH BOARD

100 YEARS 
MOVING IDEAS: ADVANCING SOCIETY

**TRANSPORTATION RESEARCH BOARD
2020 EXECUTIVE COMMITTEE OFFICERS**

Chair: Carlos M. Bracer, Executive Director, Utah Department of Transportation, Salt Lake City

Vice Chair: Susan A. Shaheen, Adjunct Professor, Co-Director, Transportation Sustainability Research Center, University of California, Berkeley

Division Chair for NRC Oversight: Chris Hendrickson, Hamerschlag University Professor Emeritus, Carnegie Mellon University, Pittsburgh, Pennsylvania

Executive Director: Neil J. Pedersen, Transportation Research Board

**TRANSPORTATION RESEARCH BOARD
2020–2021 TECHNICAL ACTIVITIES COUNCIL**

Chair: Hyun-A C. Park, President, Spy Pond Partners, LLC, Arlington, Massachusetts

Technical Activities Director: Ann M. Brach, Transportation Research Board

Richard Bornhorst, Principal, FACTOR, Inc., Silver Spring, Maryland, *Freight Systems Group Chair*

Michael Griffith, Director, Office of Safety Technologies, Federal Highway Administration, Washington, D.C., *Safety and Operations Group Chair*

George Avery Grimes, CEO Advisor, Patriot Rail Company, Denver, Colorado, *Rail Group Chair*

Brendon Hemily, Principal, Hemily and Associates, Toronto, Ontario, *Public Transportation Group Chair*

Nikola Ivanov, Deputy Director, Center for Advanced Transportation Technology Laboratory, University of Maryland, College Park, *Young Members Council Chair*

Pamela Keidel-Adams, Regional Vice President, Kimley-Horn and Associates, Inc., Mesa, Arizona, *Aviation Group Chair*

C. James Kruse, Director, Center for Ports and Waterways, Houston, Texas, *Marine Group Chair*

Jane Lin, Professor, University of Illinois, Chicago, *Sustainability and Resilience Group Chair*

Mark Reno, Principal Engineer, Quincy Engineering, Inc., Rancho Cordova, California, *Highway Infrastructure Group Chair*

Elizabeth Rushley, Lawhon & Associates, Inc., Columbus, Ohio, *Data, Planning, and Analysis Group Chair*

Fred R. Wagner, Partner, Venable, LLP, Washington, D.C., *Legal Resources Group Chair*

Kathryn Zimmerman, Applied Pavement Technology, Inc., Urbana, Illinois, *Policy and Organization Group Chair*

Conference on Health and Active Transportation

December 11–12, 2019
Washington, D.C.

Rapporteur
Kelly Rodgers
Streetsmart

Co-Sponsored by
Standing Committee on Transportation and Public Health (AME70)
Standing Committee on Pedestrians (ACH10)
Standing Committee on Bicycle Transportation (ACH20)

Supported by
Centers for Disease Control and Prevention
National Institutes of Health Office of Disease Prevention and the National Cancer Institute
Volpe National Transportation Systems Center

This conference was funded in part with Federal funds from the National Cancer Institute Office of Disease Prevention, National Institutes of Health, Department of Health and Human Services, under contract No. HHSN2632018000291.

Transportation Research Board
500 Fifth Street, NW
Washington, D.C.
www.trb.org

The **Transportation Research Board** is one of seven major programs of the National Academies of Sciences, Engineering, and Medicine. The mission of the Transportation Research Board is to provide leadership in transportation improvements and innovation through trusted, timely, impartial, and evidence-based information exchange, research, and advice regarding all modes of transportation

The **Transportation Research Board** is distributing this E-Circular to make the information contained herein available for use by individual practitioners in state and local transportation agencies, researchers in academic institutions, and other members of the transportation research community. The information in this E-Circular was taken directly from the submission of the authors. This document is not a report of the National Academies of Sciences, Engineering, and Medicine.

TRB Standing Committee on Transportation and Public Health
TRB Standing Committee on Pedestrians
TRB Standing Committee on Bicycle Transportation

Planning Committee

Ed Christopher, *Co-Chair*
Janet Wojcik, *Co-Chair*

David Berrigan
Cynthia Chen
Christopher Kochtitzky

Daniel Rodriguez
Melissa Kramer-Badtke

Leslie Meehan
Mehri Mohebbi
Amy Plovnick

Moderators

David Berrigan
Ed Christopher
Christopher Kochtitzky

Melissa Kramer-Badtke
Leslie Meehan
Amy Plovnick

Daniel Rodriguez
Geoffrey Whitfield
Janet Wojcik

Facilitators

Phil Bors
Nisha Botchwey

Mark Fenton
Ann Steedly

Scribes

Leslie Carson
Christina Bridges Hamilton

Anastazjia (Tasha) Ray

Mudia Uzzi
Shuling Wu

TRB Staff

Bernardo Kleiner, *Associate Division Director*
Thomas Palmerlee, *Associate Division Director*
Gary Jenkins, *Associate Program Officer*

IN MEMORIUM

In memory of Chris Kochtitzky, a colleague and friend whose dedication to bridging public health with the built environment and transportation was integral to the success of this conference and to building healthier communities.

Preface

The purpose of the Conference on Health and Active Transportation (CHAT) was to bring together leaders from the transportation and health disciplines. Together, people charted a course for the future around three theme areas using active transportation (AT) as the canvas: Reflecting on Innovative Practices, Building Strategic Institutional Relationships, and Identifying Research Needs and Opportunities. Plenary sessions captured the essence of each theme while individual breakout sessions gave participants an opportunity to drill down on the various themes.

This conference was designed as a follow-up to a 2015 conference: Moving Active Transportation to Higher Ground: Opportunities for Accelerating the Assessment of Health Impacts. The CHAT conference was held on December 11 and 12, 2019, in Washington, D.C., with 145 registered participants. Conference attendees were drawn largely from the transportation (50%) and public health (40%) fields. One-quarter of the attendees were affiliated with the federal, state, and local levels of government. Representatives from the private sector, national associations, nonprofit organizations, and metropolitan planning organizations (MPOs) were the other sectors represented.

The opening session began with an assessment of where health and AT stands today, current issues, and considerations moving forward. This session set the stage and provided context for each of the theme areas. Afterwards, participants attended breakout sessions that were organized by one of the three theme areas. The breakouts were structured to allow for maximum participation, discussion, and the interchange of ideas. The ideas presented in all breakout sessions and discussions are those of individual participants and do not represent consensus of all participants.

The innovative practices plenary session featured Lightning Talk presentations from 10 regions nationwide. Presentations comprised a range of disciplines across health and transportation, government and nongovernment, and academic and nonacademic experiences. In the institutional relationships plenary session, participants heard the perspectives of transportation and health officials who have been working on these defining cross-sectoral relationships.

The second day began with the research plenary session, in which panelists discussed the research questions in *Transportation Research Circular E-C239: Arterial Roadways Research Needs and Concerns* and the issues identified in the *NCHRP Report 932: A Research Roadmap for Transportation and Public Health*. The expert panel in this session reviewed these research questions and others to promote a dialogue about whether the nature, scope, and scale of these questions are suited to the challenge of integrating health into transportation.

The attendees then had the opportunity to reconvene in breakout sessions and articulate how to move forward in terms of priorities, goals, and opportunities. The closing session began with a summary from each of the breakout theme groups. It was followed by a presentation by a leading transportation professional on how to plot a course for the future. The last session provided closure to the conference, which included discussion of the planning for the conference proceedings.

This summary was prepared by the conference rapporteur, Kelly Rodgers, Streetsmart, as a factual summary of what occurred at the conference. The planning committee's role was limited to planning and convening the conference. The views contained in the report are those of

individual conference participants and do not necessarily represent the views of all participants, the planning committee, the TRB's Standing Committees on Transportation and Health, Pedestrians, and Bicycle Transportation, the Centers for Disease Control (CDC), National Institutes of Health, the Volpe Center, TRB, or the National Academies of Sciences, Engineering, and Medicine. This publication has not been subjected to the formal TRB peer-review process.

Contents

DAY ONE

OPENING SESSION

The Prelude: An Active Transportation Journey	1
Welcome Remarks	1
<i>Janet Wojcik and Ed Christopher</i>	
Health + Transportation: Opportunities for Two Titans.....	2
<i>Jim Sallis</i>	
Innovative Practices for Health and Transportation	10
<i>Janet Fulton</i>	
Building Intersectoral Collaboration Between Public Health and Transportation.....	16
<i>Andy Dannenberg</i>	
Transportation and Health: Changing Culture	19
<i>Norman W. Garrick</i>	

CONCURRENT BREAKOUT SESSIONS

Exploring the Landscape: Reflecting on Innovative Practices	24
<i>Geoffrey Whitfield, Moderator</i>	
Building Strategic Institutional Relationships	33
<i>Melissa Kraemer Badtke, Moderator</i>	
Active Travel Behavior Research	45
<i>David Berrigan, Moderator</i>	
Designing the Walkable Streetscape	45
<i>Madeline Steinmetz-Wood</i>	
Unfortunate Realities of Youth.....	46
<i>Jennifer Roberts, Ralph Buehler, and Calvin Tribby</i>	

PLENARY SESSIONS

Reflecting on Innovative Practices	56
<i>Amy Plovnick, Moderator; Gretchen Armijo, Geoffrey Whitfield, Sagar Shah, Nicole Payne, Brian Kiel, John Clymer, Megan Weir, Jana Lynott, Kate Glantz, and Jordana Maisel</i>	
Building Strategic Institutional Relationships	73
<i>Melissa Kraemer Badtke, Moderator</i>	
At the Intersection of Health and AT: Minnesota's Route	77
<i>Amber Dallman and Craig Martinez</i>	
Making Transportation Healthy Again	80
<i>Anna Ricklin</i>	

DAY TWO

OPENING SESSION

Research to Support Health Integration and Institutionalization in Transportation Agency Processes and Decisions	84
<i>Janet Wojcik and Daniel Rodriguez, Moderators</i>	
A Research Roadmap for Transportation and Public Health	84
<i>Laura Sandt</i>	
Transportation Research Circular E-C239: Arterial Roadways Research Needs and Concerns	88
<i>Megan Wier</i>	
Health Integration and Institutionalization in Transportation Agencies	89
<i>Andy Dannenberg</i>	
Panelist Presentation for Research to Support Health Integration and Institutionalization in Transportation Agencies	91
<i>Brian Saelens</i>	
Health Integration and Institutionalization in Transportation Agencies	93
<i>Susan Handy</i>	
Development of a Neighborhood Walkability Index for Studying Active Transport Contexts Across Communities in the United States Over the Past Three Decades	94
<i>Andrew Rundle</i>	

CONCURRENT BREAKOUT SESSIONS

Addressing the Future	99
<i>Chris Kochtitzky and Leslie Meehan, Moderators</i>	
Moving Innovative Practices Forward.....	99
<i>Nisha Botchwey and Phil Bors, Facilitators</i>	
Moving Institutional Relationships Forward	107
<i>Ann Steedly and Mark Fenton, Facilitators</i>	
Health Benefits of Transit Use: Preliminary Results from the Active El Paso Study ...	114
<i>Chanam Lee</i>	
Are Communities in the United States Planning for Pedestrians with Disabilities? Findings from a Systematic Evaluation of Local Government Barrier Removal Plans	115
<i>Yochai Eisenberg</i>	
Quantifying the Health Impacts of Transportation Investments to Support Routine Transportation Decision-Making: A Case Study in Raleigh, North Carolina	117
<i>Theodore Mansfield</i>	
Estimating Health Impacts of Active Travel Behavior Using an Integrated Transport and Health Impact Model: Prince George's County in Maryland.....	119
<i>Binbin Peng</i>	
Health in Transportation: Active Transportation	124
<i>Ana Ramirez Huerta</i>	

Addressing Health Disparities and Equity through FHWA Policy and Infrastructure Investments	127
<i>Victoria Martinez</i>	

CLOSING SESSION

Making it Work in a Transportation Environment.....	129
<i>Ed Christopher, Moderator</i>	
Reflecting on Innovative Practices	129
<i>Phil Bors and Nisha Botchwey</i>	
Building Strategic Institutional Relationships	130
<i>Mark Fenton and Ann Steedly</i>	
Identifying Research Needs and Opportunities	132
<i>David Berrigan and Leslie Meehan</i>	
Closing Keynote	133
<i>Jennifer Toole</i>	
Next Steps: Future Direction	139
<i>Bernardo Kleiner</i>	
References	140

APPENDIXES

Appendix A: Poster Sessions.....	143
Progress in Public Health and Transportation: Changes in State- and Regional- Level Prevalence of Active Commuting to Work from 2005–2017	143
<i>Geoffrey Whitfield</i>	
Opportunities to Improve Community Mobility Through Community Health Needs Assessments	144
<i>Alexandra King</i>	
Promoting Partnerships to Support Community-Informed Active Transportation Safety and Mobility	146
<i>Jill Cooper</i>	
A Decade of Benchmarking Biking and Walking	148
<i>Ken McLeod</i>	
Beyond KABCO: Improving Our Understanding of Pedestrian and Bicyclist Injuries with Hospital Data	149
<i>Katherine Petcolas</i>	
Classification and Regression Tree Analysis to Determine Best Performing Walkability Metrics for Studies of Physical Activity and Public Health.....	151
<i>Ronit Dalmat</i>	
Evaluating Modal Shift in Response to Electric Scooter Sharing Services in Oakland, California.....	152
<i>Melody Lin</i>	
A Tale of Two Regions: Linking the Transit Built Environment to Health Outcomes....	154
<i>Nicole Geitebruegge</i>	

Evidence to Inform a Cycling and Walking Investment Strategy	156
<i>Angie Cradock</i>	
Cycling Without Age: An Innovative Program to Improve the Quality of Life for Older Adults	157
<i>Paula McNiel</i>	
Health, Safety, and Economic Benefits of Implementing Road Diets	160
<i>Lauren Blackburn</i>	
Healthy Mobility Model for Healthy Communities	162
<i>Curtis Ostrodka</i>	
Build It, But They Might Not Come: Breaking Down Barriers to Active Transportation	163
<i>Torsha Bhattacharya</i>	
Walkable Neighborhoods and Obesity Over Time: Findings from the National REGARDS Study	165
<i>Natalie Colabianchi</i>	
Impact and Mitigation of Traffic Noise and Air Pollution in Somerville: A Health Lens Analysis	166
<i>Sharon Ron</i>	
Health Impacts of Bus Rapid Transit Systems Worldwide	168
<i>David Rojas-Rueda</i>	
Health Impacts of Bike Sharing Systems in Europe	169
<i>David Rojas-Rueda</i>	
Correlates of Active Commuting, Transport Physical Activity, and Light Rail Use in a University Setting	170
<i>Katie Crist</i>	
Using Synthetic Controls with Interactive Fixed Effects to Examine Changes in Vehicle Speed Related to New York City’s Vision Zero Program	171
<i>David Ederer</i>	
Network Screening Approach for Cyclist Safety in Québec City	173
<i>David Beitel</i>	
Colorado Downtown Streets	175
<i>Cate Townley</i>	
Walking to Public Transit Helps Achieve Physical Activity Recommendations	176
<i>Vi Le</i>	
Adoption of a Complete Streets Policy in North Las Vegas: Using Evidence-Based Practices to Improve Health and Safety	177
<i>Nicole Bungum</i>	
Voices for Healthy Kids Framework for Equity-Focused Complete Streets Policies	179
<i>Claudia Goytia</i>	
Creating a Seat for Public Health at the Transportation Planning Table	180
<i>Phyllis Davis</i>	
Measuring Temporal and Spatial Exposure of Urban Cyclists to Air Pollutants Using an Instrumented Bicycle	181
<i>Kaitlyn Schaffer</i>	
Evaluating the Physical Activity Impacts of Riding Electric Kick Scooters	183
<i>Yi Wen</i>	

Adapting Public Health Strategies and Interventions to Include People with Disabilities in Active Transportation Policies and Programs	184
<i>JoAnn Thierry</i>	
Incorporating Public Health and Equity into Colorado’s Statewide and Regional Transportation Planning	185
<i>Karen Roof</i>	
Where Do Healthy Bicyclists Grow? Traffic Gardens as Safe Spaces for Cognitive and Socio-Emotional Development	187
<i>Richard Holt</i>	
Systems Approaches to Integrated Health and Injury Control: Guiding Principles and Practical Applications for Community Engagement	189
<i>Laura Sandt</i>	
Does Higher Neighborhood Walkability Reduce the Impact of Mobility Limitation on BMI?	190
<i>Yochai Eisenberg</i>	
Why Do Hispanic Americans Use the BRT Services More than Others? Underlying Factors Behind Ethnicity	192
<i>Jiahe (Jane) Bian</i>	
Quantifying the Health, Transportation, and Economic Equity Impacts of Completing the East Coast Greenway in the Delaware River Watershed	193
<i>Daniel Paschall</i>	
Appendix B: Conference Program	197

DAY ONE: OPENING SESSION

The Prelude

An Active Transportation Journey

WELCOME REMARKS

JANET WOJCIK

Winthrop University

I'm from Winthrop University in Rock Hill, South Carolina, but my main role here is representing the American College of Sports Medicine and the ActivEarth Task Force, promoting physical activity for active transportation (AT) for health benefits, the health of planet, and economic development.

We've worked on this conference for approximately a year. We wanted to bring people together from different organizations and backgrounds, to start a conversation—hence the name CHAT—to move AT forward into our fields. About 5 years ago, there was a previous conference on AT here, so this conference was designed as a follow-up.

Out of our registrants, we are about two-thirds are female. The breakdown of the fields is as follows. We have 50% from transportation and planning and 40% from health. We have more practitioners than academics, but almost a 50–50 mix. We have people from some level of government and then people from private sector, national associations, nonprofit organizations, and MPOs.

ED CHRISTOPHER

Transportation Planning Consultant

My name is Ed Christopher, and I'm the co-chair of this conference and also the chair of the TRB Subcommittee on Health and Transportation. Our purpose today is to collectively chart a course for the future around three theme areas, using AT as the canvas.

A core component of this conference are two sets of concurrent breakout session, where you will have the opportunity bring your perspectives, which will then be fed into this report as an E-Circular. We have a rapporteur here and scribes solicited from local universities to take notes. These breakouts are the core of conference, with focus on these three theme areas: Innovative Practices, Building Strategic Institutional Relationships, and Identifying Research Opportunities. For the first set of breakouts, you will introduce yourselves, explore the issues, and we have facilitators for the breakouts. For the second set of breakouts, you will focus on a developing a plan for move your theme forward. In the end, we will bring this all together. Between breakouts, we have a series of plenary sessions, and each is focused on a particular theme area. The format and design of plenary sessions, and the breakouts are customized to their topics. Accompanying the plenary sessions, and before the final breakout, is a poster session tonight, with 34 posters at last count.

I want to emphasize is that the planning team worked hard to construct the conference with the aim of identifying a vision moving forward.

HEALTH + TRANSPORTATION: OPPORTUNITIES FOR TWO TITANS

JIM SALLIS

University of California, San Diego

I'm going to talk about health "plus" transportation and opportunities for two titans. Using a transportation metaphor, the destinations for this talk are to discuss how these two sectors are titans of the economy, provide some brief examples of how transportation affects health, and then focus on opportunities for mutual benefit and how we overcome barriers to collaboration. The focus for me is reducing driving and increasing AT—that's how we will meet our transportation and health goals. We also need to pay attention to reducing social and economic disparities. Then I'll give you some examples of how changes may be closer than they appear and I'll list a couple research priorities.

Transportation and health are titans, and they don't always get along. When two big titans like this don't agree and aren't pulling in same direction, there can be collateral damage, and those are health consequences. The goal of this talk, and this conference, is to find common ground. By working together, both sectors can contribute more to improving the lives of Americans. If we can agree that we want to achieve that, then there is a solid basis for doing things better, which means doing things differently.

What do I mean by titans? The health industry spends \$3.5 trillion annually—it's the largest single sector of the U.S. economy—but it can be dysfunctional and misdirected (Figure 1).



Health in the USA

- The health industry spends about \$3.5 Trillion annually, the largest single sector of the US economy
- But it is notoriously dysfunctional and misdirected

- Graphic from Trust for America's Health

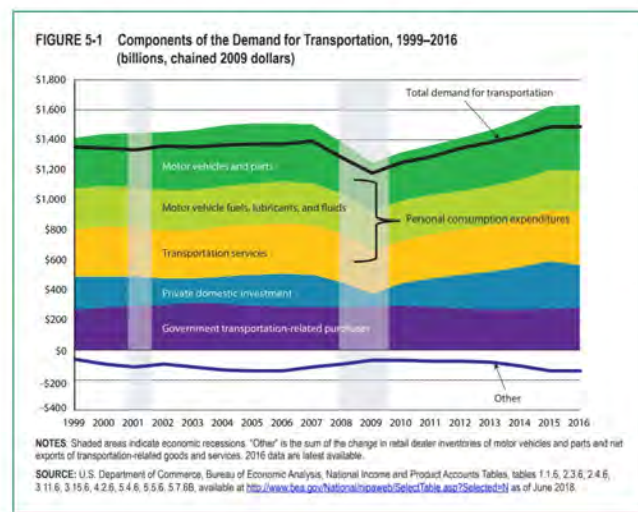
FIGURE 1 Health in the United States.

When we look at what makes us healthy, the largest part, 50%, is behaviors. Smoking, physical inactivity, and poor diet are the things that are driving health in the United States. In addition, the environment, primarily toxic exposures affect health, but the built environment also influences health. The smallest impact on health is healthcare, but in the public debate, that is what we seem to talk about the most. Even if more people have healthcare, and they should, it wouldn't have that big an effect on health because healthcare often ignores the things that make people unhealthy in the first place. The misdirection is that we spend 88% to 90% of money on medical care, on the smallest contribution to health, and only 5% on healthy behaviors. Here we want to focus on what transportation can contribute to making people healthy through healthier behaviors, through AT.

What about transportation? Annual transportation spending, according to the U.S. Department of Transportation (DOT), is about \$1.5 trillion annually, which is about 9% of gross domestic product (GDP) (Figure 2). It's the fourth largest sector of the economy after health care, housing, and food. This graphic shows that transportation spending is not increasing. Government spending is flat. The biggest sector is what people spend on cars. I will demonstrate with data that this part of economy is creating problems for health.

Our transportation spending is unbalanced. This slide shows spending on walking and biking (Figure 3). The amount spent on walking on biking before 1990 was zero; it was prohibited by law in the federal transportation budget. By 1990, agencies could spend up to 1%. Then the cap was increased and the peak year was 2009, which was the year of the economic stimulus package. I understand it is down to 1.5% now. We spend only 1.5% of transportation dollars on projects that could help health, so this is a major issue. We can use research and other strategies to boost this number.

If you are spending 99% of your budget on things other than walking and biking, you will get this: a commute mode share with a higher percentage of car trips than all trips all together (FIGURE 4). Public transit has gone down over time, bicycling is "other"—this is an indication of prevalence and importance placed on the bicycle.



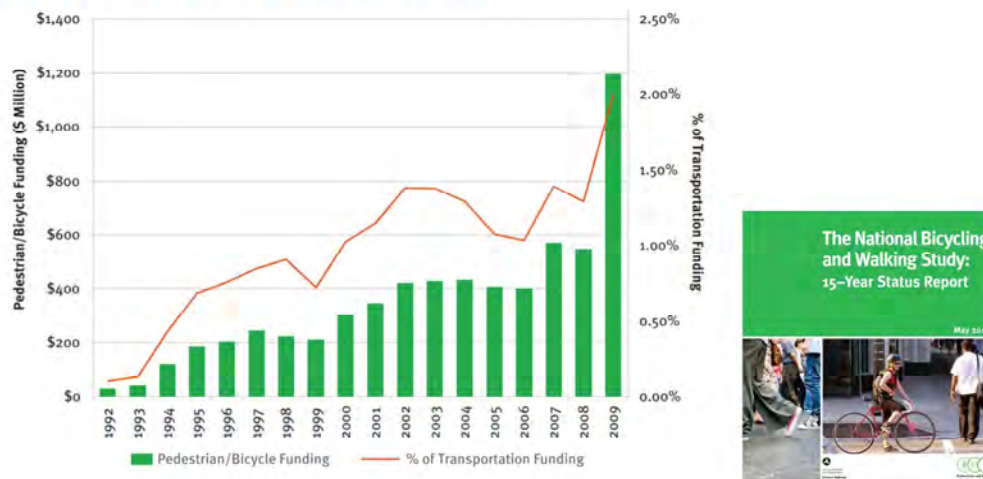
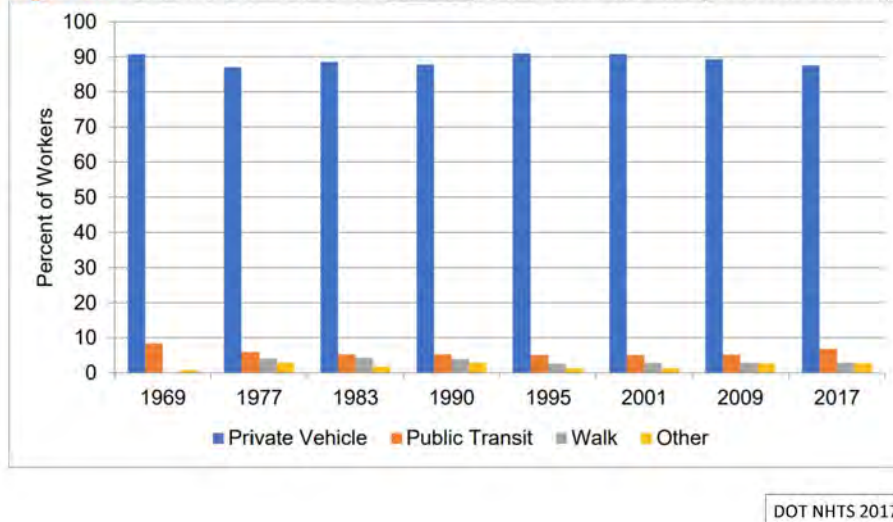
USDOT Transportation Statistics Annual Report 2018

Transportation in the USA

- Annual transportation spending is about \$1.5 Trillion annually
- About 9% of GDP
- Fourth largest sector of the economy after healthcare, housing, food

FIGURE 2 Transportation in the United States.

Federal Pedestrian and Bicycle Funding, 1992–2009

**FIGURE 3** Federal pedestrian and bicycle funding.**Figure 13.** Trends in the Distribution of Workers by Usual Commute Mode (Percent of Workers)**FIGURE 4** Commute mode share.

Trillions have been spent on suburban development built according to separate use zoning that make it virtually impossible for people to walk from where they live to anywhere else. Trillions for freeways and highways that are meant to help mobility, but instead often block people from using AT. You can't walk or bike from one side of the freeway interchange to the other. We have intervened extremely effectively on walking and biking—to decrease them.

The health field has seen the importance of land use and transportation. A special issue of the *Lancet (I)*, the world's most influential health and medical journal, focused on urban design, transport, and health. The health field now recognizes these impacts. The first paper in this series reviewed the multiple impacts of transportation and land use (they work together) on health. It

includes road traffic injuries, which is on the transportation agenda and has been for 100 years, and air pollution, which was forced onto the agenda because of the smog in Los Angeles and other places. It also includes chronic disease, depression, social isolation, personal safety, and health inequalities, which are not on the transportation agenda. This first paper reviews the evidence linking all of these, written by Billie Giles-Corti and colleagues (2).

Here are the 10 leading causes of death (Figure 5): Many of these causes are related to transportation in negative way, mainly through cars. In seven of the top 10 causes of death, transportation is actively contributing to these causes of death through policy and decades of practice. Hundreds of thousands of people die from heart disease and cancer every year. Conversely, the positive health benefits of walking or physical activity is related to almost the same number of people.

John Pucher, Ralph Buehler, and others documented how active commuting was related to health outcomes in 50 U.S. states and similarly with 47 cities. The percent of adults in a state, just at a statewide level, who commute by walking or cycling was correlated at 0.7 with meeting physical activity guidelines, -0.5 with obesity and -0.07 with diabetes. We are aware in the health field of the need to partner and collaborate with the transportation field.

This speaks to the opportunities for change. This green on the slide shows the percent of walking, cycling, and transit mode share (Figure 6). This correlational study shows that the United States has the lowest active mode share and the highest obesity of all of these countries. The good news is how high AT is in some countries. Some of those are 50% or above and they are in Europe. In the 1940s, many European cities were clogged with cars and they made the decision to promote walking and biking. They have spent decades working on this which has yielded huge results.



FIGURE 5 Leading causes of death.

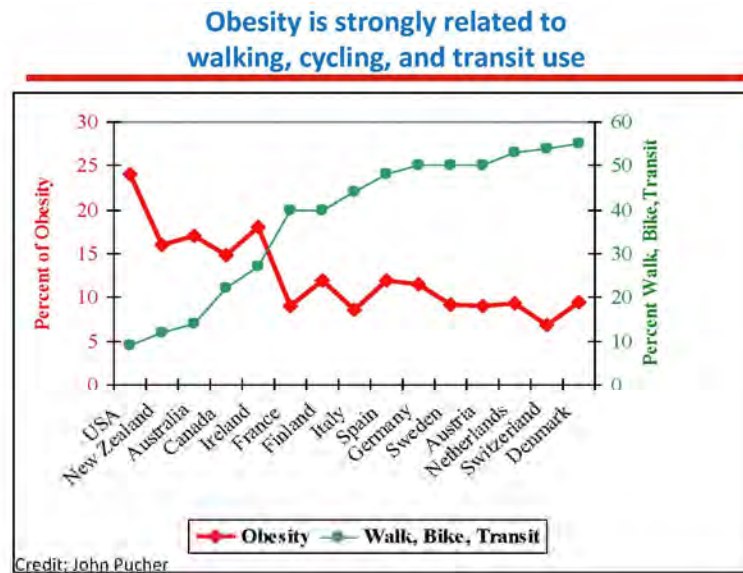


FIGURE 6 Obesity and active transportation.

Should we work together to go from a car-dominated society to a more pedestrian-friendly society? In a pedestrian-friendly society, cars still exist. This is not about banning cars, but shifting the emphasis, dramatically, to have impacts on health. In that *Lancet* series, there was a paper by Stevenson et al. (3) who modeled the health impact of sustainable transport policies (Figure 7).

He modeled a 10% modal shift away from private motor vehicles to cycling and walking. I'm showing three cities here. These effects are about quality of life and length of life—the actual numbers are not important, but comparison across numbers is very important.

Stevenson. Lancet Series on Urban Design, Transport, & Health. 2016
 Modelled *sustainable transport policies: a 10% modal shift away from private motor vehicle VMT's to cycling and walking*

Population Health Outcomes (DALY's gained per 100,000 population)	Melbourne	Boston	London
Cardiovascular Disease	622	765	582
Type 2 Diabetes	86	94	27
Respiratory Disease	2	3	8
Road Trauma	-34	-34	-41
Total	679	826	581

FIGURE 7 Modeling mode shift.

If we replace 10% of car miles with walking and bicycling, what would the health impacts be? With road trauma, it would likely get worse because there is no way to model safe bicycling facilities; if people bicycle in unsafe places, more bicyclists will be killed. This mode shift does not have much effect on respiratory disease or the effects of pollution. The impact of modal shift on chronic disease, such as cardiovascular disease and diabetes, is where all the health benefits are.

What about future innovations—will they save us? Will autonomous vehicles (AVs) save us from road trauma? Maybe, but that's a small effect on health. Will electric cars cut down pollution enough to make a health impact? They will help depending on the electricity sources, but they won't have as big an effect on health compared to more walking and bicycling and less sitting.

We have the evidence from the *Guide to Community Preventive Services*, based on prospective data that was consistent with cross-sectional data, that approaches combining transportation systems interventions with land use and environmental design are effective in increasing physical activity (4). We have evidence that if you change transportation system and environment, physical activity will increase. But we have a lot of barriers.

Some of the barriers to the transportation and health fields meeting shared goals are as follows:

1. U.S. transportation policy is often focused on moving as many cars as fast as possible and on improving level of service (LOS).
2. U.S. transportation spending is low for active travel.
3. There is often a lack of coordination with transportation and land use departments, with separate jurisdictions, agencies, and laws.
4. There is a lack of requirements for health impact assessment or cost–benefit assessment that includes health effects for transportation decisions.
5. Auto and oil industries are large special interests group often having competing priorities.
6. Relatively low amount of lobbying by active transportation groups. It is something we need to recognize and work on.

Designing for physical activity has more than just health benefits. We undertook an exploration of literature a few years ago and found that designing parks, cities, and buildings to promote physical activity has many other benefits, including environmental sustainability and economic benefits that are important to decision-makers (5, Figure 8). There is more demand for walkable environments than what is available. The health literature shows evidence for social, environmental, safety, and economic benefits with active design. There is a lack of research on health and transportation in many areas. Where we do have research, it is almost all positive. If we design for AT, we get diverse benefits. Figure 8 shows a range of benefits resulting from designing for physical activity.

Can we reduce car travel and increase AT? This is a simple and fundamental piece of data: 40% of all trips are three miles or less, which is very walkable and bikeable. For most people biking, even 5 mi is very bikeable. Over half of all trips could be done by walking and biking, but are not currently. These trips are changeable. Here are case studies, done by Pucher, Dill, and Handy (6), of bicycle interventions around the world (Figure 9). Here are cities that started at about 1% bicycle mode share and over time they all increased, including Minneapolis, Minnesota. It's really not the weather. San Diego has perfect bike weather but has 1% bicycle mode share.

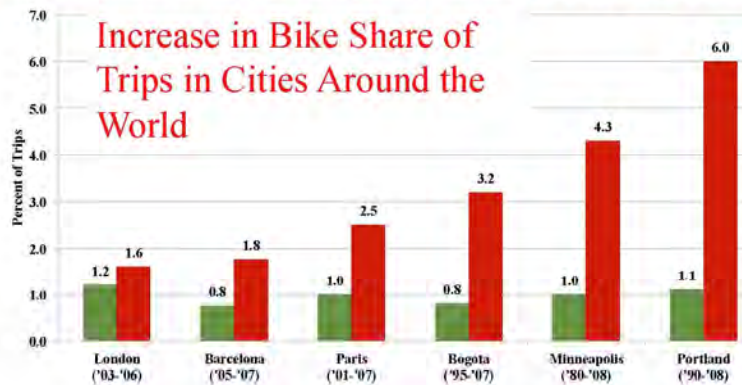
Designing for Physical Activity Has More Than Health Benefits

	Physical Health	Mental Health	Social Benefits	Environmental Sustainability	Safety / Injury Prevention	Economic Benefits
Open spaces / Parks / Trails	57.5+ 3.5(0)	93+	12.5+ 4(0)	20+ 4(0)	23+	19+ 4(0)
Urban Design	105+ 54(0) 19+	31+ 4+	80.5+ 29(0)	265.5+ 45.5(0) 3.5+	14.5(0) 18.5+	69+ 10.5(0) 4+
Transport Systems	7+ 3.5+	3+ 3.5(0)	23+ 21(0) 3+	70+ 21(0) 3+	67+ 14(0) 4+	56+ 3.5(0) 4+
Schools	19.5+ 3.5(0)	71+	11+	21.5+	4+ 3+	15+
Workplaces / Buildings	55+ 3.5(0)	18.5+ 4+		20.5+		49+ 1.5(0)

Sallis, J.F., et al. (2015). Co-benefits of designing communities for active living: An exploration of literature. *International Journal of Behavioral Nutrition and Physical Activity*, 12: 30.

FIGURE 8 Cobenefits of AT.

Case studies of multi-level, multi-component, multi-year interventions suggest bicycling can be greatly increased



Source: Pucher, Dill, and Handy, "Infrastructure, Programs, and Policies to Increase Bicycling," *Preventive Medicine*, Jan 2010, Vol. 50, S.1, pp. S106-S125.

FIGURE 9 City bike share.

Here are cities that started well above 1%. With increased effort, they increased bicycle mode share as well (Figure 10). Groningen is the exception, having started at 40%, it couldn't go any higher. Another study showed that the length of protected cycle tracks in 167 European cities was related to cycle mode share. It flattens out at 25%. This shows that protected bike facilities may result in an increase in cycling.

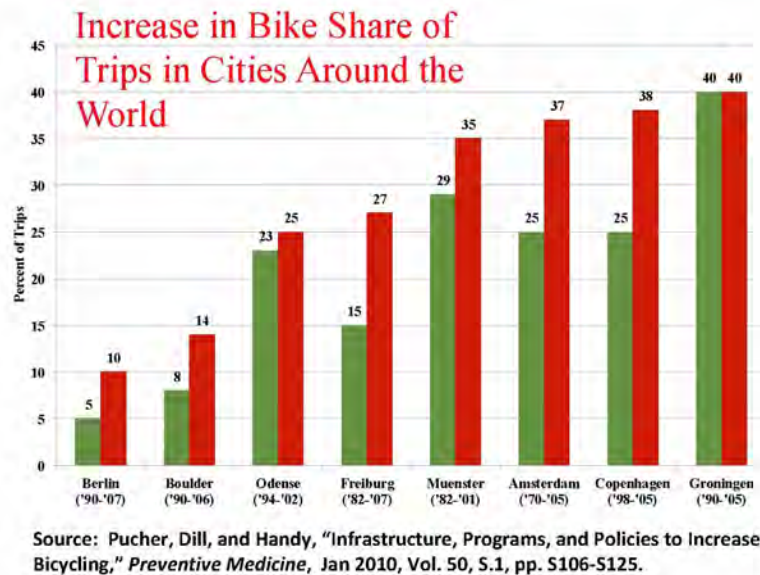


FIGURE 10 Increase in bike share.

How do transportation and health sectors work together to improve life for Americans? One place to start is collecting data on all modes of travel at a local level, including walking and bicycling. What about collecting data on sidewalks, the quality of bike infrastructure, and transit service, and making those publicly available? For AT, those are essential commodities, but most cities don't have those data. We need data on demographic variation in travel mode, infrastructure, and transit service to identify inequities of service. We need to modernize training programs to ensure public health students learn about transportation, land use, and health impact assessments (HIAs) and transportation and urban planning students learn about public health. Most importantly, we need to develop mutually beneficial collaborations. Transport and public health researchers developing joint studies and transport, city planning, housing and public health routinely coordinating and working together on a daily basis.

We need to talk about social and economic disparities because health equity and the conditions supporting health is a core value of public health. The transportation industry might benefit by joining us in this focus. The automobile domination of transportation is major force for inequity—car ownership is either impossible or a major burden for lower-income households. Overspending on roads can lead to inadequate public transit for the people depending on it and poor facilities for bicycling and walking. Limited transport options reduce job opportunities and quality of life for lower-income people. Rebalancing transportation goals should improve equity and have societal benefits. An equity focus can contribute to transportation and health goals.

Change is happening, but not everywhere (Figure 11). Here is multistory bicycle parking garage in Amsterdam, and on the right are pedestrian streets found in every European city. In the lower left is a pedestrian street in Boulder, Colorado, with playground for kids. Next to it is Seoul, South Korea, where the park, and the river flowing through it was once a freeway slicing through the heart of the city. It completely transformed the city, in a good way. The mayor at the time is now the president of South Korea.



FIGURE 11 Change is happening.

California is now leading the way with Senate Bill 743, which led to the decision by Caltrans to replace LOS as the main criteria for transportation and instead focusing on reducing vehicle miles traveled (VMT). Since this was passed, cities and agencies have been working on implementation plans. Over a month ago, Teks Omishakin was named director of Caltrans, who is a longtime advocate and expert in active transportation. He understands the health connection and will do everything he can to implement this law.

Some issues that I think are research priorities are as follows. We need cost-effectiveness of investments by transportation mode. We need to consider all the costs and benefits including health-related and economic outcomes. Also, we need co-benefits research to fill in the gaps that I showed you. We need to understand disparities and travel opportunities in infrastructure, evaluate active travel demonstration projects, which are difficult because they take time, evaluate equity effects of transportation projects, and evaluate active travel innovations, like electric scooters.

INNOVATIVE PRACTICES FOR HEALTH AND TRANSPORTATION

JANET FULTON

Centers for Disease Control and Prevention

I want to talk about innovation with a public health lens. What is innovation? What would great look like? How can we do more of it? The definition of innovation is developing new things. If you go to the TED website and just search on “innovate” you will get at least 700 hits. In this case, innovation is not a new concept; it’s in the common lexicon. So let’s think about how to innovate when integrating health and active transportation.

If you think about public health and AT innovations over the course of many years, you can think about them in a couple ways. One is what are the innovations that have helped people be more active, the behavior of physical activity? Tennis shoes had been invented for playing croquet, and those shoes eventually became Converse tennis shoes. One day a track coach at the University of Oregon named Bill Bowerman was eating waffles and looked at his waffle iron and realized it might make a good sole for running shoe. This idea eventually turned into a company called Nike. In the current day, we are trying to make cycling easy. One of the barriers for people who want to ride bikes is how do you carry your helmet from place to place? How do you pack it in your suitcase? Companies are now are thinking about collapsible helmets. These are innovations around the behavior of physical activity.

You can also think about innovations to improve the environment for physical activity. A recent example comes from the Netherlands, where they were trying to overcome the problem of people walking down the street, looking at their screen. So, how do you protect them while they are crossing the street and keep them from getting injured? They placed a stop sign at ground level. How do you make bicycles more accessible? Over the course of many years, people have innovated around bike share, which is an innovation that is ongoing. Abandoned railways have been turned into trails, paths, and even elevated parks. This has been a game-changer. These are examples of innovation for physical activity behavior as well as physical activity environment.

There are many models for innovation. Here is one: there are three boxes across a spectrum (Figure 12). One is within a current business, another is how to take a business to the next level, and way at the top is transformation, inventing brand new things. Thousands of years ago that was inventing the wheel. In the current day, that's an iPhone. There are different types of innovation and all of them are good. It depends on what problem are we trying to solve. The conversation today should be about what problem are we trying to solve and how can we innovate around it? If we get problem right, maybe we can get a great solution.

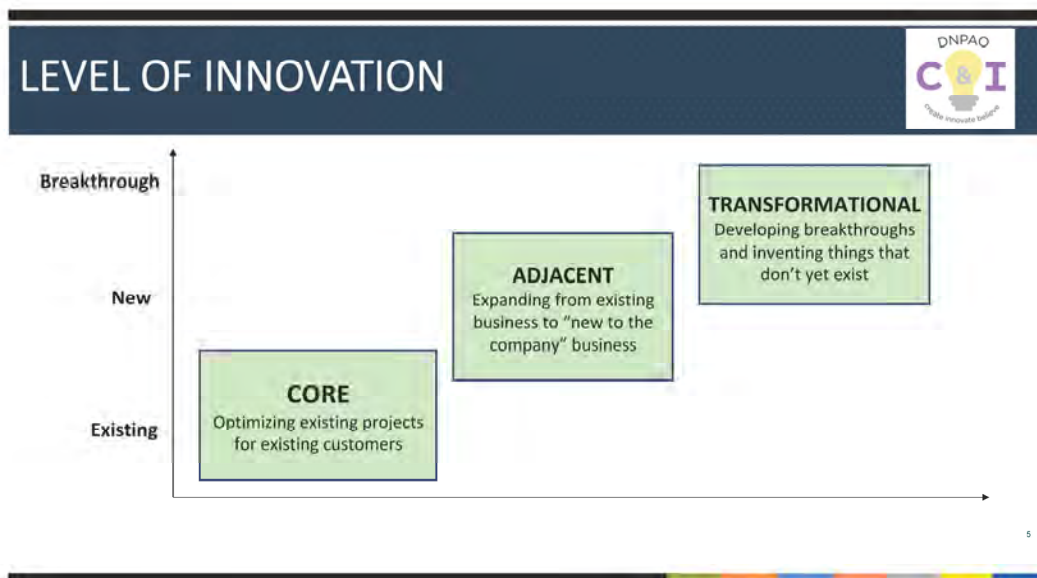


FIGURE 12 Model of innovation.

Public health came from “how to treat disease” model, but a few years ago public health reimagined itself—it took the next step forward. This is from Karen DeSalvo’s insights when she was the Assistant Secretary for Health and National Coordinator for Health Information Technology at U.S. Department of Health and Human Services. She developed a program called Public Health 3.0. She reimagined public health to focus on policy-, systems-, and environment-level changes and how to ensure that everyone is able to live in places and have conditions that make them healthy. We took this model and used it to reframe physical activity in this country, developing our new initiative called “Active People, Healthy Nation” to improve physical activity in the population. How do you reimagine efforts around key public health functions—how do you deliver programs in an innovative way; how do you train people to integrate across health and transportation; how do you share messages that are clear, concise, and simple; how do you mobilize partners; how do you develop data and data systems that matter to people?

Physical activity and transportation are in a good position: we know what works. We may not know the best way to implement them, but we have great evidence from which to build. These are displayed in the figure of the signpost below (Figure 13). In public health we work at the top of the signpost. This is the slide from the Community Preventive Services, showing how to combine transportation matched with land use and design approaches. It’s about making sure routes are connected to where you want to go, whether it be your home, your school, your workplace. We think about it as connecting activity-friendly routes to everyday destinations. We want to make sure interventions are done in equitable and inclusive ways. This frames all that we do around health and transportation.

Ways we are delivering programs in innovative ways fit into those different buckets we saw earlier. In Mississippi, three counties did something simple by just placing bike racks on front of their public buses. It helped their transportation system become more efficient in an area



FIGURE 13 Evidence-based strategies to increase physical activity.

they were trying to serve after Hurricane Katrina. This helped connect routes to be more accessible, certainly for cyclists using public transportation.

There's also an example from Savannah, Georgia. At the Center for Disease Control (CDC), the Division of Nutrition, Physical Activity, and Obesity funds over 60 states and communities to use the strategy of connecting activity-friendly routes to everyday destinations. Savannah is one of our grantees. What they are doing now is transformative. In Atlanta, there is the Beltline, a 22-mi loop around the inner city that connects neighborhoods. They are doing a similar thing in Savannah, where they are connecting an urban trail system by putting in a loop that they call Tide to Town. The challenge here is how not to have gentrification and displacement along those pathways. How do we think about preventing it from happening in the first place and potentially mitigating if it does happen? So, this is a great innovation, but also how do you plan for those unintended consequences?

How do we train people so that we can integrate health with AT? We have a model at the CDC called the Walkability Action Institute. It started with the Surgeon General's call to action to promote walking and walkable communities a few years ago. We put together cross-sectoral teams that represent planning, transportation, public health, and elected officials, and we train them to develop an action plan for their communities. To date, we have trained 51 teams and are looking to train more in the next year.

At the CDC, we have a partnership with our policy group at the director's level. They have an initiative called HI-5, named because they want high impact for health in 5 years. They are looking at all different types of interventions, but they have to show benefit and cost effectiveness or cost savings within 5 years. I'm highlighting two areas that apply to the work we are doing here, around Safe Routes to Schools and public transportation, which HI-5 is trying to tackle from a policy approach.

Sometimes partners can come to you in unique ways. We've developed a partnership with the art sector. We have a project with the National Endowment for the Arts. The purpose is to help create active environments and to bring art to table. The picture in Figure 14 tells a story about using art for a purpose. Here, they are trying to make sure crossing signals are long enough for everyone to cross the street. What if you aren't able to walk as fast? In this case, ballerinas perform in the middle of street. They stop traffic—because who is going to hit a ballerina? They've done it with dance and with clowns. Then, they take this information to policy-makers and eventually, the signal time is lengthened so everyone can cross the street. This is an example of how to use nontraditional partners to move our work forward.

Another issue is about developing and collecting data that really matters to constituents and policy-makers. Data collection can be done through paper-and-pencil survey, on-the-ground audit, or even using technology, like Google Street View. What are the innovative ways of using data for policy and planning, built environment, and behavior? See the figure below for a recent map from 2017 showing where *Complete Streets* policies have been adopted (Figure 15). Texas has about 11 to 15 local policies and a state policy. The state has 1,747 cities and 25 MPOs. Of the 1,700 cities, there are only nine adopted *Complete Streets* policies and of 25 MPOs, there are three. When you look at Complete Street policy adoption coverage, it depends on how you look and where you look. This is important for monitoring Complete Street, zoning, or master plan policies, but also for thinking longer term about how policies are being adopted. What is actually happening on the ground that's changing how people transport themselves from place to place? That's a question we need to innovate around.



FIGURE 14 Arts partnership.

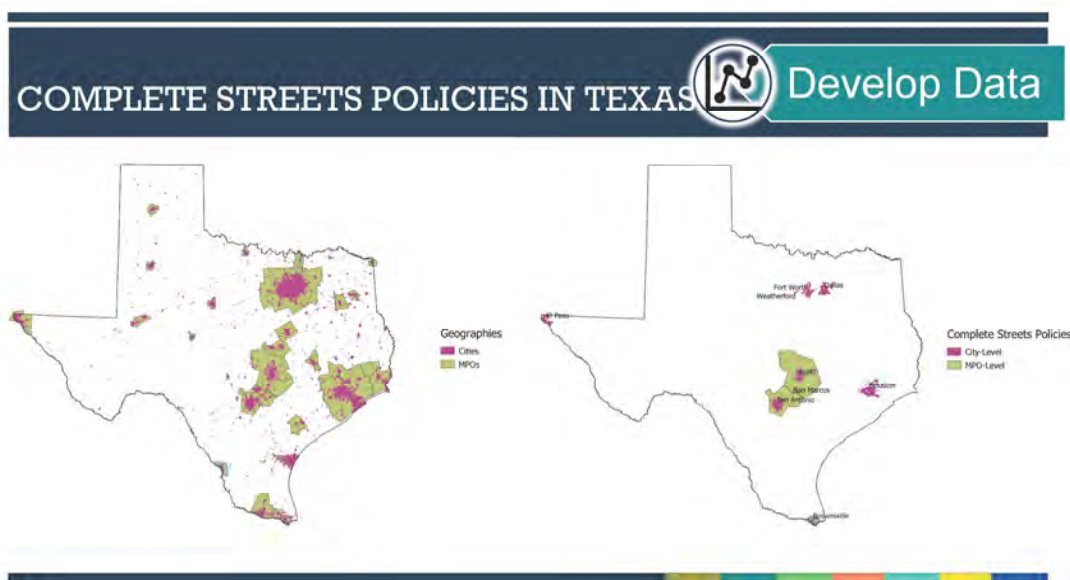
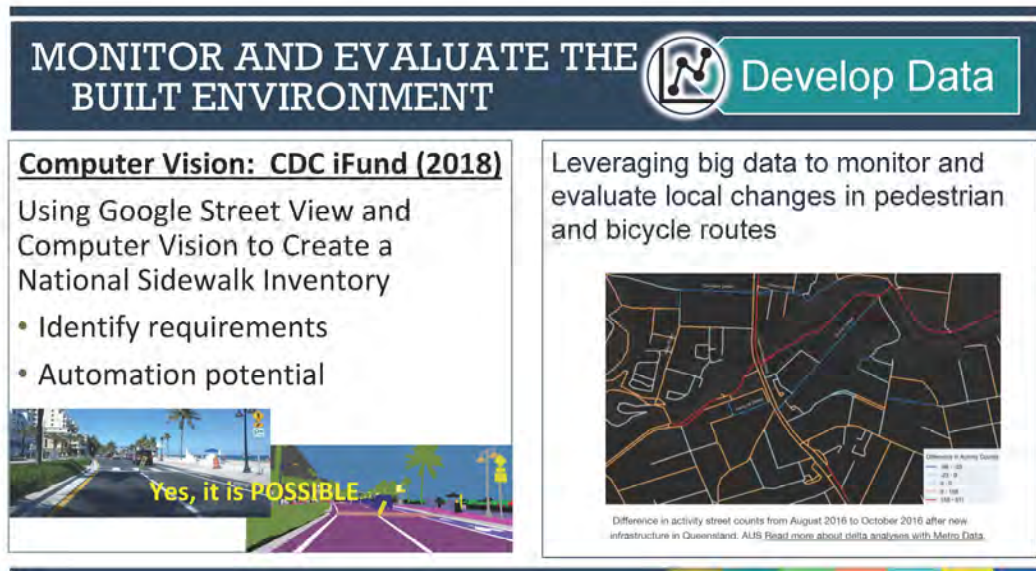


FIGURE 15 Complete Streets policies in Texas.

We can also capture information about the built environment. How do we monitor it? How do we evaluate it? We have a pilot project at the CDC in collaboration with North Carolina State University, under the direction of Aaron Hipp, associate professor of Community Health and Sustainability at the university's Center of Geospatial Analytics (Figure 16, left). We asked if Google Street View images can be used to detect sidewalk layers as a way to create a national sidewalk layer for this country or even for cities or locales. But it was first necessary to ask if it was even possible from a computing requirements point of view; we learned it is possible, but



BUILDING INTERSECTORAL COLLABORATION BETWEEN PUBLIC HEALTH AND TRANSPORTATION

ANDY DANNENBERG

University of Washington

I am representing Dick Jackson, who is not able to attend. The message I would give on how health and transportation fit together is that there are nearly a dozen different types of different interactions. It's not just physical activity, it's keeping in mind all those other interactions. What we are doing at this meeting I conceptualize as a Venn diagram, overlapping research, innovation, and intersectoral collaboration. The program talks more about strategic institutional relationships, but I will blur that with intersectoral collaboration. The part of institutions working together that matters is: are the sectors working together? Two health groups working together is great, but that's not central to what we are doing. It's when you cross the sectors that will make the difference.

What is intersectoral collaboration? It can come in variety of forms, such as alliances, coalitions, memorandums of understanding (MOU), or cooperative initiatives. It becomes necessary for these groups to work together to make a difference in the social and economic factors that influence health. It can occur at many levels; in fact, it needs to occur at all levels, local, state, regional, and national. It can be horizontal or vertical. It requires leadership, trust, and commitment between groups to work together.

Collaboration is important to fulfill the missions of those sectors. Health can't accomplish what it needs to without working with transportation. Transportation needs to understand health for its own mission. It can fulfill research gaps and generate innovations. Optimizing societal benefits is important part of intersectoral collaboration. For example, an interchange built for a single transportation purpose of moving more cars faster doesn't optimize societal benefits. The greenspace around the freeway is unusable and inaccessible. But under the Bay Area Rapid Transit line, they made the effort to put in the East Bay Greenway, so you can have cars, transit, and walking in that space. It's a better optimization of multiple uses rather than a single interchange that doesn't help other sectors. Intersectoral collaboration needs to happen all the time, because there is not a lot of interchange in knowledge and expertise in each other fields. If transportation and health people work together they can take advantage of the knowledge that each other has. It works best with clearly stated purposes, and shared values and interests.

The Guide to Community Preventive Services, which has already been mentioned, is based on intersectoral collaboration. The other part that is implicit is that it is evidence-based. The public health sector works from evidence—we don't make statements unless we have something to support them. You can't imagine a doctor giving you a vaccination or drug, for which there was no evidence that it was good. The transportation world has some evidence, but we would like to help build up evidence of choices made in transportation.

Some of the barriers to intersectoral collaboration have to do with language, such as the transportation term "nonmotorized transportation," which health people don't understand; or public health using the term "morbidity," which transportation people don't understand. We need to learn each other's languages. Some of the data we generate in the public health world, particularly long-term chronic disease outcome data, don't relate directly to a transportation choice being made. We need to get those data into a form that has value to transportation.

Another barrier is the perception by transportation agencies that “health is not in my department’s mission.” Here’s the current mission of the U.S. DOT (Figure 17). There are a lot of health words in it. The words safety and injuries clearly are in both transportation and health worlds. Efficiency includes bikes and pedestrians safely and efficiently getting to where they are going, as well as motor vehicles. Quality of life is very much a health term—consider the social determinants of health, clean air, and congestion. That’s in the mission of U.S. DOT and it’s in the mission of health departments. Quality of life for all people, that’s equity and accessibility for all people. From the health point of view, transportation is included as a social determinant of health.

Some examples of intersectoral collaborations that have occurred over time are as follows: The first occurred in 2003 at a TRB meeting on the built environment and physical activity, with a publication in 2005. A more recent collaboration between the U.S. DOT and the CDC resulted in the Transportation and Health Tool that had people from both sectors working together. Another is the TRB Subcommittee on Health and Transportation, which has been meeting since 2011. Every year at the TRB Annual Meeting, health and transportation professionals meet to exchange information. Moreover, they have a website for sharing this information, found at www.trb.health.org. Another collaboration is among NCHRP Project 20-112 Panel, comprised of transportation and public health experts. This panel directed the development of the *NCHRP Report 932: Research Roadmap for Transportation and Public Health* with research conducted by Laura Sandt and her team at the University of North Carolina—Chapel Hill. There has been collaboration at state and local levels, such as: the Oregon Health Authority signing a MOU with the Oregon DOT; a Tennessee working group on livability with health, transportation, and other agencies; and in San Francisco, the health department and the transit authority work on accessibility for people with disabilities.

Mission of the USDOT

- Ensure our nation has the safest, most efficient and modern transportation system in the world; that improves the quality of life for all American people and communities, from rural to urban, and increases the productivity and competitiveness of American workers and businesses.
- **SAFETY – reduced injuries**
- **EFFICIENCY – for peds, bikes, transit & cars**
- **QUALITY OF LIFE – clean air, less congestion**
- **EQUITY – accessibility for all people**

FIGURE 17 Mission of the U.S. DOT.

The *2018 Benchmarking Report on Bicycling and Walking* has data from 50 states and 50 cities on physical activity and other health outcomes, such as obesity (7). It brings together existing data, which has been used to compare cities and urge them to improve policies and practices. In some cases, cities are asked why they are on the bottom of the list. The CDC has done a few evaluations and found that similar evaluation have already been done in a few individual states, such as Texas and Wisconsin. Even New Zealand put out a benchmarking report. Providing data to people can motivate them to make improvements in their own cities.

There are regional transportation plans, sometimes focused on climate action, energy, or sustainability, that inherently incorporate health but they could be more visible. If public health were to become more engaged in those planning actions, health could be more prominent. Some approaches to intersectoral collaboration include HIAs, public health professionals joining working intersectoral working groups, having projects that work across sectors, giving media interviews, and showing up at public hearings to give a health perspective.

One opportunity is to try to teach students in public health, planning, and transportation about each other's fields. The way to get there is to work with accreditation agencies on what a public health or planning student has to know. Then the schools will have to teach it. Right now, there are elective courses in a dozen or so schools. There are a very small number of concurrent urban planning and public health programs. There are a lot of opportunities for continuing education courses and webinars for mutual introduction.

When you are able to undertake temporary assignments—exchanging public health and transportation department staff—you can learn each other's language and get insights. In the ideal world, it would be a permanent health position in a transportation department and vice versa, but even a temporary assignment can enlighten people. The goal is to have routine interactions between departments.

Personal relationships matter, particularly at the local level. What if the head of transportation and health meet for lunch periodically? When I was at the CDC, I was working in the Built Environment Group and one of our roles was to provide health comments on environmental impact assessments. One that came from the U.S. DOT was whether increasing fuel efficiency standards would have health impacts. We wrote an official statement that said that fuel efficiency standards are good for health. We sent the letter to the U.S. DOT. About a week later, I got a phone call from a staff member I knew from the U.S. DOT. Because we knew each other, we could talk about the issues which informed the thinking about fuel efficiency standards more than a formal letter.

We need collaboration between health and transportation departments; it is within the mission of health and transportation departments to work together. It takes some leadership for people to say that does fit with what we are doing. Some areas for intersectoral collaboration include: guiding the research; building the evidence base; promoting innovations; and reducing inequities.

My charge to Institutional and Collaborative breakout sessions is to answer the following questions: Who are the key actors for collaborative efforts? What contributions can they make? What are the best and sustainable processes to leverage the opportunities and avoid unintended consequences and get maximum impact? We have a lot of opportunity in the meeting to move forward.

TRANSPORTATION AND HEALTH: CHANGING CULTURE

NORMAN W. GARRICK

University of Connecticut

What I want to talk about is change. We have identified the issues, we understand some of the linkages, and we know we need change. I want to remind people that these issues affect places with lot of money (i.e., U.S. cities), but also in poor countries (i.e., Jamaica), that have experienced a number of negative effects from transportation policies.

The United States has high rates of driving when compared to rest of world. Even compared to Canada, which is an auto-oriented country, the level of driving is two-thirds that of the United States. Germany, which is auto-oriented, has half of the United States. Japan is a third of the United States. All these issues are interrelated as are their solutions. This is why this culture change is needed and why we need a different way forward.

Fifteen years ago, I took my first sabbatical leave in Davis, California. Previously, my research was about asphalt and asphalt chemistry. I went to Davis because I was fascinated that it had the highest bike share usage in the country and I wanted to learn about it. While I was there, I discovered that Davis had a fatality rate of one death per 100,000 people, which I learned was very low. When I returned from my sabbatical, I spent the semester analyzing my data, and found that Davis had the third-lowest fatality rate in California. I expected that a city with bicycling would have a higher fatality rate.

I found that cities built before the 1950s had a lower traffic fatality rate than those built after 1950. Those cities built before the 1950s were not based on the engineering standards that I was teaching in school. We were actually building places that were less safe based on standards being taught in engineering school. The risk of fatality for bicyclists, pedestrians, and people in cars was significantly lower in the pre-1950 cities compared to post-1950s. We say we build for people in cars, yet even drivers are not better off in the system we have created.

This suggests that we built places that move cars more efficiently and with higher speeds. And the higher the speeds, the higher the chance of being killed when a crash occurs. That led us to think about why this was happening in our cities. Could it be street design, or could it be the street network design? This is a subject that does not appear to be studied by engineers or taught in engineering school. We decided to focus on street network design issues.

I was working with a student, Wes Marshall, and he found that one impetus for change was the Federal Housing Authority. In 1938 they put out a manual distinguishing between good and bad practice (Figure 18). This manual was the basis for massive change in how to build cities in the United States. Specifically, the manual said that the grid (Figure 18) was monotonous, had little character, uneconomical, and was unsafe for road users. This design was put forward with no evidence. Even without evidence, American Association of State Highway and Transportation Officials (AASHTO) codified this idea in the functional classification that came about in 1978. This is basis for how we design streets in America.

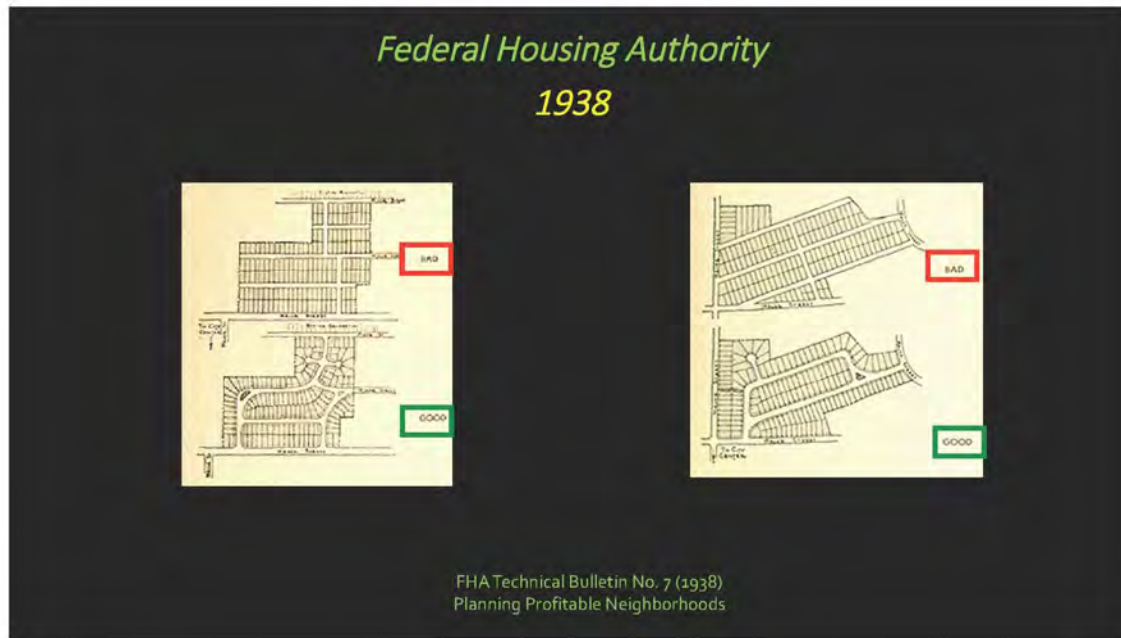


FIGURE 18 1938 Federal Housing Authority guidance.

We looked at 24 Californian cities with traffic fatalities and compared the grid pattern with a suburban cul-de-sac pattern. The chance of being badly injured was 30% higher in those suburban patterns and the chance of a fatality was 50% higher, after correcting for traffic volumes, etc. Where were people walking? In the suburban street pattern, 2% walked, 1% biked, and 2% used public transit. In cities with a grid network, 9% walked, 4% biked, and 9% took transit. Fatalities occurred at different rates and people used different modes in these places at different rates. We extended our study to the issue of health, inspired by the work of Richard Jackson, and found that higher intersection densities affected obesity, diabetes, high blood pressure, and heart disease.

Carol Atkinson-Palombo, my colleague at the University of Connecticut, and Peter Norton and I have been working on a proposal on how we have normalized the abnormal. If we are going to make change, we have to understand how we normalized this abnormal situation. And how can we normalize the normal? What does this mean? Smoking was normal 30 to 40 years ago. Are there methods and techniques we can learn from changing culture in this way?

The word abnormal is extreme, but let me give you an example of why I use this term. This is a picture of Bridgeport, Connecticut, in 1913 (Figure 19). It was mixed-use community, had a fine-grained fabric, and was a beautiful place. This is Bridgeport today (Figure 20). We need to talk not just about health of people, but also of places. This is not a healthy place. Would people have made this choice if they knew what was going to happen? Would they have gone down this auto-oriented road if they could see the potential impact?

Another place with a high bicycle rate is Amsterdam, Netherlands. This compares traffic fatalities rates in the United States and the Netherlands (Figure 21). After 1970, it decreased.

Bridgeport 1913

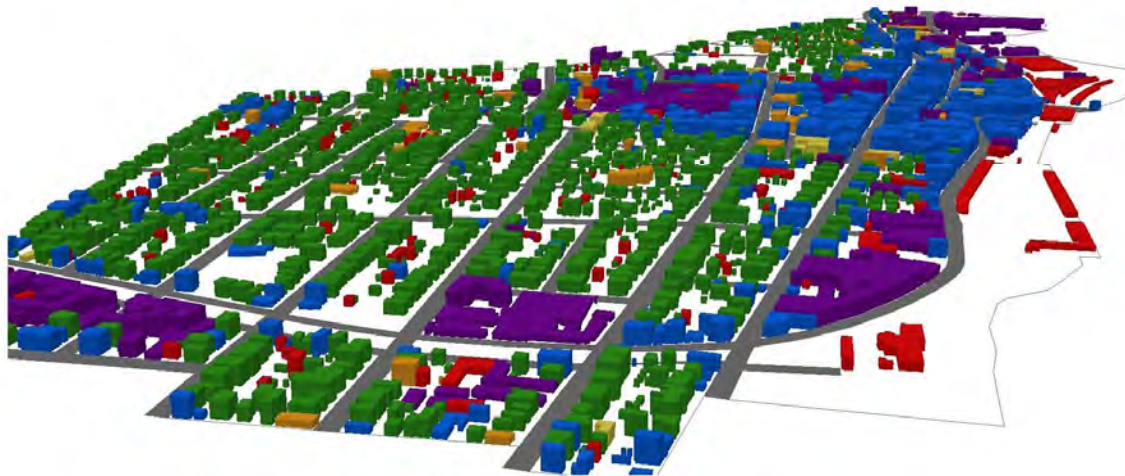


FIGURE 19 Bridgeport 1913.

Bridgeport 2013

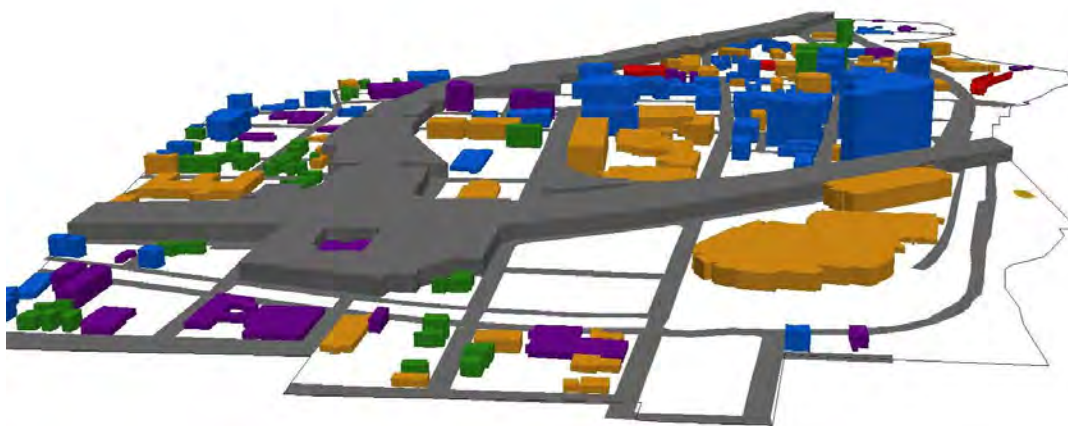


FIGURE 20 Bridgeport 2013.

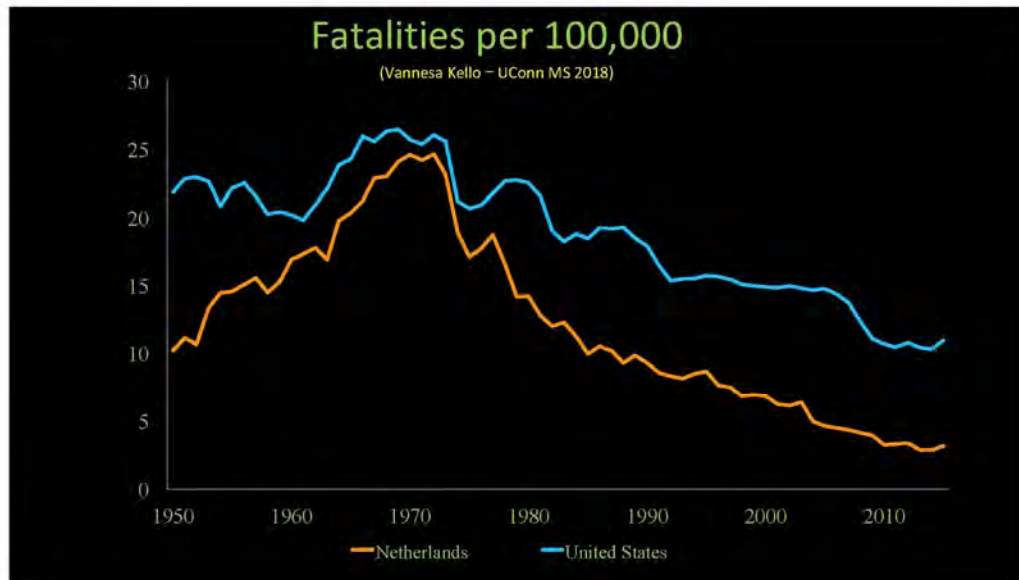


FIGURE 21 Fatality rates in the United States and the Netherlands.

The traffic fatality rate per 100,000 users for people in cars, pedestrians, and bicyclists in the United States and the Netherlands in 1970 was almost identical, especially for people in cars. In the United States, we have improved traffic fatality rates for people in cars now, but it is worse for pedestrians, although it has improved for bicyclists (Figure 22). In 2015, the Netherlands has decreased immensely, compared to the United States now and to itself 40 years ago (Figure 23).

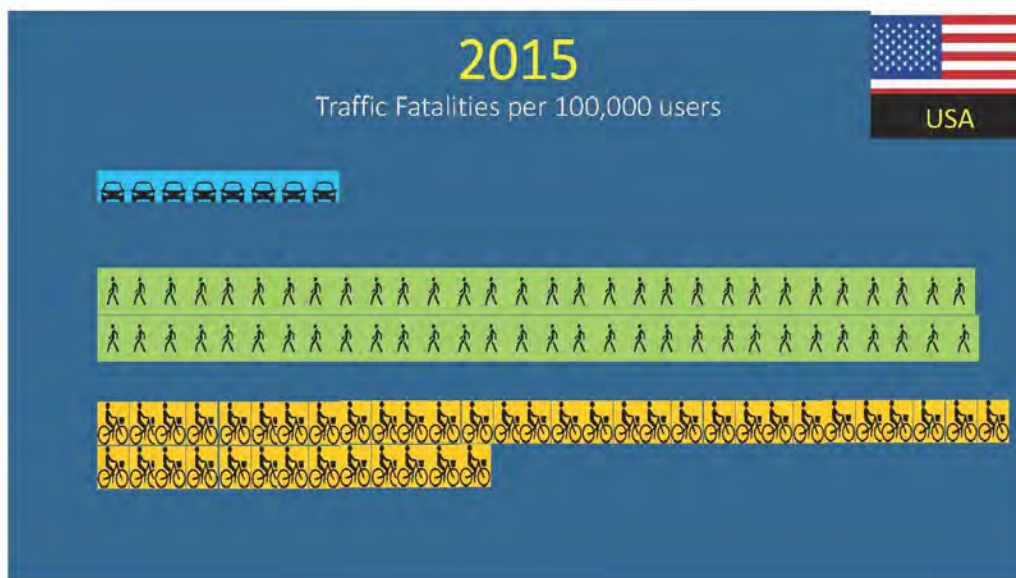


FIGURE 22 Traffic fatality rates in the United States, 2015.



FIGURE 23 Traffic fatality rates in the Netherlands, 2015.

“Vulnerable road user” is a state-of-the-art term in the U.S. British planners say that a vulnerable road user is one that is “armored.” The term suggests that we need to be armored if we are not in a car. Looking at the data from the Netherlands, where the fatality rate for the three categories of users is identical, the term is a not-so-subtle blame-the-victim term. Instead, we need to stop creating dangerous places. People need to be in the streets without armor.

Change in the Netherlands came about in part through actions such as a campaign to protest the number of children who died in traffic. This campaign, called *Stop the Child Murder*, was a protest on the shortest highway in the Netherlands, and involved participants who laid down with their bicycles in a public space to visually represent bicycle deaths. These actions led to changes in government policy beyond just building bike lanes, as the actions created systematic change. Now, they have changed the culture to the point where they have bike- and tram-only streets.

Bringing about this change is a three-step process that involves the actions of elucidate, eradicate, and educate. We need to elucidate; that is, shine a light on what is going on. A book called *Root Shock* is an example of illuminating the challenges of equity and racial justice. We need to eradicate bad policies that are buried in the transportation system, such as the work of Jane Jacobs and the work that has been done to eliminate parking minimums. *Fighting Traffic* is a book that is an example of educating people about transportation issues.

DAY ONE: CONCURRENT BREAKOUT SESSIONS

Exploring the Landscape *Reflecting on Innovative Practices*

GEOFFREY “JEFF” WHITFIELD

Centers for Disease Control and Prevention, Moderator

PHIL BORS

Healthy Places by Design, Facilitator

Jeff Whitfield welcomed everyone to the session and introduced the facilitator, Phil Bors. Bors explained how this session was organized. Participants engaged in a “gallery walk” where they brainstormed ideas according to the topic at a station. After seven minutes, participants rotated to the next station to discuss another topic. The station topics and discussion prompts are below.

Station 1: Innovations. What are innovative AT practices that can also advance health and equity?

Station 2: Needs. What are priority problems in need of innovation, i.e., where are we stuck?

Station 3: Relationships. What partnerships and collaborations are needed to support innovation?

Station 4: Research. What evidence, analysis, or research is needed to support innovation in AT and health?

After the gallery walk, Bors facilitated a whole group discussion to further discuss each station as a full group as well as discuss the unintended consequences of innovative practices and AT.

STATION 1

Innovations

What innovative AT practices can also advance health and equity?

- What are innovative public health or AT practices that can also advance health and equity?
- Identify practices that exist now and figure out why aren't they widely disseminated.
- Every Day Counts (EDC-5) STEP (Safe Transportation for Every Pedestrian).
- Federal highway funding: peer exchange to share information on countermeasures, innovative practices (e.g., Austin, Texas) diverse geography exchange.
- NCHRP research papers: funding to take the paper to put into practice.

- Increase density in cities.
- Move *Complete Streets* plan into implementation—decision criteria changed to prioritize bike–pedestrian (e.g., Nashville, Tennessee).
- Codify trail networks in MPO planning for transportation.
- Rural: build capacity in rural areas that have been brought to urban focus ± coalition at health centers – assessment of bike connections.
- Research of new micro mobility technologies: use, equity, and accessibility.
- Automatic counters ± surveillance of active transit use.
- Assist local leaders with funding and technical assistance (e.g., Tulsa, Oklahoma).
- Wheelchair charging stations strategically located to promote walking and rolling for people with physical disabilities.
- Build relationships with communities (churches, mosques, schools) so they lead research:
 - Schools’ policies on adaptive bicycles that are required to purchase and is available for check out by students and
 - Lead to innovative responses.
- Community walk audits (focus on people with disabilities or a variety of needs).
- Play Streets.
- Youth Engaged in Activities for Health (YEAH!).
- Pop-up placemaking and placekeeping—tactical urbanism.
- Elevate Community-Based Participatory Research (CBPR) and Participatory Action Research (PAR) value. Build this through partnerships.
- Transportation demand management (TDM) apps for common users and underserved neighborhoods (tools to assess land use and transportation). Increase awareness on where to find them.
- Wayfinding ... “5 min walk to ...” “10 min bike to ...” evaluation.
- *Vision Zero* initiatives; shift focus to injuries and deaths and not just crashes.
- University of California, Berkeley, Anti-Displacement Risk.
- Google Street View Walkability.
- Strava and other bike apps
- How to pull private entities together to innovate together?
- Federal Highway Administration (FHWA) Innovation Grants–SafetyU Program.
- Story walks: libraries program book pages and walk to read and engage space.
- Courses on public health and the built environment for university students, including public health, planning, and design fields.
- Pedestrian streets.
- Pittsburgh reviewed crash maps overlaid with community feedback. High crash areas overlap with low community feedback areas. Planners went to the low feedback areas to understand what they need.
- Boston’s 311 line review of sidewalk calls—conditions.
- Design effective interventions to limit required enforcement. Example: for bike lanes, add rails to prevent parking therein, or for speed reduction add bump outs or street parking.
- Center for Arts and Sciences in Valencia, Spain: riverbed that was rebuilt as an urban greenway.

- Language of “poor” and “black.” Change to “low resource” and “people of color,” and “equity.” Agencies in Colorado use this type of language but not all other state and federal agencies do.
- Define commonly used terms. State DOTs often use the term “equity” referring to funding formulas that balance transportation spending across urban, suburban, and rural communities. More recently, the term has been used to clarify that certain neighborhoods—communities have, historically, lacked the same investment and transportation funding. These have typically been communities with high proportions of people of color and low-income residents.

Whole Group Discussion

- We need to look at surveillance especially in AT.
- How do we integrate private entities?

STATION 2

Needs

What are priority problems in need of innovation, i.e., where are we stuck?

- Implementation. We know what works and what we need, we just aren’t implementing it on the ground. We have very good master plans but they are not being implemented. *Complete Streets* policies are adopted in many places but are typically not accountable for results.
 - We lack messaging about AT and health that resonates with transportation decision-makers, e.g., government officials, elected leaders, governors, mayors, city managers.
 - We need to change who makes the decisions about transportation infrastructure and spending to include nontraditional partners, e.g., American Association of Retired Persons (AARP), American Heart Association (AHA), arts organizations, community-based organizations.
 - The transportation planning process is often slow and community members can lose interest and enthusiasm for projects. We need more “quick win” projects.
 - The transportation planning profession is not demographically diverse. We need more inclusive agencies with different perspectives.
 - We have a gap in availability of local level data, especially health data. Other sectors are also missing local data.
 - The healthcare sector is often preoccupied with insurance coverage.
 - *Complete Streets* can come across as “sloganeering.” We need to focus on how to get pedestrian–bike policies in place.
 - Health and other AT advocates in communities often know of countermeasures (e.g., leading pedestrian intervals) but do not appreciate the complexity of unintended consequences from specific engineering choices.
 - Public health field is often not used to doing modeling and forecasting, unlike engineering disciplines.

- Even transportation field uses flawed modeling (e.g., LOS has been dominant for decades, which has given us our car-centric landscape).
- The public health field has been doing HIAs in recent years, but in general still lacks analytic capacity and local data to plug into models.
- Some communities have ended up with “*Complete Streets* to nowhere,” which are isolated neighborhoods disconnected from a larger network. Some communities have ended up with unequal implementation of *Complete Streets*, which are more likely to be implemented in higher socioeconomic status (SES) neighborhoods.
- The transportation system is not set up to prioritize pedestrian/bike transportation. “Squeaky wheel” implementation is common. “Squeaky NIMBYs” (not in my backyard) are also a big part of decision-making, which can kill AT projects. In either case, it’s important to listen to and understand their perspective rather than dismiss them.
- Rural communities are often forgotten in the AT discussion and underfunded. They may only have access to “dumbed-down” urban interventions that do not fit in a rural context.
- Groups representing the least advantaged people should be directly involved in solutions and innovations.
- Need to consider how to reduce inequity from *Complete Streets* rather than perpetuate it.
- Need more standardized goals for greenways. For example, park departments have different goals for a greenway (leisure) versus planners (AT). Counterpoint: we should not necessarily standardize the goals because they would naturally change given the geographic context.
- How do we motivate individuals to take action to utilize AT?
- Need better transportation options because they are so critical for daily living needs.
- Need law enforcement to be more community led. Law enforcement needs systems of accountability to address and evolve from historical bias in policing. *Vision Zero* tends to be very law enforcement-oriented and can hinder buy-in among communities that already have low trust with police.
- Data alone is not sufficient in persuading policy-makers. We need to be better at storytelling.
- Our society is aging and we do not typically consider older adults as a key equity group.
- Civics 101 for health and place for residents and community.
- Enforcement of policies that are already in place (e.g., keeping bike lanes clear of parked vehicles). Police tend to be biased in favor of motorists rather than pedestrians–bikes.
- Crash reports are often incorrectly coded by police officers because they may lack knowledge of how to accurately complete crash reports.
- We need a common definition of “rural.”

Whole Group Discussion

- Maybe we need innovation around how to implement our current efforts.
- Sloganeering is when there is a saying or slogan being said or “thrown around” with nothing happening or backing it.
- Rural communities think they are getting urban interventions that are “dumbed down” and do not necessarily fit the rural community’s needs.

- It may not always be appropriate to standardize goals. There needs to be a balance of what we want–need to do for that space.
- Increase the number of people biking vs increasing the vitality of a space (because this could look different than just having more bikes).
- *Squeaky* people could also be the ones that keep things from happening or reversing some of the implementation.
- This is where we need to talk to these “naysayers” to listen if they have a concern before policies are in place.
- Need to look at community-led enforcement efforts.

STATION 3

Relationships

What partnerships and collaborations are needed to support innovation?

- Convergence partnerships (coalition of national funders) with public health as a convener. Think outside the box because the relationship may not be obvious.
 - Inclusion of all abilities.
 - Not limited to national organizations.
 - Individual participants and organizations.
 - People with disabilities.
- State DOTs and state departments of health (DOH) and local DOTs and county health departments.
 - Task forces (e.g., Colorado Transportation and Health Task Force, organizations from both sides).
 - Equity considerations:
 - Those who can or can’t pay. The least taxed often have the greatest need. How to include them?
 - Gathering data is good but meaningful projects build collaboration and trust between agencies (e.g., with demonstration projects).
 - Health-oriented industries: how to use, advertise, motivate?
 - Communication and marketing.
 - With organizations, how to break down silos?
 - National Association of Governors, power at executive level in states.
 - Build the economic case = bipartisan.
 - Implicit = gentrification.
 - Must include missing advocacy and related organizations.
 - School systems.
 - Utilities are major land owners.
 - Border patrol suggested as resource, but with strong counterpoint from some individuals against their involvement.
 - Connect advocacy organizations across topics: mobilize justice, disability organizations, equity organizations, and the arts.

- More police on foot and on bikes.
- Law enforcement:
 - Traffic enforcement specific to pedestrian/bike safety and
 - State highway safety offices (programs, funding).
- Professional organizations [e.g., Institute of Transportation Engineers (ITE), AASHTO, National Association of County and City Health Officials (NACCHO), and Congress for New Urbanism (CNU)] and publications such as the *Manual on Uniform Traffic Control Devices*.
 - Some can change practice standards.
 - Can pool resources.
- Hospitals: community health assessments; partnerships can help set priorities.
- Federally qualified health centers (FQHC) and primary care organizations.
- Universities, colleges: student analytic projects.
- Funders: state departments, foundations.
- Census.
- Parks: local, state, and national.
- Business community:
 - Local business owners and chambers of commerce and
 - Big business, some have foundations.
- Libraries.
- Urban Land Institute: access to developers, realtors, architects.
- Youth sports organizations and youth development organizations, such as 4-H.
- U.S. Green Building Council.
- Cross-sector data partnerships linking how to collect, analyze, and disseminate data.

Whole Group Discussion

- Task forces can help build collaborations of organizations and establish trust for the people or groups that really have the same goals for a community.
- How do you bring “active motivated industries” (e.g., Nike) to the table and use their networks and marketing to help reach people who want to be active?
- We all can benefit from economic development, which is something that AT facilitates.
 - Should look at if the U.S. Census Bureau would be a good partner since there are about to be people going door to door to collect data.
 - Ride the coat tails of some of these changes especially if we phrase it as the economic benefit because the local businesses and chambers of commerce could push more to make these changes for that benefit.
 - Think about not trying to build things from the start but instead seeing if youth sports organizations could be a way to move the AT platform forward.

STATION 4

Research

What evidence, analysis, or research is needed to support innovation in AT and health?

- Community assessments led by community members, both qualitative and quantitative.
 - CBPR or PAR.
 - Rural assessments emphasized:
 - Hospital access and
 - Doctor access.
 - Relationships with community leaders to be involved with research design.
 - Communication outside of academia about innovations.
 - Sustained partnerships for trust.
 - Food access issues solved.
 - Physical disability.
 - Who can benefit the most from transportation innovation?
 - Standards of assessing LOS to VMT.
 - No lack of ideas, lack of funding with capacity for innovation.
 - National Institutes of Health (NIH), National Science Foundation (NSF) involved in funding.
 - Policy-makers.
 - Connecting AT to climate crisis.
 - Research connecting safety and health and AT. How to ensure safety when increasing mode shift?
- Micro mobility: decrease AT, increase injury?
- Comparing outcomes between state highway safety plan (SHSP) in states with more versus less political input (similar to AASHTO centralized versus decentralized DOH measures).
 - Access to healthcare in rural areas: systemwide, chronic depression, and AT.
 - Narratives for translation.
 - Aging (part of equity).
 - Intersection of aging, race, and rural.
 - Social isolation: mental health, *Healthy Places*, opioid crisis.
 - Evaluate the impact of innovative strategies:
 - Separate each of the different strategies when implemented together,
 - Unintended consequences, and
 - Strategies to address these or prevent.
 - Quantitative metrics of social and economic benefits of active infrastructure.
 - Core set of variables that must be collected for each strategy.
 - There is enough research; create stories from what we have.
 - Public transportation services to get people to places (health outcomes, costs, etc.).
 - We know what works but not how.
 - Evaluation in the longer term.
 - Where do you go to find the information?

- Research translation.
- Medical transportation.
- Build decision-making tools at the project level. Translate public health into tools.
- Communications around transportation social determinants of health (SDOH).

Machine learning and artificial intelligence (AI) in understanding effective.

- Equity considerations in all research.
- Multimodal equity.

Whole Group Discussion

- We are lacking evaluation of long-term effects of different AT initiatives. We have plenty of ways to collect information, but we are not using them to evaluate how these initiatives help over time.
- Need to focus on translating the research findings not just into academic journals, but to the industries or practitioners that can help make these implementation changes.
- There is research lacking on how AT opportunities improves access to food opportunities or access to healthcare.
- Need to figure out how to deliver the research findings in an “attractive way” to the community leaders who would be able to make changes based on the research findings.
- Need to start discussing how AT also relates to activities of daily life and how to help mediate social isolation.

Phil Bors brought everyone together to discuss the unintended consequences of innovation and AT.

Unintended Consequences

- Technology: e-scooters and e-bike sharing results in injuries and littering of sidewalks. Seeing e-scooters as a problem can distract from the root problem: high-speed traffic and urban design that doesn't promote slow speeds and safe riding.
- Equity displacement: who is AT for? People of color are pushed to the fringe.
- Green gentrification [e.g., Atlanta Beltline (8)]:
 - Signals neighborhoods are being flipped to developers looking to invest.
 - Is investment for current or future investments?
 - Compact development.
- Over-surveillance and policing of communities of color:
 - Problematic data sharing with law enforcement and
 - Education for police should be part of this topic.
- Research. Increasing density leads to increased exposure to poor air quality. What is the buffer to protect occupants?
- Data. Who owns it and how should it be used? What rules should govern Sidewalk Lab?
- Equity. Inequity in funding projects. We need to prioritize areas needing the most help [e.g., Charlotte Greenway examples (9)].

- Equity. Outcomes of transportation investments have realized little reflection regarding equitable distribution. It is widening rather than reducing inequities.
- Data and equity. 311 calls (in Boston example) and limitations of data.
- Communications. Promotion of one mode (e.g., rideshare) can “peel off” ridership for another mode like transit.

Whole Group Discussion

- Micro mobility has exploded without the thought of both the positive and negative outcomes (e.g., e-scooters decrease AT and increase head injuries and the e-scooters are just being left on the sidewalks and reducing mobility for people with disabilities).
- How do you make investments in a community without causing the displacement issue? Need to be intentional about who the AT changes are for. Are these investments for current residents or are they for future residents?
- Need to begin to look at how more people being on the street (pedestrians and cyclists) are affected by the air pollution from the cars that will still be on the road.
- Partnering with law enforcement could cause an unintentional consequence of communities of color having their information shared with them. This could result in over policing of these areas.
- Neighborhoods that have more access to AT opportunities are sometimes the communities that continue to get the improvements. This could be because it is easier to do the permitting for these communities.
 - It is also easier to sell new ideas to communities that are already doing or getting improvements versus a community that is underserved and has other concerns than having AT.
 - We need to shift the goal to reducing inequity.
- One way you could find the areas that really need help with equity would be creating a map of where the problems are and which communities have these problems but are not speaking up. Then you can specifically go to those communities and get their opinions and let them know that they can be heard. We need to look at our data and see who we are not hearing from versus just going based off of the information we are getting because that could not be an accurate picture.
- Crash reports sometimes are not filled out properly by police officers and the officers do not realize that the crash reports are used for more than just insurance purposes. Therefore training is needed about why these types of things are important and how we can change the culture of the fact that it is not always the pedestrians’ or cyclists’ fault for the crash.
- Need to make sure that the language that we reference to all of these things is consistent to help facilitate change.

DAY ONE: CONCURRENT BREAKOUT SESSIONS

Building Strategic Institutional Relationships

MELISSA KRAEMER BADTKE

*East Central Wisconsin Regional Planning Commission
Moderator*

Badtke introduced the session and facilitators Mark Fenton and Ann Steedly.

MARK FENTON

Transportation, Planning, and Public Health Consultant, Facilitator

Ann Steedly and I worked on this session together and we will be presenting together on both days.

The repaved school crossing in Figure 24 in Montana represents a solution bore from strategic relationships. The community passed a *Complete Streets* Policy and opportunistically waited until repaving to work on the crossing. The Centers for Disease Control and Prevention (CDC) helped fund the state department of health, which gave money to University of Montana. The University of Montana worked with local groups, including parent activists, to get the project done. This is all about relationships.

My children are part of the first generation to have shorter life expectancies than their parents, due primarily to an increase in chronic diseases. This was recently published in the *Journal of the American Medical Association*. The *CDC Community Guide* shows it's not just the network. Its macro-level design and micro-level design recommendations to improve safety and access for all. The CDC data provides me with my checklist of what to do.

We will be exploring four categories for building institutional relationships. There are relationships that happen at the national, state, MPOs, and local levels. These are not just horizontal relationships, such as with state DOTs and state public health departments, but are also vertical relationships, such as with the U.S. DOT, a state DOT, or a local public works



FIGURE 24 Crosswalk, Billings, Montana: (a) 2008 and (b) 2016.

department. There are also cross-sectoral relationships, e.g., public and private sectors, universities, and community foundations.

Here are some examples of collaboration at different levels. Hawai'i undertook walk audits and trained interdisciplinary teams to lead walk audits. Montana did a walk audit and identified a location for a protected bike lane, despite community skepticism about biking and safety concerns. If you provide a safe facility, they will bicycle.

In the context of climate change, AT is important. Thanks to a workshop with the Walkability Action Institute in the U.S. Virgin Islands, the Montana Health Department and Public Works Department jointly created a guiding principles document that is *Complete Streets* guidance on recovery and reconstruction work. Today, we will identify best practices, existing gaps and needs, and opportunities for routine integration of best practices.

ANN STEEDLY

Planning Communities, LLC

Steadly explained how the session was organized and how this session relates to the Building Strategic Institutional Relationships session to be held the next day. As part of their introductions, participants were asked to provide a seven-word story that describes an important relationship between health and transportation (see below):

Cate Townley	Influence prioritization of transportation projects with state data.
Heather Deblin	AT makes me happier and healthier.
Craig Martinez	Promoting health equity through shared decision-making.
Victoria Martinez	Making it easier to have partners or be our own champion for health.
Jeff Lindley	Talking to organizations with a different perspective.
Heather Zaccaro	Regional transit coordination meets local activity-friendly routes.
Kim Clark	Defining common language on all levels throughout organizations.
Jennifer Toole	Health foundation in suburban Maryland, radical activism.
Roy Gothie	Interagency MOU, DOT, DOH, DCNR, Pennsylvania DOT connects.
Troy Hearn	People really are more important than cars.
Melody Geraci	Collaborate on legislation to force change now.
Ken McLeod	I rank state DOTs not health departments.
Valerie Jauregui	Partnering with greater metropolitan DOTs to make changes in rural counties.
Lindsey Kimble	Improve biking and walking opportunities in Knoxville.
Amber Dallman	Health pushes for demonstration projects and counts guidance.
Sarah Larsen	Fighting sprawl and inequity through multimodal transportation.
Nicole Bungum	HIA city MPO public health coalition.
Jessica Stroope	Local community coalitions can pressure policy changes.
Nicole Payne	Transportation is a public good.
Karen Valentine Goins	AT needs practitioners, advocates, and research evidence.
Sandy Cummings	Influencing health without talking about health.
Megan Weir	Co-leading <i>Vision Zero</i> to save lives on our streets.
Emily Ussery	Incorporating health community design into disaster recovery.
Melissa Kraemer Badtke	Interconnecting health and transportation plans and programs.

Ed Christopher	23 CFR 450 with emphasis on MPO planning regulations.
John Clymer	Mayors are powerful change agents and accelerators.
Janet Wojcik	Interdisciplinary community coalitions bring about change.
Alina Baci	Connecting the dots to achieve shared goals.
Laura Sandt	Leveraging health and injury data for decision-making.
Jasmy Methipara	Policy TPMs need to prioritize health factors.
Anne Steedly	Listen, be inclusive, be the change.
Mark Fenton	Shared certification training. Planners, engineers, health agents.

Fenton and Steedly divided participants into groups and explained the group activity. Participants discussed relationship issues at various levels of government according to the following four categories: local–municipal level, national–federal level, state–regional level, and vertical cross-section. In these groups, participants also identified opportunities to improve on those relationships or discussed how to replicate successful examples. Participants were also asked to describe relationships between sectors and across scales on a scale of good to bad, and strong to weak. This was accomplished by writing a sticky note along a grid with good–bad on a horizontal axis, and strong–weak on a vertical axis. Participants noted important topics, which were used to help frame the set of topics for discussion the following day.

GROUP 1

Local–Municipal Level

- Town and Gown:
 - Opportunity to build for large walk–bike population,
 - Public education opportunities, and
 - Evaluation skills and people power.
- Land use stakeholders and community need more harmony:
 - Land use plans at odds with what residents want;
 - Local advocacy—not just the usual suspects;
 - Go to where people are—street ambassadors and walk audits; and
 - Planning academies.
- State–district engineering and local governments (bad relationships):
 - Local official education, engineering certification;
 - University curriculum and the ITE, continuing education credits; and
 - Annual trainings and conferences.
- Land use and transportation planning (weak):
 - Health and land use are important too;
 - Concerns about individual rights;
 - Getting all to understand–engage–walk audits;
 - Requirement in grant applications; and
 - Pop-up demonstrations.
- Micro mobility and local DOTs (varies):
 - Require micro mobility to internalize costs, including staff capacity;
 - Be clear on local responsibility;

- Create data standards on movement and injury; and
- Private ownership.
- *Vision Zero*: mayors–DOTs–health–advocacy:
 - Not just an “event,” education and encouragement,
 - Build staff capacity, and
 - Measure and share success.
- Department of Public Works–local health equity:
 - Denver requires Department of Public Works (DPW) dollars to measure equity impacts on the infrastructure:
 - For example, missed appointments due to transportation shortcomings.
 - Rural settings.
- Local advocacy–local officials:
 - Facilitating local advocacy,
 - Media connections (much broader audiences),
 - Social media tools to regular residents, and
 - People for Bikes–last mile program to focus on reaching broader audiences.
- DPW–health:
 - San Francisco: 13% of streets equals 75% of injuries and fatalities; requires investment.
 - Mayoral initiatives can be a driver (e.g., walk with a mayor).
- *Vision Zero*:
 - Understanding disproportionate investment, enforcement.
 - Local law enforcement relationships: “giving bikes lights versus tickets.”
- State-owned roads in local settings.
 - Change must occur at the legislative level.
 - The state cares about LOS, evaluated by LOS.
 - Political pressure at highest state level: examples leading the way, Minnesota, Massachusetts, California.
 - Guidelines, which evaluation measures matter; training on these.
- Utilities to local communities and streets.
 - Only required to replace what’s there.
 - No coordination with local capital planning work.
 - Climate reconstruction, resilience requirements:
 - State and local requirements and
 - Staff capacity.
- Fire departments and local DPW and planning:
 - Resistance to political pressure, education, and change in regulations and requirements.

Local–Municipal Level Grid Summary

- **Strong–Bad:** State-owned roads in local communities.
- **Strong–Good:**
 - Local bike advocacy groups.
 - People for Bikes–last mile program.
- **Neutral–Center:**

- Private bike–e-scooter share companies and DOTs.
- Local municipality–public works to local public health and equity.
- Town and Gown.
- District–local government—many gaps!
- **Weak–Neutral:** *Vision Zero*.
- **Weak–Bad:**
 - Fire departments and
 - Local public utilities rebuilding bad infrastructure.

GROUP 2

Federal–National Level

- CDC–Federal Transit Administration (FTA):
 - My group has fairly frequent and positive interactions with FTA technical assistance–funding recipients.
 - Particularly good for bringing healthy food for rural areas; help facilitate agency-to-agency collaboration.
 - Opportunities to replicate or improve:
 - Personal (staff) connections between agencies are the main basis of the positive interactions and
 - From an agency perspective, supportive policy systems are the basis of positive interactions.
 - FHWA collaborations [past work with CDC, Housing and Urban Development (HUD), etc.].
- National forum, work with states:
 - Jump start to health conversation.
 - Roadmap for Surgeon General.
 - Connecting with League of Cities, National Association of City Transportation Officials (NACTO).
 - Ohio Mayors Alliance (alliance of 35 largest communities in Ohio).
 - Mayors are very powerful change agents.
 - A mayor can organize meetings with stakeholders quickly.
 - Mayors can make things (policies–projects) happen quickly.
 - Opportunities to replicate or improve: Federal agencies can work with mayors to make things happen.
- Federal district offices working with state–local offices.
 - Federal district offices may not be up to speed on federal level rules–regulation and may not provide sufficient support to local agencies.
 - Opportunities to replicate or improve:
 - Conduct joint trainings between federal district offices.
 - There needs to be a shift to better vertical connections.
- CDC partnerships
 - CDC have partnerships with existing coalition and networks to mobilize and partnership with local organizations for policing change.
 - Opportunities to replicate or improve:

- Could be more of them.
- Verticality of enforcement of FHWA rules.
 - Improvement of rule–best practices enforcement from federal to state–local levels would be helpful.
- General training around transportation and health best practices.
 - Pedestrian and Bicycle Information Center (PBIC) is a resource (10).
 - Communication of good practices around health and transportation in an effective way would be helpful.
 - Communicate good practices to engineering schools as that is the primary training areas of many transportation staff.
 - If you want to train public health practitioners on issues of transportation and health, it would be helpful to come from a space other than public health schools, as many public health practitioners do not go to public health schools.
- Bureau of Transportation Statistics–National Household Travel Survey Data (BTS–NHTS):
 - National data sources can drive evidence-based health–transportation decisions.
 - Example: BTS mapping mobility tool.
- Federal-level organizations providing local data to local organizations.
 - Most data are not available in local levels.
 - Work needs to be done to develop data.
 - Resources to increase and improve data collective would be helpful.
 - Figuring out how to help with responsiveness to survey would be helpful.
 - Being more innovative about how we complete data collection and how to link individual-level data with community-level data would also be helpful.
- Relationship between ITE and health-oriented groups.
 - There are good working relationships between ITE with national organizations.
 - Transportation organizations may have good individual links, but it is not always a systematic connection.
- FHA–HUD local planning land use.
 - Local housing authorities goes directly to HUD for assistance about transportation-related issues as opposed to transportation bodies.
 - More connections between housing bodies and transportation bodies would be useful.
- Measure of success (more people oriented).
 - Moving to a more people-centered measures of success rather than transportation-oriented success would help.
 - Examples: access to grocery stores; average distance of schools.
- University accreditation entities:
 - Incorporate trainings and accreditation efforts to bring about structural change of more inclusive active health and transportation efforts.
- TRB research communication efforts:
 - U.S. DOT may not always do enough to get research into the hands of engineers.
 - Opportunities to replicate or improve:
 - Direct connections with staff engineers in agencies–organizations would be useful.

- CDC grants to local health departments for technical support (in relationship to environmental change).
 - CDC has done good work to offer resources to other agencies to provide technical support to local administrations. Many of the communities that receive this technical are small, poor and/or rural communities that would not be able to get this support otherwise.
 - Opportunities to replicate or improve:
 - Scale up these resources and protect it from budget cuts.

Federal–National Grid Summary

- **Strong–Bad**
 - TRB research–state DOTs.
 - Information distribution: U.S. DOT – Federal HQ → federal districts (states as well).
- **Strong–Good**
 - FHWA–PBIC.
 - CDC: policy, systems, and environmental changes, grants to local health departments.
 - Ohio Mayors Alliance (National Forum work).
 - CDC–FTA.
 - FHWA has lots of free resources.
 - ITE and health–AT-oriented groups, American Public Health Association (APHA), CDC, America Walks, etc.
- **Weak–Good**
 - Joint call, signatories:
 - Robert Wood Johnson Foundation (RWJF) funded and
 - Organizational (newer).
 - Federal: national organizations supporting or providing local level data.
 - CDC funding: national partners and nonprofits
 - BTS–NHTS–Data.
 - Measures of success HUD and U.S. DOT?
- **Weak–Neutral**
 - University accreditation entities.
- **Weak–Bad**
 - FHA–HUD, local planning and land use–housing context.
 - FHWA: no enforcement of walk–bike policies.

GROUP 3

State–Regional Level

- Land use and transportation coordination:
 - Poorly done, land use and transportation planners don't always communicate.
 - Local transportation versus top-down.
- HIA:

- Opportunity for state health departments, state DOTs to use a tool to ensure health is included.
- Health in all Policies Task Force:
 - “Forced” to sit together (legislative mandate).
 - Share ideas.
- Health at bigger (regional) planning table:
 - Is health really there?
 - What would health do at table?
 - Counties: be aware of 5-year county health plans; didn’t share with the transportation planners.
- Building legislative champions.
 - Healthy transportation (cares).
 - Overcome DOT–MPO that don’t want to move.
 - TRB’s Health and Transportation Subcommittee.
- Health in All Policies (HiAP) committee and advocacy groups proposed (health and AT, e.g., parks, health workforce).
 - Strategic Growth Council program – ± placed high up – ± effective.
 - Important to have grassroots base; champions with state DOTs–DOHs.
 - Speak up for policies we have, e.g., state DOTs speaks up on behalf of Safe Routes to School.
- Need advocates who push for change and implementation.
 - For example, 503(c)4 → do more legislative work; \$50M/year for pedestrian–bike infrastructure in Illinois.
 - For example, have *Complete Streets* Policy but implementation questionable by some.
 - For example, UT required to bring state agencies and advocates together.
 - Quality of life framework being used to address state health disparities.
 - Education needed.
 - Utah DOT planning uses 5- to 15-year period; solutions development includes all modes–regional systems plan.
 - LOS: instead, use throughput of people, good health, mobility, connected communities, economics (brand new metrics to be determined).
 - Framework helpful in working with local people. What does quality of life mean to you?
 - Does it affect budgets? AT added money via legislation.
- HIA. How is it working? Opportunity for better integrating with environmental efforts.
 - Health modes: describe relationships between problems and consequences.
 - Massachusetts has an Executive Order to carry out HIA for some transportation projects.
 - Sometimes need specific tool for concrete project → can help effect change.
 - Caltrans supported HIA for freeway project → widening lanes would hurt community.
 - Caltrans decided not to do more HIAs.
 - Required to include environmental justice impact but not all state DOTs are doing it (air quality).

- Excited to do until they use it.
- Maybe helpful to build into processes that already exist, and have funding requirements.
- City of Chicago–North Lakeshore Drive.
 - City wanted to do HIA, state said it didn't have to and didn't do HIA.
- Do HIAs lead to project mitigation? Or is it already too late?
 - All about communication. Mitigate effects only; inherently limited.
 - Applying HIA to state plan versus project may have different results, i.e., demonstration project, focus on project opportunities.
- HIA and implemented four recommendations in project (e.g., signal timing, longer sidewalk length)
 - Put HIA first. Harder to change minds after project scope designed.
 - Build into eligibility requirements; evidence base is already here.
 - Avoid “We're already at this point.”
- Minnesota applied HIA to state multimodal plan – ± equity reports with each district.
 - Key informant interviews regarding transportation challenges.
 - Early results: transit not adequate to serve everyone without car; walking and biking can be scary.
 - Will be helpful in moving away from LOS to better metric (decreasing VMT, etc.).
 - What is level–length of HIA? This one was led by the Minnesota DOH.
- California supported community in using HIA to demonstrate that building highway transportation only in Bakersfield would lead to increased driving into Bakersfield.
 - Need to get funding; shaped plan because they did HIA at start of project (state mandate).
- MPO and food banks—access to healthy food.
- State DOT–DOH MOUs: lower frequency, do we know how many exist?
- Jurisdiction: state–local priorities conflict on Main Street; state protects this priority.
- State Mayor's Alliance: umbrella organization that shares ideas, best practices, competition.
- Massachusetts. DOT, DOH collaborate because of legislative mandate; health data in online transportation platform.
- State transportation enhancements–transportation alternatives funding broken.
 - State gives unused money away to governor.
 - Rural cities without planning departments.
 - But DOTs and DOHs have good relationship.

Questions and Opportunities

- HIAs. Timing (early) → integrate key components into transportation?
 - National Environmental Protection Act (NEPA); mitigation versus project selection–prevention.
 - Tying HIAs to outcomes.
 - What happens when Main Street is functionally a highway?

- Engage early and often.
 - Work with local health departments (LHDs).
- Kentucky. Local health departments have no money; reinventing public health and university extension offices.
- Becoming part of transportation groups; trying to get mandate to include both at regional transportation meetings.
- Food access: extensions working to increase access.
 - Trying to include community planning in role.
- Rural needs: physical activity, etc. Different ways to apply strategies by urbanizing.
 - More in common with other rural areas than state overall.
 - Extension services in high-obesity counties (CDC), mostly rural counties.
 - Rural has lots of flavors, inconsistent with federal definitions (>50).
 - Minnesota: equity interviews on transportation challenges.
 - If unable to own vehicle; ability to travel is limited.
 - Rural transit inadequate, especially for disadvantaged groups, groups with multiple transportation needs.
- Opportunity: changing measures away from LOS and prioritize noncar riders.
 - Different ways of measuring: meaningful, effective measures.
- Trying to create sidewalk network: effectiveness, use. What is a vulnerable user?

State–Regional Relationship Grid

- **Strong–Bad**
 - State highways as de facto Main Streets. Conflicting priorities.
- **Strong–Good**
 - State mayors’ alliance.
 - Health county MPO: Walkability Action Team.
 - Statewide Health in All Policies Taskforce (agency needs).
 - State DOTs and departments of public health collaborating in data, *Complete Streets* funding program
 - The state DOT and health department have a great relationship.
 - Health and transport serve on project Planning Advisory Committees (PACs).
- **Good (only)**
 - Planning and environmental linkages.
- **Weak–Good**
 - Collaborative land use plan; everyone wins.
 - MPO food banks.
 - DOH – DOT MOUs.
 - HIA as a tool for DOT and state health departments’ collaboration.
- **Weak (only)**
 - State Department of Environmental Protection and MPOs–state DOTs.
- **Neutral–Center**
 - Building state legislative champions to increase funding, change policy.
- **Weak–Bad**
 - Having health at the big regional planning table.
 - Transportation coordination.

- The Transportation Alternatives Program–Transportation Enhancement (TAP–TE) program has 40% of projects complete.

GROUP 4

Vertical Cross-Sections

- Extension cooperatives ± AT.
- California example: State task force on zero fatalities.
- Community benefit funds ± leveraging resources.
 - For trails and transit to medical appointments.
 - Could be an opportunity.
- Horizon Foundation funded by Johns Hopkins University.
 - Executive director's vision to push into suburban communities.
- Arlington Public Schools (Virginia): five new schools partnership with the state DOT for TDM for no more trips by car. They made it a priority.
- *Vision Zero* national network structure.
- Guide on how to work with cooperative extension agents.
- Crash–injury data from police and emergency response: how to connect the data and different standards.
 - Transportation, public safety, and public health.
 - Relationships with pedestrians and law enforcement.
 - Capture and formalize data agreements.
 - HIA and crash data (different requirements).
 - Federal law–safety data. Pedestrian safety action plan not being adopted.
- Relationship–Highway Safety Plan.
- Safety plans.
 - Concerns with relationships and the view of pedestrians.
 - Vulnerable road user versus dangerous design.
- The California Endowment.
 - Community partners and staff in the agencies to share.
 - Align efforts.
 - Finding relationships take a long time.
 - Priorities.
 - Grassroots–takes money and foundation support.
 - Takes years to build relationships.
 - Do pop-ups to show change.
- Federal policy.
 - Highway Safety Improvement Program (HSIP) does not have a lot of money.
- Spreadsheet that shows what everyone is going to do so all are held accountable.
- Ownership with community members and engagement barriers–meeting during the day, language barriers, child care, food security.
- Rural communities–police department requesting 50% of park bond.
- Speaking to their needs and how can we make it mutually beneficial.

Vertical Relationship Grid

- **Strong–Bad (slightly)**
 - Horizon Foundation–Howard County, Maryland Government.
- **Strong–Neutral (slightly positive)**
 - Cooperative extension.
- **Strong–Good**
 - *Vision Zero* national network mayor, public health department.
 - Arlington, Virginia public schools TDM; no more trips by car.
 - California Endowment cross sectors.
 - University system.
 - Universities + MPO/transportation + data.
 - Medical professionals as spokesperson(s).
- **Neutral–Neutral**
 - State Task Force on Traffic Zone Fatalities (California example).
- **Weak–Good**
 - Hospitals–community benefit funds.
 - Colorado–partnership to fix bicycles.
 - World Health Organization, United Nations, Global Road Safety Partnership, and locals.
- **Weak–Bad**
 - Common language, goals, context; words matter.
 - Formalized data sharing agreements, MOUs, handshakes.
 - Crash injury data from police–emergency rooms.

DAY ONE: CONCURRENT BREAKOUT SESSIONS

Active Travel Behavior Research

DAVID BERRIGAN

*National Cancer Institute, National Institutes for Health
Moderator*

David Berrigan introduced the Lightning Talk speakers: Madeline Steinmetz-Wood, Jennifer Roberts, Ralph Buehler (Virginia Tech), and Calvin Tribby (National Cancer Institute).

DESIGNING THE WALKABLE STREETScape

MADELINE STEINMETZ-WOOD

McGill University

My research is on the microscale environment and walking. Most of the research in this field has been on macroscale elements of the built environment and how these influence walking behavior. The macroscale elements of the built environment include population density, intersection density, and land use mix. Less research has been done on the cumulative impact of microscale features, such as traffic calming elements, pedestrian infrastructure, building characteristics, and aesthetics.

Our research team developed a virtual auditing tool, called the Virtual Systematic Tool for Evaluating Pedestrian Streetscapes (Virtual-STEPS), using Google Street View to audit built environments. We audited 5% of streets in 136 forward sortation areas (the first three digits of postal code) in Montreal and Toronto. We calculated the summary score to look at the cumulative impact of these features. Then we linked this information to a survey of 1,403 adults from Montreal and Toronto. We formed three logistic regression models per walking outcome of interest: walking for leisure and walking for transportation. We controlled for covariates, such as macroscale features and self-selection. The models were run in the total sample and stratified by age group, by older and younger adults.

The microscale score was not associated with walking for utilitarian purposes in the total sample for older adults, nor for younger adults. However, it was associated with walking for leisure in the total sample in younger adults, but was inconclusive for older adults. What this means is that the environmental determinants of leisure walking and utilitarian walking differ. Macroscale features, such as population density and land use mix, might be more important determinants for utilitarian walking, but the microscale may be important for leisure walking. Microscale features are modifiable, which can facilitate the application of these findings to existing neighborhood settings. It's difficult to change the block size, but less difficult to add benches, plant trees, and install traffic calming features. It's a cost-effective and efficient method of increasing physical activity.

Questions from the Audience

Question: How did you control for elements of the macroscale environment?

Steinmetz-Wood I controlled for the walkability score, which includes distances to destinations. In our sample selection, we stratified when we were choosing which people would be interested with respect to areas. Half our sample was in lower walkability areas and half from higher walkability.

Question: Did you see a difference in microscale effects?

Steinmetz-Wood You need a certain degree of macroscale walkability to see the microscale effects. We saw a greater effect with areas with a higher intersection density. This does include areas in the top 50%; there is potential for impact here.

UNFORTUNATE REALITIES OF YOUTH

JENNIFER ROBERTS

University of Maryland

I'm an assistant professor at the University of Maryland. This research is from a qualitative study of experiences of African American youth. Trayvon Martin was fatally shot and killed when walking home in 2012. He was killed because he looked suspicious. This is an example of someone engaged in AT, but because of the way he looked, he was assumed to be suspicious. This brings us to the idea of "walking while black," although this idea can be extended to other people of color. This expression was borne from "driving while intoxicated." This expression demonstrates the racial profiling experienced by African Americans, and has been expanded to other issues of safety. For example, there is research from Las Vegas and Portland that showed that motorists were less likely to yield or stop for pedestrians in a crosswalk who are African American. This has also been expanded to include the criminalization that has been bestowed upon some African Americans, just simply for cycling. In the Chicago area, many African American cyclists were more likely to be stopped and ticketed for random reasons.

The study I did was called Physical Environment and Activity Transportation, which looked at AT experiences by youth in the Fairfax County region of Virginia shortly after the opening of the 2014 Silver Line in Washington, D.C. There was an absence of heavy rail previously. We had focus groups with youth between ages 12–15 and the majority of them were African American or Latinx. I will focus on the AT determinants today rather than the behaviors that were affected. The three determinants were racial profiling, adultification, and sexualization.

Many youth experienced racial profiling. They were prohibited from going to certain areas by either parents or peers. Also, some experienced racial epithets while they were engaged in AT. Adultification was another theme, particularly with the boys. Boys were told to fend for themselves if they need to go somewhere. They were more or less forced into AT by way of walking. Whereas girls were more prohibited by a sexualization aspect. They couldn't engage in AT unless they went with a male relative, such as a brother or their father. Some said they didn't like AT because of the catcalling they experienced. The environmental and social variables

converged on the experience of AT among these youth of color. It's an unfortunate reality, not just an unintended consequence that is a result of a bad decision. AT is a privilege. You can easily walk in some spaces depending on who you are, and that is not the case for some folks. This is full summary of what we found and the article is available on Open Access (11).

RALPH BUEHLER

Virginia Polytechnic Institute

I will discuss a paper I wrote with John Pucher and Adrian Bauman, which will be published in the *Journal of Transport and Health*. It is titled Physical Activity from Walking and Cycling for Daily Travel in the United States, 2001–2017 (12), and it examines demographic, socioeconomic, and geographic variation. The main impetus for looking at changes in active travel was the growing interest, initiatives, and funding in this area; hence, we wanted to know what was happening. Were the rates of walking and cycling rising, falling, or stagnating?

We used the NHTS 2001–2017 (13), to measure changes in active travel in the United States between those 2 years. We looked at the trip-based perspective, such as mode share and trip rates, as well as the health perspective. In order to analyze these data, we took the number, duration, and distance of trips from the trip level and aggregated it to the person-level data set. We then looked at the share of the population achieving 10, 20, and 30 min of walking and cycling per day. These thresholds mimic former and current physical activity standards. Then, we used descriptive analysis and logistic regressions estimating the likelihood to achieve 10, 20, and 30 min a day of physical activity from active travel. We did that at the cross-section for each year and we also used a pooled model to test for changes in the coefficients over time. We had to do many things with the two NHTS datasets to get them comparable.

From 2001–2017, national prevalence rates of daily walking increased slightly; cycling remained unchanged. This is a negative message. Most demographic differences in cycling and walking persisted over the two decades. One notable change was a significant decline in walking and cycling rates of children aged 5 to 15. This is a huge drop, especially in cycling where we have a 50% decline. This also supported by a survey by the Sporting Goods Association that measures sports participation and cycling by children; the survey also found a 50% drop for that age group. Cycling grew mainly among the highly educated, employed, high-income, non-Hispanic white, male demographic and who were between 16–44 years old. We found that high car ownership is strongly related to low levels of walking and cycling. Active travel increased most for households without cars. There was considerable variability in between regions in the United States, including urban and rural locations, and density of the neighborhood. Cycling and walking rates were highest and increased the most in highest density areas.

The efforts to increase walking and cycling in the United States. have not been sufficient. Much more needs to be done to improve walking and cycling conditions in order to achieve population-level increase in physical activity from daily travel. We see it in certain spots and with certain groups, but we don't see it nationally. There is a lot of room to do more for walking and cycling and to go above the 2% of spending for AT. The spending on walking and cycling is a drop in the bucket compared to other modes of transportation. Over the years, inequities in walking and cycling persisted. We need to address these with policies for socioeconomic groups, racial and ethnic groups, income groups, children, adolescents, and older adults where we see

that the rates of walking and cycling are low or are even declining. If these data are correct, we have to do more to increase walking and cycling.

Question from the Audience

Audience What about the uncertainty and these small samples? Are these real changes?

Buehler Looking at different indicators over time, we find that many changes for bicycling, especially for smaller socioeconomic groups, are not statistically significant, but for walking they are significant. Most of the negative trends in bicycling are not significant, but they are still pointing in same direction.

CALVIN TRIBBY

National Cancer Institute at NIH

My work is similar to the previous one, where we are using NHTS data. Our main research question: was there a change in transit-related walking associated with a change in rideshare use between 2009 and 2017? Our hypothesis is because ridesharing has exploded over the last decade, it could take away from other AT modes, such as walking to transit. This is a potentially negative outcome for transportation-related physical activity.

We were interested in assessing metropolitan areas, where transit and ridesharing occur, and also assessing transit and ridesharing at a national level. Our approach was to use NHTS, restricting our analysis to those over 18 because they are not allowed to use rideshare unless they are accompanied by an adult. We used the survey travel data, which has detailed information on every trip, including information about walking to transit or taxi–rideshare use. We categorized people according to whether they walked to transit or not, and whether they were a taxi–rideshare user. In 2009, there was no question on rideshare because it didn't exist. For that year, we used taxi rides for the travel survey data. In 2017, taxi–rideshare was combined into one question. We looked at the difference in prevalence by using logistic regression, specifically the predicted margins, and adjusted for common travel-related covariates and used the weights provided.

Rates of transit-related walking were not associated with taxi–rideshare use. Transit-related walking was flat, but we did see taxi–rideshare use almost doubled. Were the two related? We included an interaction term between taxi–rideshare use and year, which was not significant, so we concluded that taxi–rideshare use was not related to a change in transit-related walking. At the metropolitan level, we stratified by metropolitan areas, and only the ones underlined here had a statistically significant change in taxi–rideshare use (Figure 25). Those in bold had a significant change in walking to transit. Our hypothesis would be in the lower right that an increase in taxi–rideshare use led to a decline in walking to transit, but the only city where this holds is in Los Angeles.

Here are some future directions for research. Existing population-level data are limited temporally and to specific travel modes; scooters, for example, are not captured on this survey so we don't know what's happening at a population level. The NTHS comes out every 8 to 9 years, but the transportation ecology is changing faster than that. We need a better understanding of individuals' behaviors to inform population surveys for physical activity surveillance. We don't know enough at individual levels to ask the right questions to capture and track physical

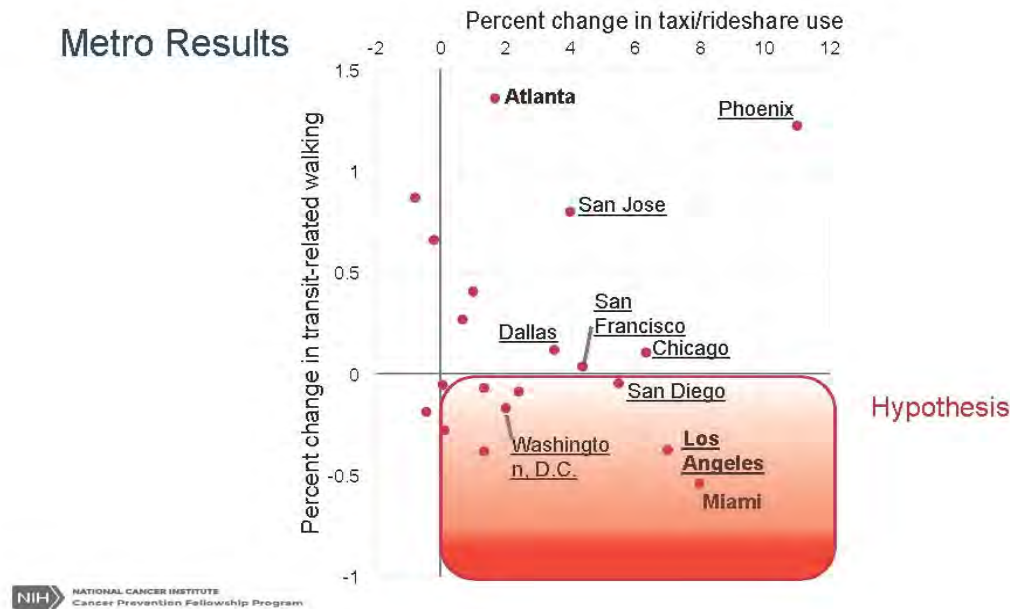


FIGURE 25 Taxi-rideshare and transit-related walking.

activity through these new modes. Although we didn't see a relationship at national level, we still need to track unintended consequences for walking and physical activity because of travel-related technology changes, such as rideshare, electric bikes and scooters, and delivery options. We need better data to understand individuals' behaviors.

QUESTIONS FROM THE AUDIENCE

Buehler One item I forgot is that trip-making by foot or bike, even though it didn't increase, still looks good compared to trip-making overall. Trip-making declined overall between the two surveys. Walking and bicycling held steady compared to the number of overall trips.

Audience For Jennifer Roberts, did you follow up with supervisors or policy-makers about the findings? What happened with the results? They sound persuasive.

Roberts No, I did not. The paper came out in April, and we are now in a state of determining how to go further. This was intended to be a mixed-methods study, but I had a number of obstacles moving forward. I took what I had so far and decided to at least publish the qualitative. I am trying to get inroads into Fairfax County, Virginia.

Audience This is a question for Ralph Buehler and Jennifer Roberts. What can we do to change these trends over time in cycling and how can we get other groups besides white males to be active?

Buehler Based on other studies, there are many policies to increase walking and cycling for all groups. The base is safe, separated infrastructure, but that's not enough. We need car-restrictive

measures to reduce attractiveness of driving and to get people into other modes of transportation. There are other ways to incentivize walking and bicycling, such as tax incentives to get people to walk and cycle to work. There are other initiatives to show people that walking and cycling is attractive, such as *ciclovia*, a permanent bike path or cycleway. There are measures that work in certain places, but can be hard to scale. Many bike networks in U.S. cities are quite fragmented. In downtowns, it is bike-friendly but it's harrowing as soon as you get further out.

Roberts A lot of issues I talked about are societal, such as racism and the micro-aggressions that people of color face. There are multiple levels. For example, I know a colleague who has done research on how African Americans feel more comfortable walking or running in areas that are not as integrated. We have issues with residential segregation. Maybe seeing more people engage in AT will change the perception that they are suspicious, but it still goes back to discriminatory beliefs that people hold. One other factor, research has shown, is that the perception of cycling is negative among some people of color, particularly for African Americans. People will think that I can't afford a car—not because I like to cycle or I'll get there faster. We need to change that image and perception. There is no easy policy.

Audience How do we look at low-income people moving into the suburbs? People are moving to the suburbs because urban areas are not affordable. How do we account for that in research? Do we need to rethink the role of the car in the suburbs? A car might provide economic opportunity—a car could help them get a job and improve their status in life. Does that then create more space for them to undertake AT?

Buehler We need places that allow you to be active while transporting yourself. Penalizing people living in the suburbs for driving without giving them options is not fair. A fundamental use issue is land use, with single-use zoning, which is very strict in the United States. By comparison, single-use zoning in Europe allows for doctor's offices, dry cleaners, kindergartens, and others in residential zones. Until the zoning changes, not giving someone the opportunity to drive deprives them of opportunity.

Audience I'm expanding the idea of travel to include recreational travel, which is important. What is happening to recreational walking and cycling, particularly for children? Is that changing? We might not know and might not be able to know with the data we have.

Steinmetz-Wood One of my goals was to study leisure activities, not just AT. How do people in suburbs stay physically active and what can we do for them? I was particularly interested in older adults, those who are aging in the suburbs. We need to think about environments that are inclusive for them, so they are able to leave their house and be more active. Microscale features can have an impact for that, potentially for older adults, although our results were inconclusive. From an intervention perspective, it could have an impact to make neighborhoods more inclusive.

Buehler We couldn't look at leisure versus no leisure because of how the variables changed in the NHTS. Jan Garrard wrote a chapter on cycling for women, addressing this very question of leisure versus non-leisure physical activity from cycling from international data. She found the

big difference between high-cycling countries and low-cycling countries was the use of bicycle for utilitarian purposes. Cycling in countries with low levels is mainly a sport.

Berrigan The National Health Interview Survey, 2005–2016, had standardized questions on walking for leisure and for transportation. There were series of papers as a result by Susan Carlson, Jeff Whitfield, and others.

Audience My question relates to the alarming decrease in AT in children. Are there any specific ways that can be addressed?

Tribby In Washington, D.C., public school students are given a pass so they can take the Metro or bus. If other school districts could provide options rather than relying on parents to drop them off, the cost aspect could change some behaviors.

Roberts Another study I did was with youth in D.C. metropolitan area and the highest AT behaviors were kids from the District of Columbia. They have to get to school by transit because there are no school buses.

Buehler Classes that teach children how to ride a bicycle are required in D.C. schools, so children learn to cycle in school. The bicycle industry is seeing dropping sales in children's bikes. For the D.C. program, which begins in third grade, they have to supply strider bikes because kids cannot bike yet. So, it's not a rite of passage growing up to learn to ride a bike. This is an alarming signal, so this training in school could be important.

Audience I'd like to hear about geographical equity. What can we say about rural areas?

Tribby Previously, I've looked at the 2017 NHTS for bicycling for different purposes between urban and rural areas, and if there are health behavior differences that could explain the health outcome disparities. For leisure cycling, if you use a dichotomous variable, there's a slight difference; if you use a continuous variable you see no difference. Where we see a difference is in cycling for transportation.

Buehler It's very understudied. I was on an NCHRP panel overseeing the development of AASHTO bikeway guide that has a section for rural areas and it was hard to find rural studies. From other countries, federal governments require mixed-use paths to be built along federal and state highways. These extend into rural areas and give a safe place to ride. There are still issues with trip distances, but there are some destinations that are close enough for bicycling. There is no strong research in this area.

Moderator Daniel Rodriguez introduced the second part of this panel, which involves remarks from Jim Sallis and Ralph Buehler, and focuses on a research agenda.

Sallis My thoughts are organized into two areas: things we know and what's next.

- We know that AT is good for health, but what are the estimated health care savings for various subgroups?

- Multicomponent bicycling interventions have been effective. What are the evidence-based principles for context-specific bicycling interventions (urban versus suburban or hot weather versus cold weather, for example)?
- The adoption of the *Complete Streets* programs is widespread, but what has implementation been like? If it has been implemented, what is the impact on multiple travel modes? How does it impact equity? What are the barriers? We need evidence that can be used for more implementation efforts.
- Cities worldwide are prioritizing AT and we desperately need evaluations of the most ambitious changes. What's the impact from the cities in Europe that have removed cars from the center of cities? We have some bicycling case studies, but what are the continuing impacts? I'd like to know more about the ingredients—is there a special set of ingredients or is it, the more you do to support cycling, the better?
- Health and economic impact assessments could change transportation funding practices if transportation projects had to justify their projects on health and economic impacts. For example, in San Diego, we spent \$2 billion widening a freeway, with a lot of disruption. The jurisdiction stated at that outset that the justification was that the project will speed up the morning commute by 1 min.
- What are the impacts of voluntary versus required HIAs?
- What is needed for AT research to progress?
- Incentives for health, transportation, and planning researchers to work together. That doesn't often happen with NIH funding or U.S. DOT funding, so a change in practice would be helpful.
- Ongoing co-funding of studies by health and transportation funders. At the funder level, that would be a level of collaboration that would drive different kinds of research.
- I would like to see programs with set-aside funding to support the evaluation of health, economic, and equity impacts of AT promising practices. In other words, natural experiments and policy changes. This is very tricky for funders, but with things that take so long to implement, you need long-term funding. University Transportation Centers (UTCs) would be a good mechanism for doing that.
- Policies to improve equity of funding for active and sustainable transportation research. There's more asphalt research funding than AT funding. We all need to be advocating for equity in AT funding. Lastly, an opportunity for collaboration in research and data collection: A new consensus study report from the National Academies, *Implementing Strategies to Enhance Public Health Surveillance of Physical Activity in the U.S.* (14).

What does this have to do to AT? Daniel Rodriguez and I led the chapter on community supports for physical activity. Here are a few that have relevance for transportation: We want to prioritize a set of constructs and corresponding survey items to assess perceptions of community supports for AT and active recreation. We would like these to be used in national surveillance systems and promote their use at the local level. We need transportation experts involved in developing these and implementing these as part of transportation data collection.

Another is to identify and compile GIS-based data sources and methods to facilitate national surveillance. A specific role of transportation departments is to collect data on where people do AT, such as sidewalks and bicycle facilities. These facilities often have poor data on usage, which we need for better health and transportation planning. Another is partnering with professional organizations to query their membership about physical activity-supportive policies

where they work, specifically with land use and transportation planning professionals. Then developing methods to link policies, surveillance systems, and geospatial data is another area where transportation and planning professionals can participate.

Ralph Buehler I have six items where I think research could go. The first area consists of car-restrictive measures and car-oriented standards—we have to know more on how policies that restrict car use affect active travel. We’ve been studying proactive travel policies, such as bike lanes, and their effect on cycling, but need to study parking restrictions, the cost of driving, the cost of parking, and so on, and their interaction with pro-walk, pro-bike measures. There seems to be a strong interaction. Seville (Spain) built a bikeway network and restricted car use to downtown, but then the government changed and removed car-restrictive measures and cycling started falling. Later, the government changed again, and put car-restrictive measures back in and cycling went back up.

The second part is research on how engineering standards affect active travel, such as minimum parking requirements and LOS. These affect level and speed of automobile travel, which interacts with active travel opportunities and perceived safety. That is important going forward—we did a study about the needs for pedestrian and bicyclists in an automated vehicle (AV) future. As a walk and cycling advocate, some of the answers in our interviews for me were frightening because some engineers said that pedestrians and cyclists get in the way of these AVs. These vehicles can flow so smoothly and efficiently but pedestrians need to cross the roadway. A pedestrian could just step into the roadway and the AV has to stop and we want to avoid that. We are at the beginning of setting these standards and the things are evolving. We need research in this area while these standards are discussed.

Related to change is more research into these future modes, like e-scooters. Some early studies show that a lot of e-scooter riders are initiated by pedestrians. We have to understand the micro mobility revolution, which can be great if walking, cycling, and new mobility work together, but if [they] cannibalize each other, there is not much [to] gain.

Our paper shows a steep drop in the rates of children using modes of active travel. Why are children not walking and cycling? I was a chaperone for an eight-block walking trip for first graders. The temperature was in the 40s, but seeing other parents and teachers, it seemed like we were going on a five-day hike in the Siberian tundra. There was a lot of anxiety about walking eight blocks. It seems like it was a burden for some.

We need studies on safe networks of infrastructure for pedestrians and cyclists. A study by Institute of Highway Safety found a lot of dangerous bike infrastructure (15), so we have to evaluate these more. If you build infrastructure that’s not safe, it’s bad for those who walk and cycle, and in the long run, it’s bad for those advocating for this infrastructure for the future.

We need studies on *Vision Zero* (16). We have to figure out the connection between *Vision Zero* efforts and this 60% increase in pedestrian fatalities nationally. There’s some disconnect between policy language and what’s on happening on the ground. Nationally, we should see trends in active travel data, e.g., walking and cycling; if not, we have study these discrepancies. What works in some places and why doesn’t it work in other places? This is geography and also inequities with other groups of people. Why does it work for white males who are middle-aged, but it doesn’t work for others?

The fifth area is related to studies on perceptions. How can we change perceptions of pedestrians and cyclists as the “other?” I see that in policy language that proposes bike lanes, for example, there is huge community pushback. There is a social science aspect in this perception

of walking and cycling: who is walking and cycling and why is it not me? Also, we need research on the perceptions of drivers of pedestrians and cyclists. We heard that drivers yield less to African Americans trying to cross in a crosswalk. What's going on in the driver's mind? We need political science research. In some places these changes work, they change the policy and practice. In other places, they fail. We have to figure out why it works. What can we learn from the political process, not just the policy, but the process of implementation?

Moderator Rodriguez opened the floor for questions.

Audience Why does the infrastructure work for white males? One of the answers is because it is white men who are designing those systems. How do we get more women and people of color to be engineers?

Buehler I agree. We need to diversify the group planning and designing infrastructure. I can only speak for urban planning programs because that's where I teach. It has been and is challenging for most urban planning programs to have a diverse student body and diverse faculty, which is an accreditation standard. Almost all such programs are struggling and trying to increase diversity in the student body and faculty who teach in the program.

Audience This is more of a reflection to connect the dots between two things said. Sallis mentioned the need for evidence-based principles for context-sensitive infrastructure design. I think we need to design for differences not only in urban or rural areas or for climate, but also from an equity perspective with communities of different backgrounds. It may not be that the infrastructure needs to be different, but the process needs to be different. This relates to the comment on the need for studies on the political process. We should focus on the process, currently led by white men, on how to engage communities in designing their own future. How do we bridge the transportation planning process with a health and equity perspective?

Sallis I agree. Especially with communities that are resistant to bicycle infrastructure. For example, we need more community engagement to figure out how to create more opportunities for biking and to help mitigate concerns about gentrification. If we make the neighborhood nicer, will new people move in and we will have to move out? That's why in addition to health, transportation, and planning experts, we need housing experts in these conversations so we can address housing at the same time. For lower-income areas in particular, bicycling could be a solution. It could give them access to more jobs. I've heard of successful programs that promote bicycling in low-income areas in South Africa. They have figured out how to make it work there, and I would like to bring those benefits here.

Audience I taught a class with 80 young women in engineering. I think the problem is that women don't know they can do this kind of work. I didn't realize it myself until I got into graduate studies. As professors, you can connect with your students and help them understand that this is connected to health and that will get more women engaged. I just did some research on design thinking (user-centered thinking) that was published in the *Journal of Engineering Education*. We see that, from freshman to senior year, design thinking decreases among women in particular. We think women are leaving the field because they don't make the connection that they can help people through their work.

Audience We hear trepidation from people fielding travel surveys about their usefulness in context of new, big data sources, which may have biases against walk and bike trips that we use for our research. What if in 2025, the next NHTS is using 75% of passively-collected data and the sampling of bike/walk trips is decimated? How do we get ahead of this? What partnerships do we need? Do we need to reach out to Uber and Lyft and ask about their location data? We can be too comfortable with how our data are created. It is changing as rapidly as other parts of the transportation ecosystem.

Audience The point about medical claims costs as part of the return on investment (ROI) made me wince. My experience is working with corporations around wellness plans to improve the health of their employees. They ask me about ROI and how much they will lower my medical claims cost. Most of those claims are far out, for example, cardiovascular disease is a disease of older age. I tell them that I'm looking at a 10-year window and the executive wants a 3-year window because they want a promotion within that time. Who pays the claims? If we save claims for someone aged 75, that's not borne by the corporation, but borne by Medicare or another insurance program. Using claims to motivate the cost estimate, we need to ask who bears the cost of which claim when. If some of those claims are borne by corporations, then maybe we have another constituency that promotes active travel. But it's a nebulous claim that is picked up by Medicare sometime in the future, then it's harder to factor into an ROI model. It's a fraught research question.

Sallis I understand the issue for corporate health promotion. This is different. A few months ago I was in a session with Larry Frank and Vancouver-area stakeholders and he did some of this modeling. Government pays for the roads and health care, so it's more connected there. They modeled major benefits from more investment in AT and better land use. The situation could be different. For what you are describing, the short-term is very important.

Buehler Look at packages of policies, for example, maybe zoning law changes so they don't supply parking in order to reach the goal.

Audience I think we are missing partners to address those research questions. Police departments have a goal to promote safety and we found success in inviting them onto task forces and committees to understand common goals. Another sector that is missing is the media. The Denver Department of Public Health and Environment is developing a media training module because often these stories about fatalities and injuries are described as: the person was wearing dark clothing, they didn't have lights on their bikes, they were jaywalking, etc. By changing the language, we can change public perception about who belongs on the streets.

DAY ONE: PLENARY SESSIONS

Reflecting on Innovative Practices

AMY PLOVNICK

*Volpe National Transportation Systems Center
Moderator*

Moderator Amy Plovnick introduced this session on learning about innovative practices from the private, public, nonprofit, and academic sectors.

GRETCHEN ARMIJO

Norris Design

The innovative approaches from my experience are GIS mapping and visualization. I've worked at the state, county, and local levels in the public sector and now in the private sector at the intersection of health and transportation. The consideration of health can help achieve multiple co-benefits, including environmental and social.

I will share one innovation in the public sector and one from the private sector, using these two tools: creating a neighborhood-level equity index, including built environment conditions; and SDOH factors, such as education and income. Newly available point-level data was rolled up to the neighborhood level and combined into one index, so it was easy to understand and visualize past investments across the city. Mapping can serve as a gut check or reveal surprising differences that are hard to see in the report. This was included in *Blueprint Denver* (Figure 26), which is a plan that provides policy guidance for 10-20 years on housing, transportation, and private development. Policy-makers now have hard data to prioritize investments in neighborhoods that need it the most. *Blueprint Denver* was adopted this past summer and already public improvements, such as tree planting, are happening in the highest-need neighborhoods. Now, the Denver City Council is asking private developers seeking approval for projects how their projects will improve equity in highest-need neighborhoods. At Norris Design, we used mapping and visualization for Bennett, Colorado for their parks, trails, and open space master plan. They were health-conscious and concerned about connectivity to parks and trails, and accommodating future AT and recreation needs. They needed Norris to help with a GIS map of their existing facilities, which showed gaps in connectivity and some opportunities. This is an interactive map and users can click on a certain park or trail and upload data about the playground condition or built environment elements and future needs or desires for those facilities (Figure 27).

This map also helped show an existing trail (running north-south) connected to recreational and cultural facilities, and to a regional trail (Figure 28). They also wanted to honor their cultural history. They had a vision for an agricultural heritage trail. We help them to



FIGURE 26 Blueprint Denver report.

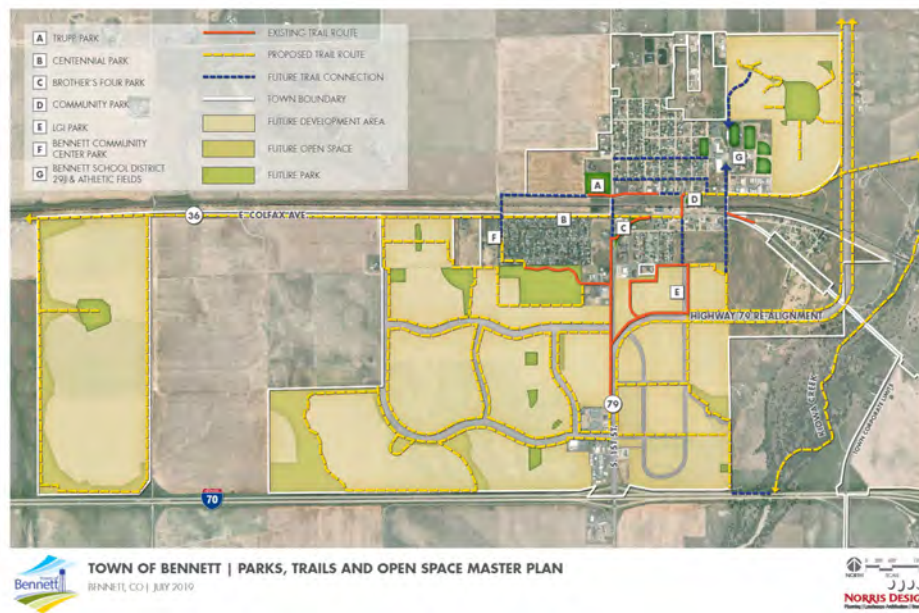


FIGURE 27 Interactive GIS map.



FIGURE 28 Bennett Agricultural Heritage Trail Concept.

envision the possibilities by graphically showing what the community wanted. Using 3D software, we were able to show elements like sun and shade, the scale and depth within the environment, and how people use the space (Figure 29). I like the interpretative signage as a way to learn the history. The signage serves as an evidence-based strategy, a prompt to get people physically active, and provides wayfinding and historic interpretation. These graphic renderings were well-received by decision-makers and the public.

The lessons learned from using maps and visualization include the creation of a common language that technical and nontechnical people could understand, building awareness and buy-in, and having something easy to understand for decision-makers. Not only are municipalities better positioned to apply for grants when they can visually describe what they want to happen, but also it is a tool that encourages public-private partnership. Developers build the environment that we want; they have a key role. These types of tools can be a cost-effective way to express where you are going and attract the support you need to get there.



FIGURE 29 3-D Concept image.

GEOFFREY WHITFIELD*Centers for Disease Control and Prevention*

I'm representing the CDC and a larger collaboration with Aaron Hipp at North Carolina State University. Our plans were to use machine learning and Google Street View images to extract information about sidewalks (Figure 30). The problem is simple in concept, but not easy to achieve. The humble sidewalk is key piece of neighborhood infrastructure that makes walking safe and easy for everyone, but there is no consistent surveillance of sidewalks in communities, states, or in the nation. We need that surveillance to identify gaps in sidewalk networks in order to best place our interventions, and to monitor our progress in meeting our national walkability goals. We are facing a problem of scale. The U.S. Department of Transportation estimates that we have more than 5 million miles of roads and we can't audit all these roads for presence or absence of sidewalks. We want to use machine learning to automate the identification of sidewalks from Google Street View images. We use location information embedded in those images to create a spatial database of sidewalk availability for any community, state, or even the nation as a whole.

This is scratching the surface for what might possible when assessing environments for physical activity, such as bike lanes, tree canopy, crosswalks, or even destinations.

In 2018, we won a small internal CDC innovation grant and contracted with Aaron Hipp to explore the feasibility of this idea. He brought along graduate students in computer science and engineering who were tasked with conducting a literature review to tell us the state of the science and what's possible. We are epidemiologists at CDC, not computer scientists, so we needed to bring in that external expertise. Their conclusion from the white paper was that this plan for sidewalk surveillance was very possible. They went above and beyond what they were asked to do, and started to undertake a preliminary image analysis using existing image-processing algorithms. We've continued to move forward on this line of work. One of the things has come out of this is a community of practice. During the literature review, Hipp and his team reached out to researchers around North America who are interested in similar work. The CDC acts as convener and hosts quarterly calls. This group has been helpful to identify key barriers with this line of work.

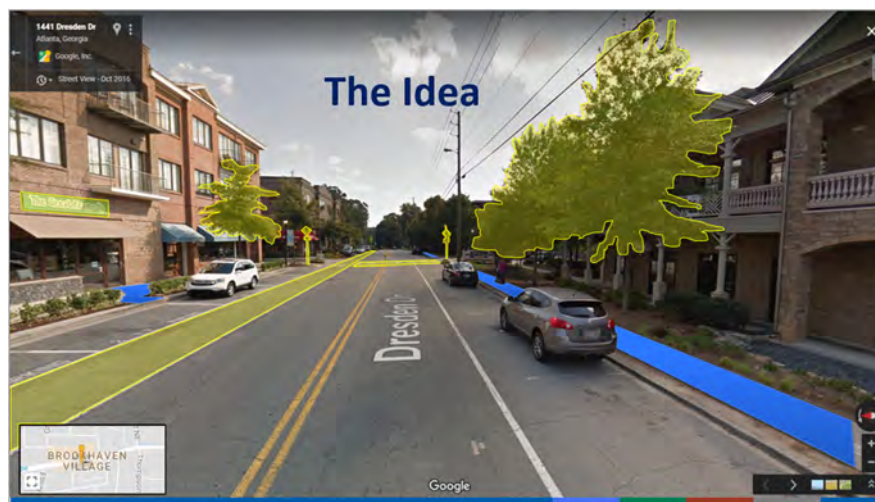


FIGURE 30 Google Street View, sidewalks.

We have at least three technical barriers to overcome. The first is a lack of diverse training images. In layperson terms, we are teaching a computer what a sidewalk looks like. In order to do that, we need images that are hand-labeled or ground-truthed. We can get those for urban areas fairly easily, but we also need images for suburban and rural areas. Imagine the differences in sidewalk appearance between Maine and Phoenix. We need regional specificity and degree of urbanization. The second hurdle is that we have a lack of specialized algorithms. The most commonly used algorithm is called *Pyramid Scene Parsing Network (PSP Net)*, which is a generalist image-processing algorithm. If we can develop or customize them to be more focused on roadway analysis that will improve their performance. The third hurdle is the lack of pilot testing or validity studies. I'd like to acknowledge the work of Bonwoo Koo and Nisha Botchwey at Georgia Tech, who have extracted usable information from *Google Street View* images with PSP Net, including sidewalks. They used this information to predict travel behavior. The big question, is that extraction sufficient for our surveillance purposes? And how accurate is accurate enough? There are logistical issues, too. How do you best work with Google? Is it through a programmer's interface or a third party vendor? How many images per street segment are needed for proper sidewalk identification? If you get this information from a machine learning algorithm, how do you change that into a usable spatial database that we can share widely?

SAGAR SHAH

American Planning Association

I manage the planning and community health program at the American Planning Association (APA). APA has a specific interest in the intersection of health and planning, which we have been working on for the past 10 to 15 years. There are various domains where planners can influence health. Active living is one area, and the others are environmental exposures, emergency preparedness, climate change effects on health, food systems planning, and so on. It is more than AT, although AT is a critical domain. Our members work with local communities on plans, programs, and projects relating to health and transportation. We believe at APA that, in order for programs, plans, or projects to be successful, planners cannot do that alone. Cross-sectoral collaboration is the foundation and a basic ingredient to improve health. With this theory in mind, we became part of the Joint Call to Action to Promote Healthy Communities. It is from eight national organizations that ask our members to collaborate locally to influence land use and transportation decisions to create healthy communities. I would like to emphasize the other partners that play an equal role: American Institute of Architects, American Public Health Association, American Society of Civil Engineers, American Society Landscape Architects, National Recreation and Park Association, U.S. Green Building Council, and the Urban Land Institute. Through these organizations, we have 850,000+ members. Our goal is to help our members locally to collaborate and create healthy communities. In the call to action we identified four things. The first is building relationships. There is how lingo and jargon between sectors, so we are suggesting that we have coffee or lunch with someone from another sector. The second is to establish health goals and work toward them. The third is to implement strategies, which can be *Complete Streets* policies or can be collaborating on policies that affect health indirectly. For example, how a plan can tackle the effects of climate change—health is a co-benefit of these plans and policies. Finally, planners and health professionals can share

expertise. When planners are working on comprehensive plans, they need help analyzing health data, and they can ask public health agencies can help identify health disparities.

When I became part of this group, I was inspired by the commitment from these organizations, from staff involvement, and the interest among members. It was eye-opening to me and it's a positive sign of us working together. But there are challenges. One of the challenges is funding, which is familiar to all of us. We have been fortunate to get seed funding from the RWJF. We are trying to formalize the structure of the Joint Call to Action, and secondly, we are creating communication materials, such as discussion guides for different sectors. If a planner wants to talk with a park person, what are discussion questions or common topics for all types of professionals? We are doing this nationally, but we only see success when we do this at the local level. We would like to proliferate among our members by disseminating these pillars and ask them to use the discussion guides as starting points.

NICOLE PAYNE

National Association of City Transportation Officials

I am talking today about how cities are changing their transportation planning framework to correct inequities caused by historical development of transportation policy and infrastructure. NACTO is association of about 81 cities and transit agencies across the country, which covers 46% of the U.S. population. We are trying to raise the state of practice for street design that prioritizes people who are walking, biking, and taking transit. Our mission is to build cities as places for people with safe and equitable transportation choices. Our work with the *Better Bike Share Partnership* specifically focuses on understanding and addressing barriers to bike and e-scooter share use in low-income and communities of color, which are designed in a way that limit the physical, social, and economic mobility of the people who live in these communities.

One barrier is health and safety. In transportation, this means the physical impacts of traffic violence, but we are using the lens of justice to move beyond this definition and address the institutional social determinants of inequities. We have realized that what is created by government policy can be uncreated by government policy. This innovation is centered on government identifying institutional discrimination as the problem we are trying solve. Who is being served? Who is being harmed? What does this look like in action? Tackling discrimination through innovation involves redefining on whose experiences we base design parameters. For example, NACTO's *Designing All Ages and Abilities Bikeways* (17), people of color, people with disabilities, LGBTQIA (lesbian, gay, bisexual, transgender, queer, intersex, and asexual) people all experience public spaces differently as a result of informal and formal policies and legislation around who is allowed to exist freely and move freely in public spaces. By centering our design processes on characteristics of these groups, we ensure the development of more usable public infrastructure and an environment that works for everyone. Governments across the country use formulas with data and metrics to decide where to devote resources. We should update these processes to include not only the physical elements but, also social elements that are tied to historical disinvestment, e.g., the practice of redlining, or the destructive development of highways that impact nonwhite, low-income families. If we do so, we begin to move the needle on atoning for these past wrongs, while creating a formal venue to ensure that these communities receive the priority attention and support they need to thrive.

An almost universal fear for communities of color who wish to use public facilities is interaction with police. If the goal is to grow safe and comfortable use of AT, it is imperative that we address our historic and current issues of racially biased policing and enforcement of public spaces in transportation. In their bike plan (Figure 31), Oakland notes that black cyclists are stopped by police at higher rates than all other racial groups. In order to meet their formal agency goal of decreasing police stops for people of color by 50%, Oakland is improving and releasing police stop data, building coalitions to develop racially-based metrics to be used in officers performance reviews, and developing non-punitive, nonemergency approaches to safety enforcement.

Finally, who is the infrastructure built for? Who is welcome to share that space, unconstrained? Our designs should move from standard or “off-the-shelf” design options to being directly responsive to various norms, traditions, and uses that communities have already organically developed. An example from Oakland is the *90th Avenue Repaving and Redesign* project. In the local “scrape or bike” culture, people like to be visible, and like to be seen, so they use the center of the street to ride their bikes. Program manager Brytanee Brown designed this street redesign around that existing use (Figure 32). From our global team’s work is an example in Turkey where the street redesign was centered on the community’s shared tradition of public gatherings (Figure 33). The ties that bind these new approaches and the lessons learned are that planners cannot do it alone, and probably should not do it alone. While planners are content experts, communities are the context experts. We can only eradicate these policies of inequities when government listens to and values the expertise of and works with communities they serve.

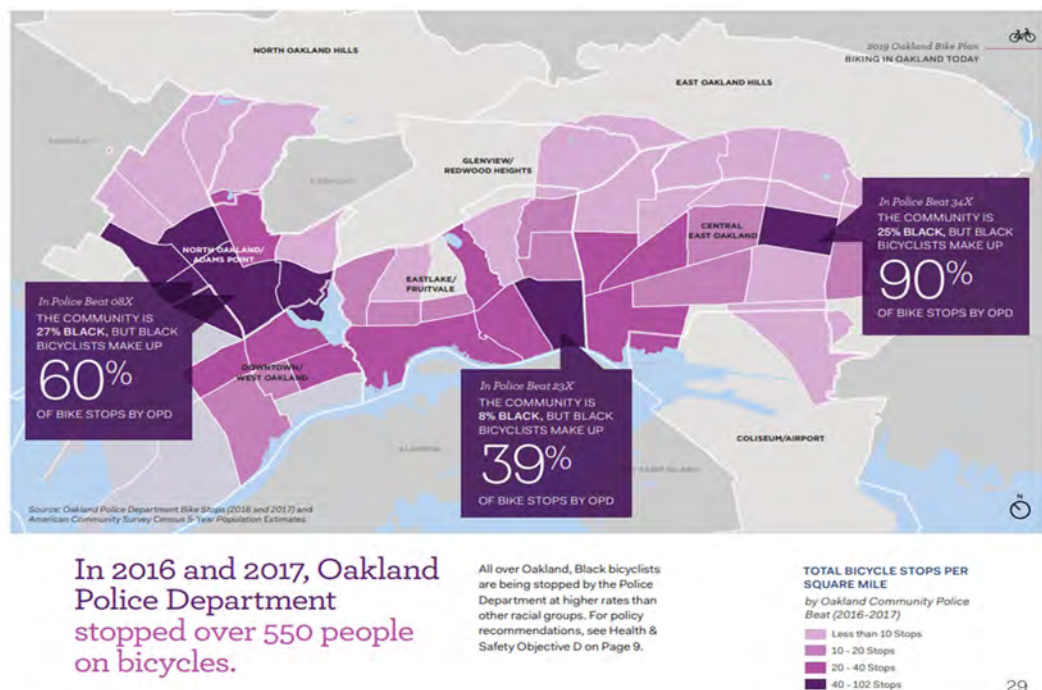


FIGURE 31 Addressing discrimination in policing.



FIGURE 32 Oakland Department of Transportation.



FIGURE 33 Street redesign in Turkey.

BRIAN KIEL
WSP, Inc.

I'm an economist based in New York, and currently my work doesn't align with public health nor AT. Still, this conference does align with undergraduate research I've done looking at greenways and the ecosystems services that they provide, especially the qualitative benefits at environmental, economic, and social levels. The qualitative level is interesting and allows us to communicate on personal level. However, if we want to promote AT at the same levels as other regional roads and treat this an equal partnership as a piece of transportation infrastructure, we need to quantify them. In light of trying to set the agenda over the next five years in terms in

public health and AT, I want to talk about things like social cohesion and the best ways to include them.

For background, this research started from a study where I was able to travel to good biking cities. I was able to see amazing examples of greenways, which I define not just as a recreational asset, but an asset like a multi-use path that offers ecological, economic, and transportation benefits beyond recreation. In Davis, California, I interviewed families that could send their 6-year old children on a path because there are no interactions with street grids, so they can bike to school on their own. This is interesting example of personal autonomy at a young age, although not something you can use to convince governments to fund more of these.

How can we quantify social cohesion to measure how an AT project brings these benefits to life? Social cohesion has many definitions. I think we need to agree on what those components are and how to quantify those individual components so that we build the case for more significant investment. I've proposed a few ways to quantify this, such as using something like a social vulnerability index, which is something we do in resiliency projects (18). I propose that quantifying social cohesion or coalescing around the idea of the social benefits of AT is one of the best ways to convince decision-makers that these deserve an increase in investment. I propose over the next few years at these conferences, that planners, elected officials, and public health practitioners start thinking about what these components of social cohesion mean and how to quantify them. Finally, how do we think about standards, perhaps not at a national level but from the funder's perspective?

JOHN CLYMER

National Forum for Heart Disease and Stroke Prevention

The National Forum for Heart Disease and Stroke Prevention (National Forum) is a 501(c)(3) organization that was co-founded 18 years ago by the CDC, the AHA, and the Association of State and Territorial Health Officials as a way for organizations committed to cardiovascular health to share information across silos with unexpected collaborators. The Community Guide is compilation of task force with high-octane researchers that is the gold standard for evidence-based policies to prevent disease at population level. The *Community Guide* is based on systematic reviews. There are specific recommendations that fit closely with the agenda we all share today. Chris Kocnitzky and his colleagues are very involved in these reviews, including the review with the combination of AT modes and environmental approaches to make communities inviting for people to walk in. *Smart Growth America* and the APA and others have made this intervention the most downloaded information of interventions reviewed by the Task Force for Community Preventive Services.

How does the National Forum translate from bookshelf to actual use? One of the programs is Move with the Mayor (19), which originally was created to marshal the authority of mayors and their power to use the social and earned media to propound and amplify messages of physical activity. The fact is, in their communities, heart disease and stroke are leading causes of death, which can be prevented by sitting less and doing more. Mayors are leading the way to respond to the Surgeon General's call for walkable communities. They are not just promoting it, but also making policy, environment, and system changes. The National Forum developed a scorecard or roadmap that was intended to guide mayors to respond to the call to action. We had a lot of buy-in. We piloted the program in Ohio through a statewide alliance. Some of these

mayors sat down to fill out the scorecard themselves. They are committed to take action and take what they learned into policy and environmental changes. There are 11 participating communities that have learned what kind of policies are in place and where there are opportunities for improvement. None has a *Vision Zero* plan, so this is a huge opportunity. I am also involved with the organization, *Million Hearts*. This week *Million Hearts* will be releasing a toolkit to address the risk factors that lead to cardiovascular disease and cancers (20).

MEGAN WEIR

San Francisco Department of Public Health (affiliation at the time of the conference)

I will share some work we have been advancing with in San Francisco. I have been working at the intersection of health and transportation for over a decade. San Francisco adopted *Vision Zero* in 2014, which was truly a paradigm shift for traffic safety. The previous approach had focused on individual failings and behaviors and has shifted to how to anticipate that people make mistakes, and design a *Vision Zero* system so that no one dies as consequence of humanity/human error.

I co-chair *Vision Zero* in San Francisco and we are the only *Vision Zero* city that we know of where the health department partners with the transportation agency, which is surprising because *Vision Zero* is a framework that aligns with health. There is a focus on saving lives, prevention, equity, data-driven/evidence-based approaches and speed—which is the leading predictor of crash survival. Our team also partners with multiple city agencies to develop data systems to ensure that the most comprehensive data is informing our work. Thank you to the SFMTA who funded our *Vision Zero* epidemiologist to spearhead our injury surveillance work linking police and hospital data. Since launching *Vision Zero*, we have had the lowest two years for traffic fatalities in 100 years (Figure 34). Sadly, this year we have seen an increase in people killed on our streets, though we are still are seeing the number of deaths below previous years. No death is acceptable; we have a lot more work to do to save lives.

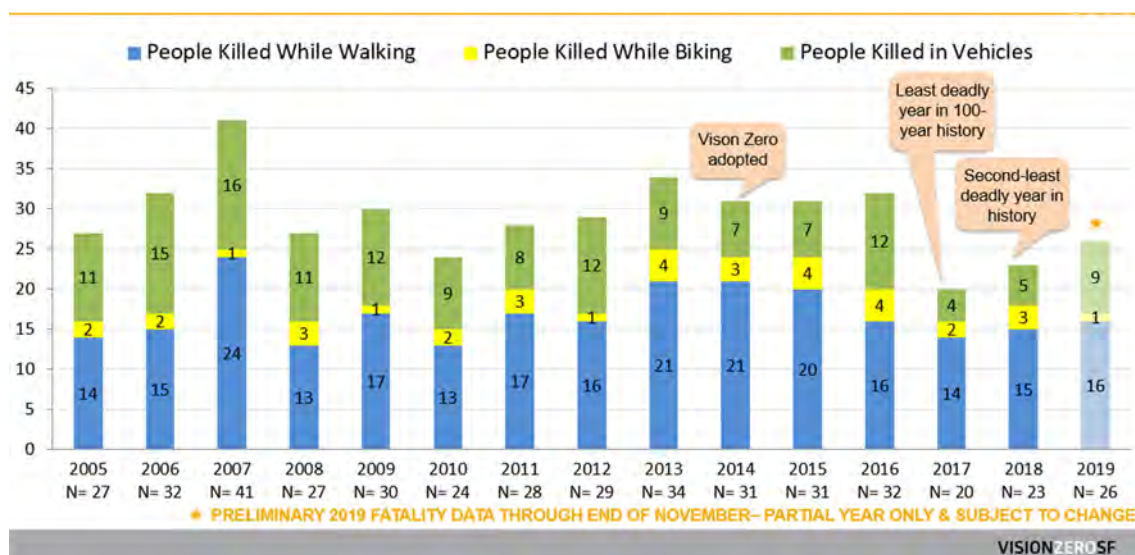


FIGURE 34 2019 fatality data, Vision Zero—San Francisco.

A focus at today's conference is that data is really critical but never sufficient. We need to have the right stakeholders and political will to make change in our transportation systems. In the last five years, we have focused on strategic actions, reengineering miles of streets, targeting data-driven enforcement and education; however, we must also adopt transformative policies to create a safe, healthy, sustainable city. We have to focus on equity, or we will never realize our goal. We are working to advance transformative state policy change to lower speed limits, implement automated enforcement, reduce VMT through congestion pricing, and regulate Uber and Lyft. And we need to partner with initiatives that also require safe streets, increases in walking, biking, and transit and reduced vehicle trips—including emergencies like climate change and affordable housing. We need to coordinate on messaging and funding. Moreover, we will not achieve our goal if don't address equity. Our high injury network—the 13% of city streets where 75% of severe and fatal crashes are concentrated—is disproportionately concentrated in low-income communities, communities of color, and neighborhoods where our seniors, people with disabilities, and other populations more dependent on walking and transit live. We must focus our resources on these same historically under-invested communities to achieve our goals. And we have to the right people at the table.

JANA LYNOTT

AARP Public Policy Institute

Increasingly, AARP is showing up locally to demand that our built environment supports healthy lifestyles for all at every age. There is increasing evidence that benefits of livable communities extend to those aged 65 or older. The disbenefits impact older adults even more. For example, an older pedestrian is 31% more likely to be killed in a collision than a younger pedestrian. One example of AARP working locally is through a partnership with *Team Better Block* to put on pop-up *place making*, also called tactical urbanism, where we use temporary materials that can be borrowed, built, or bought at a low cost to show the community what's possible. In Bethel, Vermont, our objectives were to use *place making* for economically stable and socially vibrant communities, create opportunities for *Complete Streets*, and change perceptions and attitudes toward community change. On a rural highway passing through a town, with AARP grant funding, community organizers created a temporary installation that included a multi-purpose lane, better demarcation of sidewalks, curb bulb-outs, replaced parking with a popular taco stand, and added seating. In a vacant storefront, they had local sales of arts and crafts (Figure 35). There was a demonstration bus route to the neighborhood as well.

The street was made safe for everyone. The project lowered traffic speeds from 27 mph to 15 mph. By lowering them, truck braking was reduced, which lowered the noise to a conversation level. In terms of key factors for a successful pop-up, you want the design to include things to eat and drink, places to sit, and things to see and do. The conditions for success include:

1. **Streetscapes:** Lined with buildings and have pedestrian-friendly spaces.
2. **Character:** People like spending time in places that are unique with attractive or historic buildings. Often this is a downtown.
3. **Adjacency:** Projects should be adjacent to neighborhoods so people can walk there.
4. **Availability:** Vacancies become opportunities, so look for abandoned properties.



FIGURE 35 Bethel Better Block created livable streets.

5. Business Buy-In and Residential Support: This all has to work with support from residents, property owners, and the business community.

This project catalyzed longer-term effects. One included beautification efforts, such as a mural. Traffic calming was installed through permanent seasonal bulb-outs (they are removed when it snows). The bus route has gone into effect permanently. Two vacant buildings were rehabilitated to offer retail and community space on the first floor and housing on top.

What we learned through *Bethel Better Blocks* is that demonstration projects serve an important role in testing change and improving livability. Change, by its nature, is long-term and hard for many to envision without concrete demonstration projects. Demonstrations also allow us to bring the community along through the process by testing change in a manner that allows decision-makers and the public to experience the effort first hand. Activating public space is what is most exciting for community members—this draws them out and the street is a critical component for safe mobility between spaces. What we would do differently? AARP recommends that organizers undertake more measurements and capture more data to better communicate before and after conditions. Organizers did measure speed and noise but not bicycling levels, which would benefit outcomes in the longer term. Perhaps as a consequence, local advocates have not been able to realize a permanent bike lane through the corridor. But don't be afraid to fail. Finally, pop-up *place making* needs to be led by the community, with planners invited to observe.

KATE GLANTZ*Lyft (Affiliation at the time of conference)*

Lyft's Grocery Access Program sits at the intersection between transportation and food, two of the most important SDOH. I'm a resident of D.C. and one year ago I had the pleasure of creating and launching this initiative with a team of three from Lyft and a few champions at Martha's Table, a D.C. based nonprofit organization.

Hundreds of thousands of residents in D.C., who because of the zip code they reside in, lack equal access to high quality and affordable healthy food options. 81% of D.C.'s food deserts are in Wards 7 and 8 with only three grocery stores serving 150,000 residents. By comparison, there are 46 grocery stores in Wards 1 through 6, serving around 450,000 people.

In addition, the majority of D.C.'s food deserts are also transit deserts (Figure 36). Ridesharing can be an efficient and convenient alternative, but can be seen as luxury and prohibitively expensive, particularly in these wards that have the lowest median incomes in D.C. From data through one of our nonprofit partners, Martha's Table, we know that most of the parents and caregivers in these communities have a basic understanding of what it means to have a healthy diet. But these families don't have an opportunity to embrace healthy diets given the food insecure environment. As a result, many rely on local corner stores that often lack a variety of healthy food and charge higher prices for the few nutritious items they do sell.

In January 2019, we partnered with D.C. area nonprofits to address this problem with a simple solution. Our goals were as follows: to reduce the time and financial burden caused by commuting to grocery stores in Wards 7 and 8; to empower families with more choice in where

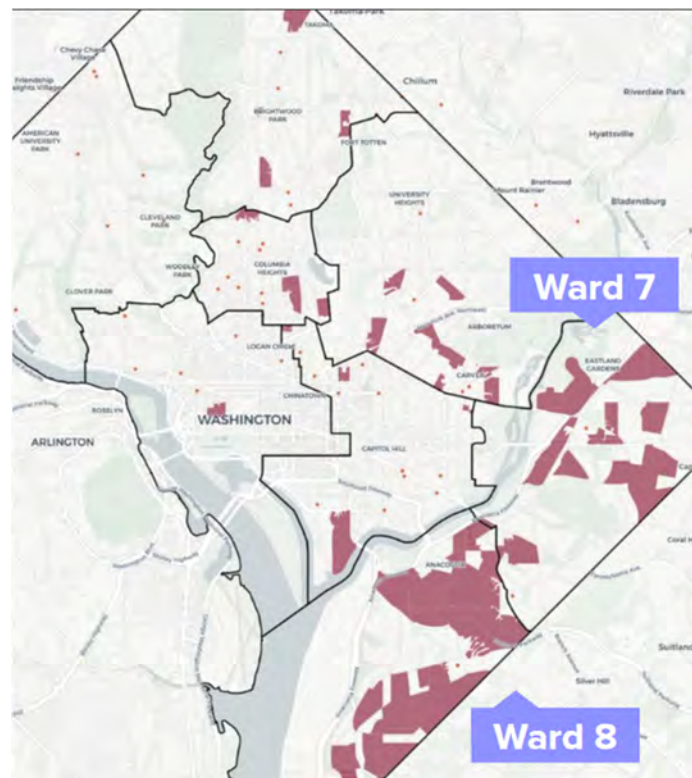


FIGURE 36 Map of DC's "Food Deserts."

they buy groceries; and to compile key learnings and identify sustainable funding sources to scale and reach more neighborhoods in D.C. and beyond.

In Lyft's *Grocery Access Program*, Lyft works with organizational partners to offer flat fare shared rides to and from grocery stores and food pantries for hundreds of families. In the six-month pilot, families who had one child in a Ward 7 or 8 school and those 61 years old or older in Ward 8 were eligible. All participants received 50 rides geo-fenced to grocery stores. Ideally this program has investment from a grocer partner to pay for the rides. Community partners should be embedded in the community so they are able to identify clients and onboard them with culturally relevant training materials. Over the six-month period, 400 participants took over 5,000 flat fare rides, and on average, the self-reported travel time of 30 minutes was halved to 17 minutes. Cost per ride after the \$2.50 flat fare was \$5.37 ride, with an average of 3.4 rides per week. The money families saved can be used to buy more food.

Lyft scaled the program to 18 cities in 2019, structured in the same way as the pilot program, with grocery and food pantry partners. This round of the program had equally diverse partners, including the United Way in Phoenix and Multi-Service Family Health Center in Brooklyn. Feedback from the program suggests that people appreciate the low cost, convenience, having access to better grocery stores, and changing eating habits to eat better. The pain points included factors, such as participants who didn't like grocery store options, didn't like the shared rides, and the stress associated with fitting all the bags in the car. In response, we are planning to experiment with fully subsidized rides. We also learned that not everyone understood what was offered, especially in older adults, who had a higher learning curve. Moving forward, Lyft will be working with professors to assess the intervention to enhance well-being in food insecure areas. Lyft has other transportation access programs: job access, civic access (getting to polls), disaster response, and bike access.

JORDANA MAISEL

Inclusive Design and Environmental Access Center/University at Buffalo

The Center for Inclusive Design and Environmental Access (IDEA) at the University of Buffalo, School of Architecture is engaged in research and design across built environments, doing this while embracing inclusive or universal design. *Universal Design* is a process that enables a diverse population by improving human performance, health and wellness, and social participation. One area of the built environment that we focus on is transportation.

Transportation is so key to employment for citizens, particularly for people with disabilities who rely on transit more often. However, there is inadequate transportation in both urban and rural areas for these populations. The innovative practice I want to share with you is our relationship with federal funding—how sponsored research contributes to the field of inclusive transit.

This presentation is a snapshot of the IDEA Center's different research efforts across the travel chain. Let's start with trip planning. Our colleagues at the Robotics Institute at Carnegie Mellon University have developed a real-time information app that benefits all users. We have the app, *Tiramisu*, available on the app store. Over time the development goal has evolved with different end users based on their different information needs. We can use machine learning to help get their targeted information needs, and in turn, reduce their cognitive load. For first and last mile travel, a TCRP report, *Shared Mobility and the Transformation of Public Transit* (21), examined the biggest barriers that deter fixed-route transit usage and three factors were related to

the built environment. Our secondary analysis of this data explored the mediating impact of disability status, finding that individuals with mobility impairment more often cite the built environment as barriers to fixed-route than other disability groups. We just launched Innovative Solutions for Universal Design (isUD) (22), modeled after LEED, which is a certification program and tool to help designers identify ways to implement universal design. The focus is on commercial buildings, but there is also a section on transit stops. There are more than 500 solutions included in *isUD* that are linked to research and best practices. Early adopters include a Fortune 500 company, a children's museum, and a hotel. This is the future of implementing inclusive design.

We have engaged in extensive research related to boarding, riding, interior configuration, and crowding. We have also looked at wheelchair securement in fixed-route vehicles, testing in both the lab and field. Now, we're trying to apply what we've learned about fixed-route to shared AVs (as a shuttle), working with vehicle manufacturers to design AVs that are usable by all. The claim is that AVs enhance mobility, but you can't get into these vehicles (as of now) if you use wheelchair. Many interested partners recognize this problem. For the first and last mile, we need to evaluate *Complete Streets* and have started to do so in Buffalo, New York. We have collected before/after data in Buffalo, including traffic counts, fatalities, and community feedback. As demonstrated in Figure 37, we are addressing usability across the travel chain, which is important because a barrier at any point can impact someone's experience and/or ability to use the system. To study this, we need to continue to engage diverse stakeholders, which we do at the IDEA Center. A lot of research has focused on mobility impairments, but we also need more research on sensory and cognitive issues. In addition, we need to extend our research efforts to different communities and socioeconomic groups.

Travel Chain

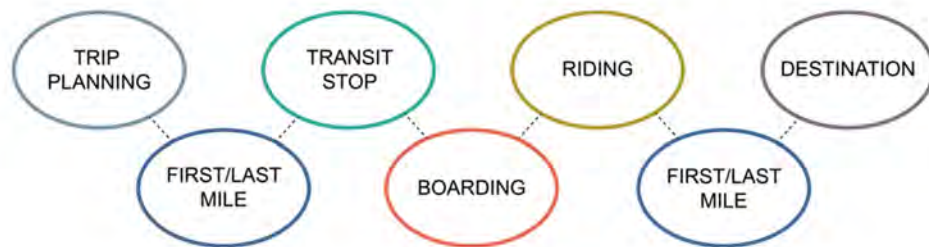


FIGURE 37 Travel chain.

QUESTIONS FROM THE AUDIENCE

Audience How are you dealing with curbside congestion?

Glantz That is not exactly my expertise. I know we are partnering with the D.C. Department of Transportation to remove parking, but for anything beyond that, I don't know.

Audience We could evaluate *Complete Streets* with an implementation science approach. We can structure those evaluations more, take different pieces, and compartmentalize them into interventions that can be replicated. Also, it's possible to implement the same thing differently, and we can try to document that and turn that into implementation data. With our research on *Complete Streets*, there was an urban planner interested in implementation, which no one was evaluating. The evaluation was being done on the policy, not on the ground. I wonder if you need to have a soup-to-nuts project to have an impact? If cost is an issue and there are contextual differences, maybe the implementation is different. Some people are starting to explore this.

Shah At the APA, we are working on health and public spaces and evaluation and developing tools for planners to evaluate projects. Transportation agency funding is not connected to evaluation, whereas evaluation is bread and butter of public health.

Audience With Google Street View, it's great to create an inventory of sidewalks, but the presence of sidewalks is not enough. Are there larger considerations? Is there a capability to see the condition or make an assessment on the condition of sidewalks?

Whitfield Yes, that's on our radar. At first, we thought it was easy, a yes or no question. Today's presentation represents the first attempt, which is just scratching the surface. One issue is curb cuts. Are there curb cuts on the other side of the street to help with crossing? Some foundational work is with curb cuts and disability access.

Audience I'm with the AT Alliance in Chicago, working on the ground with communities, counties, and municipalities to craft, adopt, and implement *Complete Streets*. Various funders have struggled to measure the implementation component. There is a wide gap on policy and on the ground. It takes five to ten years to get funding for building the street, but in between are steps, like training your staff and creating design guidelines, it is really helpful for us to measure implementation to show that progress is happening.

Audience Regarding Google Street View, state DOTs are looking to understand what their assets are, such as pavement marking. It might be worth connecting with AV companies to map out streets to the millimeter.

Christopher Some DOTs are doing similar work with LIDAR.

Audience Could the Google Street View approach be a resource for identifying locations of e-scooters?

Whitfield It's beyond where we are right now. It's a good point that a number of sectors want to know what exists on the ground. How do we unlock those data for the public good?

Audience For bike safety and access, we tend to lump bikes into same category, but there are nuances of different members. Where does the nuance play out?

Payne To be more inclusive, we need good location and design of the infrastructure, and we especially need better engagement. In New York City, they have e-bikes for bike share and e-bikes for food delivery services. Who is allowed to exist in these facilities? If you are delivering food, you aren't allowed to use the bike lane, but if you are riding with bike share it is OK. They have bike counts downtown, but how are people using their bikes around the whole city? In outer boroughs, people are riding in streets without lights.

DAY ONE: PLENARY SESSION

Building Strategic Institutional Relationships

MELISSA KRAEMER BADTKE

*East Central Wisconsin Regional Planning Commission
Moderator*

Moderator Melissa Kraemer Badtke welcomed the audience to the Strategic Institutional Relationship session.

KESHIA POLLACK PORTER

Johns Hopkins Bloomberg School of Public Health

I will discuss how educational institutions can partner with practitioners to bridge the gap between research and practice. Public health faculty at schools and programs of public health are conducting research on major health challenges and they want their research to be policy relevant and impactful, as do all of us. However, the challenge is that we are speaking different languages, operate on different timelines, and our rewards are different.

I have outlined four approaches to developing institutional relationships. The first is sharing our students and faculty. At Johns Hopkins Bloomberg School of Public Health, our Masters of Public Health students have a required practicum (100 hours). One way to complete those hours is through a program called PHASE (Public Health Applications for Student Experience), which has specific policy placements. Students who select this option are working with agencies like transportation departments, legislative offices, and other agencies at the state and local levels to discuss policy change and bring science to the policy process. This is a sustainable model because we have programs that people apply for and longstanding partnerships with local and state officials. Students can enhance their skills collecting and summarizing relevant data, translating research to policy, and working with various stakeholders often from different sectors. Students enjoy this pragmatic experience and policy-makers are getting useful data and evidence.

Regarding the ability to share faculty, Darcy Phelan-Emrick is the Chief Epidemiologist for the City of Baltimore. The Department of Epidemiology at the School pays some of her salary and the city contributes the rest. This has strengthened the city's use of data to inform decision-making. By having a close partnership with academia, the city can ensure that they have assistance from excellent researchers, and access to students—both of which have bolstered the city's capacity regarding data and analysis.

The second approach is translating results into policy, and there are two ways that we are doing this. I run an institute that oversees allocation of resources from a donor that allows for small awards of \$15,000 for a policy project that must be completed within one year. Projects must have decision-makers as partners and the principal knowledge user has to provide a letter of support for the projects. These funds support projects addressing an array of topics including transportation, food access, and opioid use. A second example is Research Dissemination

Awards provided through the *Bloomberg American Health Initiative*—a \$300 million dollar gift provided to the school to address some of the nation’s leading health challenges through research, education, and practice. These funds support the dissemination of findings from recently completed research to products, such as policy briefs, webinars, infographics, and podcasts. One example is a website that was created for state DOT officials related to graduated driver licensing policy. This is a great way of helping faculty extend the reach of their work. There are rolling applications for these dollars.

The third approach is promoting public sector engagement through public sector consultation awards. These awards are also supported by the *Bloomberg American Health Initiative*. Faculty can apply for these funds, which involves 100 hours of consultation time to partner with a public sector agency. For example, this award could be used to support a local DOT for evaluation support. Receiving these funds requires the partner to write a letter of support so the organization is fully engaged in this work. These funds gave great potential to support work in Baltimore, Maryland and across the country.

The fourth approach is providing institutional support. I am the school’s Associate Dean for Faculty, and part of my role is to support faculty’s ability to engage in public health practice. Junior faculty often wonder how engaging in public health practice could affect their promotion, so we spend time discussing practice-based work and how it ties to scholarship. We recommend a practice portfolio that includes these practice activities, which are then considered during the promotion process.

In conclusion, based on my experience, there are many opportunities to bridge academia and practice. Students and faculty are eager to work outside academia and want their research to be impactful. The most successful projects involve early and authentic engagement with the public sector and policy-makers, and joint development of ideas. We need to provide faculty with strong institutional support so that faculty choose to make time for these important activities.

JENNIFER DILL

Portland State University

On this question of building strategic institutional relationships, answering it wasn’t as easy as I expected. I’ve been a professor now for 18 years and AT has been a major part of my research agenda that entire time. Before being a professor, I worked in air quality and transportation planning in California, where I worked on policies and plans that, among other things, promoted AT (though not called that at the time). I owe a large share of my success in academia to the Active Living Research program led by Jim Sallis (23), which funded my work and introduced me to the idea of integrating health and transportation, specifically around AT.

Over this time period, I’ve seen the volume of AT research grow exponentially, with contributions from both disciplines; I have done a blog post about this. I can think of lots of examples of how the two disciplines have come together in research, including the addition of questions on health surveys that focus on walking and bicycling for transportation (not leisure). Also, we have seen the founding and success of the *Journal of Transport and Health*.

So while I see influence on each other’s fields, it has been a lot harder to build lasting interdisciplinary partnerships in academia. The “mutually beneficial collaborations” Jim Sallis called for—transportation and public health researchers developing joint studies—there are not a

lot of examples. I'm going to comment on the "two titans" analogy that described our two fields as large sectors now working together. While both industries are huge, I don't know if it's accurate to say that we are titans. Whether it is the health or transportation field, what we do is a small subset of our respective bigger worlds. AT gets a far smaller share of funding than asphalt. Public health is a smaller part of the medical health world.

Today, I will talk about the current barriers, but because overall this conference is about looking forward; I will provide some examples of ways to improve. Five years from now, I'll have a presentation with a lot of visuals and examples.

Interdisciplinary collaboration in academia is really hard. There are increasing rewards and recognition for it, but there are many barriers. Overcoming barriers takes time, and we don't have a lot of time due to professional demands. This is not something unique to our disciplines. For example, I had the pleasure of serving on committee for a computer science faculty search. By the end of that process, I discovered that the computer science people don't collaborate with electrical engineering people, and I don't even understand how they are different disciplines.

Language always comes up as a barrier, but I actually think that's not too hard to overcome. The bigger barriers are our research designs and approaches. The use of randomized control trials is a health approach. Andy Dannenberg made an analogy with drugs and vaccines regarding evidence-based decision-making. The standards and protocols in public health are based on a lab world. I would argue that transportation planning takes a different approach to standards. We do a lot of self-reporting, and that's looked down on in the health world. But, for the questions we ask, it's perfectly fine to use these type of data. We use different research databases (MEDLINE versus TRID) and many articles sourced from only one, not both. Our publishing practices are different; transportation often publishes reports online. Funding, teaching, publication standards, and promotion standards are different between the two fields.

So, what can we do to improve research collaboration? To answer that, I found it useful to step back and ask what impact we want our research to have. We want to change infrastructure and the built environment. We want to change policy, including taxes, pricing, funding, and so on. We want to implement programs and interventions that change attitudes and behaviors.

Who is our audience? Elected officials at all levels, appointed officials—such as planning boards—advocacy groups, professional organizations, and the private sector. We need to learn what answers are needed to make change. They need to tell us the research questions, then we need to do the research, and we need to make it accessible to decision-makers. Let the implementers guide the research questions. To do this research, we need to find funding mechanisms that promote these partnerships, such as UTC funding opportunities, and funders should encourage interdisciplinary partnerships. Convene stakeholders to develop research agendas so we can research in an interdisciplinary way—this conference is an example. As mentioned, personal relationships are important, which can create long-term collaborations. Funding is really important. The NIH spends \$39 billion and UTCs receive \$508 million. We should be shifting health research dollars into AT research.

JEFF LINDLEY*Institute of Transportation Engineers*

I will talk about the ITE initiative on transportation and health, what I have learned along the way, and how it relates to building relationships. In 2017, ITE pursued an initiative—which is a way ITE raises awareness of emerging issues, figures out what members need to know, and provides tools for them—on health and transportation. Our focus is on AT, although the title is broader. We have a separate initiative on *Vision Zero*. Our goals are to help members understand how their work affects people's health, provide resources and tools for the transportation process, and integrate it into day-to-day practice. The best decision we made was creating a steering committee that offers strategic guidance, which is purposely staffed with people within ITE and from the outside. Outside members include those from the American Public Health Association, the International Professional Association for Transport and Health, American Walks, the CDC, Leslie Meehan from the Tennessee Department of Health, Ed Christopher, and Kelly Rodgers from Streetsmart – who all help us understand health from the non-ITE perspective. We later created a technical working group to focus on the development of products, allowing the steering committee to focus on new ideas and guidance to the initiative. This has resulted in number of technical activities, including a series of webinars over couple years to educate ITE members about health and transportation, a series of podcasts, and an annual health theme for the spring edition of the ITE Journal. It's also a point of emphasis in our annual meeting, and plenary and technical sessions. We also try to get members to other conferences. We have been a co-sponsor of the National Walking Summit, the International Conference on Health and Transport, and we have a working partnership with Streetsmart and Kelly Rodgers.

The initiative has been a useful catalyst for change within ITE, but as I mentioned the two objectives were raising awareness and integrating health into daily practice. We are better at the first than the second. If you asked ITE members a couple years ago about health, they wouldn't have known much about how it relates to transportation; today, the awareness is much greater. Integrating into practice is really hard. We've had less progress in this area. The steering committee was a good decision because we get perspective that we wouldn't have if it were just insiders and would keep doing what we currently do. I have been less involved lately, but every time I interact with health professionals, I learn something new about transportation and health because of the different perspectives.

This initiative has relied primarily on individuals and has been driven by their participation. If the initiative were to go away, if the personalities left, perhaps some of those relationships would continue, but some might not. I'm not a fan of MOUs, but we might need to have them. Changing the mindset is hard and working with volunteers is hard. We are getting there and the members are really interested in health. Members don't want another set of tools or another process. They want transportation and health integrated into the same set of processes they already use; otherwise, it's something separate and that's harder.

AT THE INTERSECTION OF HEALTH AND AT: MINNESOTA'S ROUTE

AMBER DALLMAN

Minnesota Department of Transportation

I'm with the Office of Transit and AT in the Minnesota DOT. Today, I will talk about how we are working with the state health department. I'd like to share our vision at the Minnesota DOT. It is a 50-year vision that states that Minnesota has a multimodal transportation system that maximizes health of people, the environment and the economy. It's the first time that Minnesota DOT has acknowledged health.

We have been coordinating with the state health department for ten years now. We are working together even though we have different goals. The Minnesota Department of Health is looking at physical activity and the Minnesota DOT is looking at decreasing greenhouse gases or improving LOS. We recognize that our goals are different, but we can use strategies to accomplish the separate goals together.

There are three areas where we have had institutional collaboration. Health and planning paired up with research data and engagement. About five years ago, we created an interagency agreement that emphasizes that we should work together, including using safety and injury data together. We have modal plans as DOTs do, but we hadn't ever had a pedestrian plan, although we did have a bike plan. Usually we have a project advisory committee for modal plans, but when we were thinking about the pedestrian system plan and how local walking is, we wondered about the role of the state DOT. So we partnered with staff from *Minnesota Walks* who went through best practice areas, identified regions that did different things for walking, identified priority populations, and helped us think through the planning and how a state DOT would complete a pedestrian plan. They also helped with the Minnesota DOT bike plan. We considered a range of users, making sure we considered different level of abilities and bicycling comfort. Safe Routes to School (SRTS) has been another area that has seen tangible benefits for communities and humanizes our work. A statewide health improvement partnership provides state dollars for local public health to work on policy and environment changes, such as tobacco, health eating, AT, and an emphasis on built environment changes that support walking and bicycling.

Minnesota is on tribal land. We have 11 tribal governments and we identified Native Americans as a priority population, specifically in rural communities. We are coordinating with tribes to identify problem areas and pedestrian needs. For example, we needed a better way to count people in rural areas. Working with the tribal liaison and tribal public works staff led to research projects. Previously, we had a state research program, and local public health partners helped collect data and establish the methodology for manual and automated counts. But now, we need to figure out rural areas better, and how people walk in rural communities. We met with the Advocacy Council on Tribal Transportation and shared what we knew about walking and increased risks in rural tribal areas. Tribal public works partners were interested and some had been trying to make changes, but they don't have data to justify the change.

In one tribal community, there is one signalized intersection and many of the surrounding land uses are fenced off, which prevent pedestrians from crossing the street at other locations besides the intersection (Figure 38). However, there is a hole in a fence a quarter mile north of the intersection. In our data collection, we found over 100 people a day crossing the road through



FIGURE 38 Intersection in tribal community, photo by Minnesota DOT.

this hole versus 10 to 20 people crossing at the intersection. They were crossing at that location because there was a misalignment between the living spaces, grocery stores, places of employment, and the location of this intersection crossing. The community submitted a transportation alternatives grant to make improvements to intersections. *Stop for Me* is another research project that addresses driver behavior, including yielding behavior at unsignalized intersections. With a comprehensive approach that included education, increased awareness, and strategic enforcement, we saw improvements to driver yielding behavior in places where we have many people walking.

The last thing I'll emphasize is we need engagement to better serve community needs. Several years ago, the Minnesota Department of Health conducted a Walkable Community Workshop in a small community that was going to have a Minnesota DOT project six years later. The workshop contributed to discussions around project design and layout with the project manager. We have been doing more scoping field walks with project managers, and have been looking at how local public health can support walking and bicycling facilities for something that will be built in five to six years. Support from local public health will reinforce decisions by the project manager, and the Minnesota Department of Health can push Minnesota DOT staff to do more for walking and bicycling.

The Minnesota Department of Health has been supportive of our SRTS program, and pushed us to add to the *Walk! Bike! Fun!* K-8 curriculum to include people with disabilities. The curriculum did not have much material that addressed walking and bicycling for people with disabilities, and the Minnesota Department of Health supported adding and integrating these changes to make sure their needs are better met and can be taught to range of users.

The Minnesota Department of Public Health and local health departments were also critical in pushing us to do demonstration projects. There were several communities interested in demonstration projects, and some of what they were interested in doing was not *Manual on Uniform Traffic Control Devices*-compliant. Through their identified need, our SRTS program convened partners to think about how we could support demonstration projects. We developed demonstration project guidance as a way for our maintenance folks to test and see curb extensions and medians. Demonstration projects make it more palatable. You can take the

intervention out in the winter, so it's a way to test things to see if there is a willingness to do these. One way we are thinking about including health in the future is having transit in rural areas. We also recently established an Office of Sustainability and Health at Minnesota DOT to address climate change and resiliency.

CRAIG MARTINEZ

California Endowment

I am a program manager at The California Endowment, a health foundation located in California. We work on raising the voices and perspectives of those who experience the worst health outcomes to ensure they are a part of policy and system change solutions. We typically fund community partners, give them space and time to identify their greatest barriers to health, such as transportation, having access to healthy food, and a biased criminal justice system. As a health foundation, we work on multiple social determinates of health. For example, we heard from young people that a biggest challenge to health is being pushed out of school for willful defiance policies, preventing them from getting the education necessary for optimal health and well-being.

We are about to end a 10-year initiative that funded \$1 billion in 14 low-income communities across California to address their most critical health concerns. In an effort to promote community solutions, we fund technical assistance to community groups, childcare, and other enabling services to help communities articulate a vision of health. We have supported partners who have advocated for health perspectives in comprehensive plan updates, climate change investments, including the implementation of Senate Bill 375 that integrates transportation and housing planning with health. We see these as an opportunity to set the stage for identifying and addressing persistent barriers to health. Planning was step one, but California lost its redevelopment agency in 2010 and many low-income communities were left without capital for investment. One great opportunity was that former-Governor Brown consolidated local, state, and federal AT resources, but few low-income communities had the experience of tapping into these resources. By supporting a power-building ecosystem that includes community residents, project designers, grant writers, and advocates, communities have a greater chance of being competitive for these resources.

Lamont is small, unincorporated agricultural community in California's San Joaquin Central Valley. Even though it is vibrant community with strong community partnership, Lamont doesn't have basic infrastructure, such as sidewalks, and so people don't feel safe walking, particularly young people going to school. Because AT is a vital part of health and vibrant communities, we funded a number of partners to get state resources and were ultimately successful in getting millions of dollars in capital investments for the community of Lamont.

The role of philanthropy is to support demonstration project of power building in community development and share of community-driven advocacy and development with other partners across California and nationwide. Because of the efforts of our partners, communities across the San Joaquin Central Valley have been successful at getting resources for healthy and inclusive community development such as Kerns County. Being able to demonstrate what is possible through meaningful community engagement with local agencies and advocacy partners is important. Many times, it involves funding, enabling services such as language access, childcare, and training residents through leadership pipelines to be on board and commission. It is also important to have partners who operate both at the local, regional, and statewide levels

such as *California Walks*. For example, statewide partners were able to get policy to prioritize investments in disadvantage communities and were involved in debates to articulate what constitutes a disadvantaged community while advocating to grow the total amount of funding. These groups also provide specific technical assistance to local groups who may not have the capacity or ability to navigate complex funding programs. As a funder, we cannot fund individual capital projects, but can fund the capacity-building as a way to successfully access funding including our investments portfolio. For example, many state programs are cost-reimbursable and communities have the credit or reserves to pay for project expenses up front, but we can lend them money so they can get reimbursed.

NOTE: Martinez presented a video (24) documenting the project, which is accessible via the link provided in the References section.

MAKING TRANSPORTATION HEALTHY AGAIN

ANNA RICKLIN

Fairfax County Health Department

I'm with Fairfax County Department of Public Health and will provide local case studies from Baltimore and Fairfax County. In Baltimore City, my work in the City's Department of Transportation focused on the Red Line transit project, which in the end, the governor decided not to fund or build. Being embedded in that transit planning project allowed me to learn language of transportation and understand priorities of the field which has afforded me access to get to know the local and state transportation departments, and transportation consultants.

A key takeaway was how important it is to get to know people from all levels of transportation, including staff and a cadre of consultants who drive transportation projects. As much as we talk about state policy and procurement, it was important to engage all stakeholders to cultivate champions for the projects. Working for the city, I could only do so much to internally advocate, so I used concepts like social cohesion and health benefits to bring that language to elected officials. We developed an HIA for the Red Line to try to illustrate how it would benefit health. We drafted the HIA as part of the city's formal comments to the Environmental Impact Statement that went to the federal government as part of funding application process. That was how that HIA was used in that case, with the findings presented to local and state decision-makers.

Different steps are taken to develop projects. In one, we had a "highway to nowhere", where the Red Line was planned to run. Along the termination of that highway, there was a retaining wall separating communities – and now the wall is no longer there. The first step was to dismantle that wall. Because community residents were concerned about health impacts of construction, we proposed a demonstration of environmental tracking on the project to dismantle the wall, to measure noise, dust, and rats to see if this disruption actually affected health. It didn't. We had spikes with noise, but nothing health concerning, although it was a much smaller project than constructing a whole light rail line. Going through this process showed a good faith effort that had some positive benefit and showed that the short-term construction wouldn't be detrimental to health.

I also had the opportunity to develop green design guidelines with a granular level of detail. It was an example of a relationship with consultants because I was invited to present the guidelines to their team to illustrate to them what the city's priorities were; there were health-promoting and sustainable features, such as high-visibility crosswalks and green infrastructure (Figure 39).

Another takeaway is the passion that public health can bring and that can be applied in community context. Students don't often realize that transportation can affect health. Being embedded in the transportation department allowed me access to bike and pedestrian planners, and I had the opportunity to occasionally consult on their ideas.

Now in Fairfax County, Virginia, we have a population of 1.2 million people with a \$117,000 median income, but there are also pockets of poverty and hidden disparities. There are a lot of communities that are struggling and don't have access to jobs. With 402 square miles, there's a lot to cover. When I moved to Falls Church, Virginia it really distressed me to see a mother unable to get around safely by walking with her stroller, and putting her child at risk. We don't have sidewalks everywhere in the county. It's easier to put in bike facilities because they are on the street; sidewalks are harder because of the cost. We have the Silver Line that will take you to D.C., but local transit is the Fairfax County Connector bus. Almost 10% of our population commutes to work by transit, which is a decent number and higher than the national average, but we see 70% drive alone to work because the transportation network makes it your only option.

The background for the Health in All Policies (HiAP) program started several years ago with the development of a community health improvement plan led by the health department with goals of establishing a HiAP position and program. I now staff a cross-departmental team called Healthy Environment and Active Living, with planning, parks, and other staff. The goal is long-term culture change. My director told me "I don't want to see a monument to public health, I want to see culture change where the departments of planning and transportation are thinking of these things on their own."

In the south of Fairfax County, Virginia, we have the Embark Richmond Highway Plan (25) in a historically disinvested community, which is making us think about how we can bring in development and transportation along a new Bus Rapid Transit (BRT) project, coupled with community services. Residents are worried about housing and displacement. Planners and

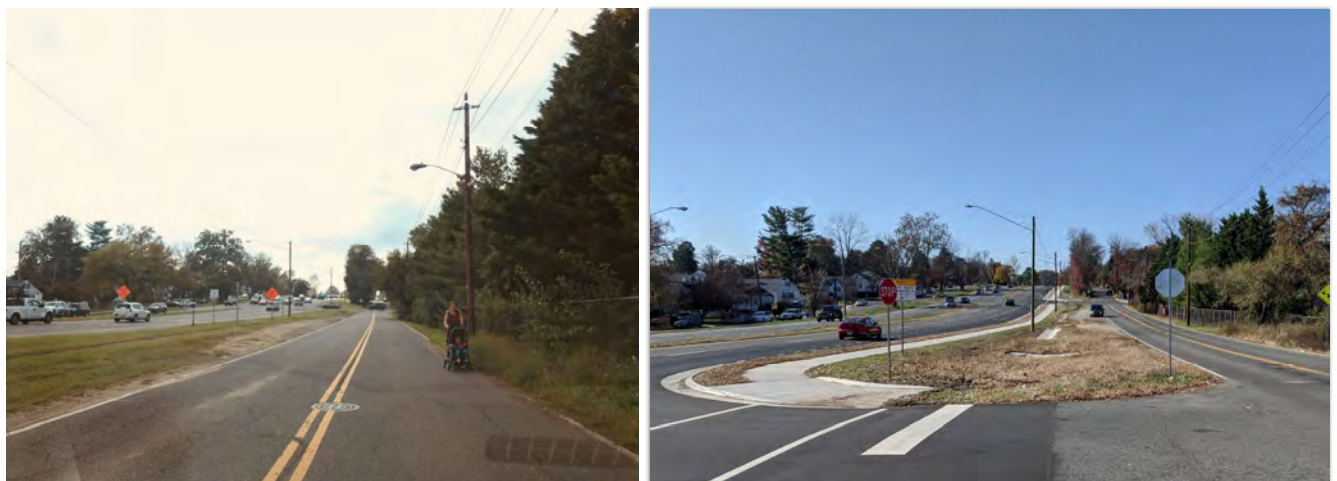


FIGURE 39 Route 50 Fairfax, Virginia—before and after.

transportation staff are somewhat aware of those concerns and issues, but may not always communicate well. For instance, there may be someone from public health talking to staff in different divisions in the same department but not with each other.

I try to connect to staff by using key messages and appealing to shared values: If public health is what we do together to ensure a livable community, then we are all part of the public health workforce. This has been an “aha!” moment for transportation. Health is part of our humanity. Safety and social connection is what we want, so we have to put people first. I teach a class on health and land development. One of my key strategies is reinforcing success where we have done the right thing. This is the same street as the woman with the stroller—transportation has the money. With this new sidewalk we can see that women in strollers don’t have to walk in the street. We in public health can’t point to such visible effects of our work. A sidewalk was built, and people are safer.

QUESTIONS FROM THE AUDIENCE

Audience The question of institutional versus individual relationships is important. For example, I couldn’t get anyone else from my organization to come to this meeting. How do we bridge that gap?

Ricklin That is extremely valid. My position was not replaced at Baltimore. In Fairfax County, my position is funded with general funds, so if I left I would be replaced, but it doesn’t mean that person would have the same relationships. Develop standing groups to step in with partners. It’s important that leadership is bought in. My health director consulted with the directors of planning and development for my interview, so they participated in selecting me, and as a result, they have buy-in on the position. Their staff have a mandate to work with me.

Dallman In our office, we schedule regular coordination and check-in meetings. Our check-in includes the general planning group, traffic engineers, environment stewardship, and the office of sustainability and health. They are solidly interconnected, which is a strategy they can take to other areas.

Lindley We are actually struggling with this. We have conversation about when this initiative ends— they have a life span—on how to make sure the momentum continues and where to place it in a more permanent structure. But that’s the easy question – I was more concerned about the external relationships and how to maintain those and how they survive if personnel change one way or other.

Audience So, ITE members don’t want new tools—what are the existing tools?

Lindley The examples we’ve talked about, imagining an engineer sitting at their desk, there are certain seminal publications, such as the Highway Capacity Manual, the Highway Safety Manual, the Green Book, and the *Manual on Uniform Traffic Control Devices*. People ask what if we had a transportation and health handbook—but they don’t want one more thing. They want health resources and tools within the Highway Capacity Manual. A little bit exists, but not a lot. That is where they want to find it.

Christopher I went to the TRB Annual Meeting and attended the committee that deals with the Highway Capacity Manual and asked about including health. They told me to get the money to do the research and we will build it in. There is your NHCRP problem statement. That's how change happens—you change those manuals. For example, with the NCHRP manual on the width of arterials and interstates, when you look at who is on panel, there is no one with health perspectives. We need influence on the panel selection. People in this room need to be involved. An example is the AASHTO process, where they pick the staff and have requirements about selection.

Dill NCHRP is funded primarily by state DOTs to address research needs at that level, which are often different interests than cities and counties. Achieving better mechanisms for cities and counties to influence funding requirements could be done through changing federal legislation.

Wojcik Wojcik thanked everyone and invited people to the poster session following (see appendix).

DAY TWO: OPENING SESSION

Research to Support Health Integration and Institutionalization in Transportation Agency Processes and Decisions

JANET WOJCIK
Winthrop University
Moderator

DANIEL RODRIGUEZ
University of California, Berkeley
Moderator

Moderator Janet Wojcik welcomed everyone to the second day of the conference and noted that the morning breakout sessions would continue the conversation from the previous day.

Moderator Daniel Rodriguez introduced this session that was designed to provide some background on existing research efforts regarding transportation and health. Panelists included: Laura Sandt, who discussed the *NCHRP Report 932: Research Roadmap for Transportation and Public Health* (26); Megan Weir, who discussed a TRB E-Circular on Arterial Roads Research Needs and Concerns (27); and Andrew Dannenberg, who was involved in both projects and discussed both.

A RESEARCH ROADMAP FOR TRANSPORTATION AND PUBLIC HEALTH

LAURA SANDT
University of North Carolina Highway Safety Research Center

I'll talk about *NCHRP Research Report 932: Research Roadmap for Transportation and Public Health*. This work is the result of the actions of dedicated members from TRB Health and Transportation Subcommittee. The goal of the *Research Roadmap for Transportation and Public Health* was to take a holistic look at strategic gaps and needs that could help the transportation community better integrate health considerations in routine processes and practices. Additionally, a goal was to identify the existing body of literature to see how it could support better decision-making and see what other existing tools and practices were in place to see what could be further extended. Because this was an AASHTO-funded project—it was state pooled research funding—a real focus was identifying research needs that could be used at the state DOT level. We weren't looking at all areas of health and how it might affect transportation decision-making, but really focused on state-level needs. At the same time, we acknowledged that innovation was happening at the regional level and we needed to look into those places to see what innovations were transferable to the state level.

The research products are still coming online. The strategic roadmap is available (see link above) and provides the rationale and the basis for the findings in the work conducted, as well as the methodology. As a bonus product of this research, we are finalizing an Excel document from our citation list because we thought that it would be a useful tool for other researchers to see a compilation of the research and to look at extended abstracts.

At the outset of this project, we struggled with boundaries for defining health, and others have had that same challenge in articulating the pathways to achieve health in transportation. We focus on six areas here: how transportation decision-making affects access to opportunities and services; opportunities for physical activity; mitigation to environmental risks; improving safety; supporting more emerging areas on how can health considerations integrate into planning into resilience and disaster preparedness; and promoting community connectedness and cohesion.

Any one of these health outcomes could be reached through a number of different transportation processes or practices, and any one transportation process could affect multiple health outcomes (Figure 40). For example, a health outcome related to safety or injuries could also be a determinant of health of other areas of interest. There is an inherent messiness, complexity, and interconnectedness in this research, which influenced our decision to cast a wide net on what we considered to be the health literature. We refined our focus through an integrated process working with some of the stakeholders that we were interviewing.

We captured more than 300 research studies. That number can be deceiving because one study itself could have covered over 400 other articles. We captured the work of Sallis and other meta-analyses and synthesis reviews. We didn't want to reinvent the wheel. We wanted to showcase the most critical studies, both recent works and seminal works from the past 10 or 12 years. We looked at the grey literature, institutional and agency reports, and strategic plans, including the task force report that Megan Weir will be speaking about. We wanted to make sure our research recommendations were compatible and consistent but also complementary to other documents produced during in the same time frame. We wanted to reflect on prior research needs statements; we identified 42 that focused on health and transportation processes. We wanted to hear from stakeholders in terms of the most critical research they are using and the gaps in data,

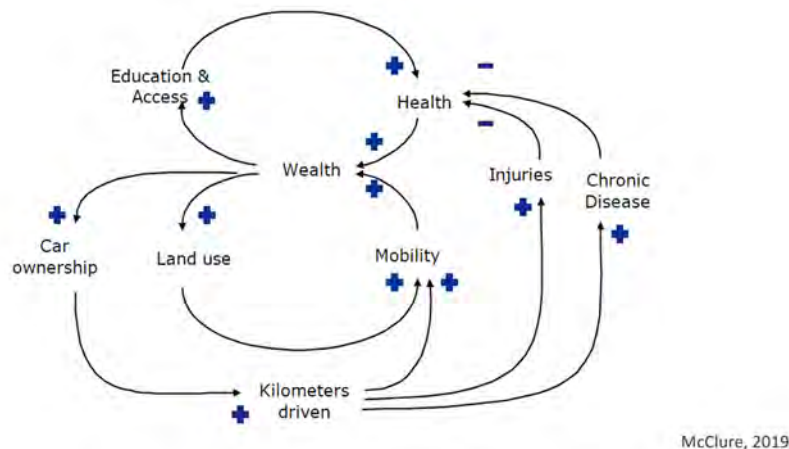


FIGURE 40 Inherent complexity and interconnections between health determinants and outcomes.

tools, and knowledge that are needed to inform decision-making at various levels. We understood that agencies and local agencies have survey fatigue, so we didn't think we could not reach all 50 states and understand all their practices. Because the topic is so complex, we thought that interviews with long-term champions of health and transportation would be a good window into this field. We had rich discussions with people interviewed.

In our review, we saw a lot of literature focusing on physical activity and active travel, and to a lesser extent, equity. That was somewhat by design because we were seeking out the literature on equity and health disparities that are perpetuated or addressed through transportation processes. We focused to a lesser degree on safety because there is already a NCHRP Research Roadmap on safety, so for the safety research we tended to look at safety relative to other health outcomes. We tried to find more research about transportation policies and practices and how they might impact stress, comfort, mental health, and other measures of community cohesion but we did not find much. Similarly, we did not find a lot of intersection with resiliency, health, and transportation.

When we classified the literature in terms of agency practices, most the evaluations and studies focused on planning and policy activity. We saw a large body of literature on *Complete Streets*, SRTS, and Health in All Policies, and to a lesser extent, *Vision Zero*. We did not find much on project prioritization schemes nor performance measures and how that might affect health outcomes. We did document number of useful resources and guidance, many of which came from the grey literature and less from peer-reviewed journals. From academia, we found more evaluation and development of quantitative tools. There were more tools than we expected, although when we interviewed people, a lot weren't aware of these opportunities and evidence-based tools. In the interviews and throughout our reviews, we were looking to document existing practices and the extent of coverage of those practices. In the final report, we documented some interesting executive and legislative mandates. We found a number of noteworthy practices around interagency collaboration. Data integration and sharing under certain policy actions was also a key theme. We were also learning how decision-making tools were being used, and in some cases, the challenges and barriers still in place using them.

We also highlighted some emerging issues that were not as well-documented, but we see as a big part of conversation in academic and practice circles, particularly around micro mobility, autonomous vehicles, and the emerging data from these new technologies. From the public health community, we continue to see an interest in opioids and mental health and how transportation policies may play a role in prevention or be impacted by these issues. Insights into stakeholder conversations included a lot of discussions around data and how to justify better incorporating health considerations in the processes. Here is one quote: "many transportation staff have the right intention but struggle to communicate the specific benefits from specific projects." This is an example of mismatch of the data available and the scale that is needed for certain decision-making processes.

Data measurement was another theme. People felt that having a *Vision Zero* program or *Complete Streets* policy led to some accountability and measuring of those programs. Data integration helped staff open up a conversation and learn how health community might be a part in transportation processes and decisions.

We also heard issues around the research and practice gap. In some instances, people said they had enough tools and data; they just needed leadership and political cover and conversation to make things happen. In other cases, we heard that they don't know the best practices and they couldn't move forward without justification, and they needed research to be more practicable.

Some of the criteria we used to develop research problem statements tried to consider how practical, implementable, and scalable the research and research products might be in order to bridge this gap.

The *Research Roadmap* is designed to capture not only fundamental gaps in knowledge and data, but also topic-specific gaps where there is not a literature on certain health outcomes or health issue. Research Implementation addresses where we have good data or knowledge, but we don't know how much it is being implemented or institutionalized across our states and cities. We framed the *Roadmap* to enable state DOTs to find their way in from whatever agency role they might have. For example, if they are involved in planning, they can quickly go to the section on planning and see research needs that support work in their area. It is not framed around health outcomes because any of these areas can affect multiple health outcomes.

To develop the six problem statements, we took the gaps that were identified and our panel ranked those gaps by urgency and the magnitude of the problem. For every one of those gaps, we had multiple research needs that had been identified from either the prior literature or from stakeholder interviews. The project team looked at those needs and ranked the research need by how practical it was, whether it was innovative, and whether it could be scaled to support work in multiple states. Then we built in a weighting factor for how it might be able to address health disparities. We also asked, could one seed feed multiple birds? For example, could a research project affect not only the bicycle community, but also pedestrians and transit? Would one study affect only air quality or multiple health outcomes?

The high scoring needs within the highest scoring gaps were reviewed. Our team met to see how this portfolio of identified needs fit with our understanding of funding agencies and their missions. These are the six statements we identified that are detailed in this *Roadmap*:

1. Synthesis of best practices for including health outcomes in transportation project prioritization
2. Data sources for establishing health outcome performance measures for transportation projects
3. Practices and recommendations in reporting and integrating pedestrian and bicycle non-fatal injury data systems
4. A guidebook for considering the public health impacts of public transportation decisions (this is based on prior research needs statement and is still relevant)
5. Effect of demographic change on travel behavior and health
6. Evaluating and integrating emerging data sources to support transportation and health planning and operations

We had 10 statements but these are the six that made the cut. Andy Dannenberg will talk about the other four statements. The following are our litmus test for these research problem statements—are these aligned with AASHTO/state DOT needs? Are they oriented toward research that is practical, innovative and can be scaled? Is this research needed before other research can be formed? We didn't fully answer that, but we wanted to lay out a solid foundation and use these recommendation to support a longer-term conversation. In the implementation plan, we acknowledge that AASHTO is just one of many funding sources for this kind of research. Many of these research problem statements may be crafted to fit the mission of other funding sources. We specifically acknowledged the role of the health subcommittee and some of

the AASHTO committees, and how they could play a role in advancing these need statements in various channels.

We will be sharing the final report at the TRB Annual Meeting and we will be sending a team member to the Active Living Research Conference. I appreciate those who planned this conference as the plans developing here will build upon this as we have been building upon the work that you are doing.

TRANSPORTATION RESEARCH CIRCULAR E-C239: ARTERIAL ROADWAYS RESEARCH NEEDS AND CONCERNS

MEGAN WEIR

San Francisco Department of Public Health

In summary, this E-Circular includes over 250 research topics, which are an illustration of the breath and opportunities at the intersection of arterial roadways and health. The format is unique because it takes a case study approach. In addition to proposing research questions, the format helps describe, in a particular context, the current issues practitioners are grappling with when considering health within arterial design and construction.

The history grew out of a proposal from members on the Subcommittee on Health and Transportation who had been working to advance at the intersection of arterials and health. To further the Subcommittee's work, we brought together in a task force to elevate these issues and questions to be advanced. Arterials have a way of elevating health issues within transportation because of the mix happening on arterials, with the speeds of traffic on arterials, the density of traffic volumes, the mix of uses, and the importance of their function in communities. Arterials exist across the country and are frequently the focus of redevelopment or upgrades. When done well, they have potential to improve the health of communities.

This definition was used in this proposal and helps illustrate the many things happening on arterials:

Arterial roads are a critical piece of urban transportation systems. They carry high volumes of traffic, serve as trunk routes for transit, are often truck routes vital for freight movement, and mediate traffic between the local streets and freeways. Their design is based on modified highway standards to optimize traffic flow and accommodate heavy trucks, and it is not uncommon for them to carry an average of 40,000 vehicles per day at speeds around 40 miles per hour.

Historically, the transportation and planning fields have been talking about the impacts of arterials on communities for decades. This includes the seminal work of Donald Appleyard, *Livable Streets* (1982), which looked at how increases of traffic volumes on local streets impacted residents, and their experiences with known health exposures such as safety, pollution, and noise, but also for social cohesion.

At the time of task force, there was also a lot of focus on arterials because of *smart growth* policies that have placed residents along busy corridors. There were concerns around health impacts from noise and air pollution, and the disproportionate impact of these decisions on low-income communities and communities of color. The original plan was to catalog research statements, but in bringing everyone together, it became clear that people wanted to talk about

issues with respect to the context and practical issues professionals were facing when trying to address health issues on arterial roadways. The document summarizes gaps in scientific knowledge and advances a case study format to share what this looked like in the day-to-day. The examples that were elevated include:

- Linking public health metrics to arterial roadways, a salient topic for this conference;
- Looking at local *Vision Zero* policies (severe and fatal crashes are concentrated on arterials);
- Looking at the proximity to arterial roadways overall;
- Opportunities for reinventing urban arterials and also looking at them in an exurban context;
- Looking at changing technologies and how they might help address arterial and health issues; and finally;
- The substantial progress and continuing research needs for modeling and tools to consider health impacts of arterials.

Another outcome was a deep dive into research needs statements database, with an attempt to “healthify” some statements focused on arterial roads. We also looked at the HIA databases with respect to arterial roads. A theme that arose in this review was the transportation focus on access management and the health focus on *Complete Streets*. From a transportation perspective, arterial design really focuses on vehicle access, compared to a *Complete Streets* approach that focuses on how arterials can better meet the needs of people traveling and living along the roadway. This highlights the space that transportation and health is still in and illustrates the opportunity for more alignment on our goals and function of arterial roads. How can the metrics better align?

For overarching themes, we see great synergies with the *NCHRP Research Roadmap*, particularly regarding how to elevate equity considerations, the need for more institutional support, and the need for metrics, such as LOS and other metrics that could be advanced to prioritize health in arterials. Also, there are synergies with the opportunities for modeling and integration of health and also the trade-offs, such as between access management and *Complete Streets*. Fundamentally, what’s the function of this roadway?

HEALTH INTEGRATION AND INSTITUTIONALIZATION IN TRANSPORTATION AGENCIES

ANDY DANNENBERG

Department of Urban Design and Planning, University of Washington, Seattle

This is the research part of the conference, looking at collaboration and innovation in research. The relationship between transportation and health is multifaceted and has a lot of co-benefits. Any research should look at the long list of areas in which health and transportation are related.

I will talk about a series of issues that are in both reports, the *NCHRP Research Roadmap* and the *Arterial Roads E-Circular*, and add where I think research can go in the future. The *NCHRP Research Roadmap* has a list of 10 priorities, of which six made it into the final report. The other four are all areas of value for which research can be done. Of the ten, three have been submitted for NCHRP funding.

The four other areas were health equity, rural health, health and resilience, and aging populations. We are working with TRB to publish in various peer-reviewed journals to reach a broad spectrum of stakeholders, and to find other ways to disseminate the information. One of my hopes is that both researchers and graduate students looking for a thesis topic will look at these lists. Prior research agendas have led to projects as a result of student research.

There were a lot of good ideas in the *Arterial Roads* E-Circular. An article in the *American Journal of Public Health* (28), reviews the questions and looks at some of the factors related to arterials and public health. What makes a good arterial from health point of view? It addresses reasonable speeds, safety, and pollution. What hinders health from the design of arterials—it tends to be the converse of those factors. The more ways we can disseminate them into the multiple formats and reach multiple audiences, the more impact they will have.

I want to talk about research tools and the role for tools in research. The Transportation and Health Tool (THT) (29) has been a collaborative effort between CDC and U.S. DOT. Another is the Integrated Transport and Health Impact Model (ITHIM), which looks at health impacts in relation to transportation choices. I would like to use ITHIM to show the head of a transportation department what the health impact of a billion dollars of highway investment is compared to the health impacts from a billion dollars of rail transit. This offers a useful message on how transportation dollars can move health forward. Another area is metrics, such as replacing LOS with VMT in California, which would be major step forward in promoting health.

There is a lot of richness in existing data sets which we can learn from. The *Bicycling & Walking Benchmarking Report* mentioned earlier looks at existing data with respect to health and transportation in the major cities and states—comparisons among them can be a source of research. Another is using existing driver's license information to determine at what age people get their driver's licenses. Younger people are not their getting driver's licenses until later, which has implications for where transportation systems need to go. Another example is using the NHTS to find how much walking is associated with public transit use. The NHTS has been collected in such a way to permit for multiple uses and studies. It's a public use data set that allows for good research exploring.

There are creative ways of using existing data. Aaron Hipp has taken images from archived traffic webcams to look at before and after bike lanes were installed. He used *Amazon Mechanical Turk*, a crowdsourcing website offered by Amazon, to get someone to count bicyclists and pedestrians and, eight hours later, got his data collected and analyzed. There are emerging issues, such as e-scooters and a range of issues related to convenience, safety, the last mile, and infrastructure. Autonomous Vehicles (AV) is another. In Washington State, we have a subcommittee on health and equity related to AV. Oregon and California have done similar work. There are things we know and things we have no way to know. We think crashes will decrease, but there are equity and accessibility issues. Will people find it so convenient to use AV that people stop walking and stop using transit? If so, that has significant implications for our infrastructure. Another consequence is a potential reduction in organ donors. If we have a 50% reduction in crashes, would you have fewer organ donors? These are speculative issues because there is no evidence that we will have major reductions in crashes. Another concern is potential job losses from automation.

On translation and implementation—how to turn research into policy decisions? How much research is needed? You need enough research to be generalizable, but you don't have to repeat it in every state to show it is applicable in every state. There is resistance to change. The transportation world has a lot of standards and manuals, and trying to change these takes a while.

We need enough research to show what works. There is a whole area called *Implementation Science* that can help get new ideas into standards.

There is a range of areas where research can engage: questions, tools, metrics, and big data. On big data, we now have access to data from social media, Google searches, and other places. When we are working with data this big, we might need to partner with people from computer science who have the skills to analyze it.

PANELIST PRESENTATION FOR RESEARCH TO SUPPORT HEALTH INTEGRATION AND INSTITUTIONALIZATION IN TRANSPORTATION AGENCIES

BRIAN SAELENS

Seattle Children's Research Institute, University of Washington

Are there any gaps in the research needs in the *Research Roadmap* and the *E-Circular*? It's hard to find gaps when you have 250 research questions already. I want to prioritize some of them, what stood out to me, and what would also be helpful for my work.

I'm a health researcher focusing on active living. I do a lot of primary data collection because the data I need don't exist in transportation or health metrics. I define health and transportation as increasing AT, although I know there are other aspects of health. I live in Seattle. I would say that I am in equity training with my community partners. The inputs for my talk were the *Research Roadmap* and *E-Circular* as well as discussions at this conference.

This is a map of over 6 million GPS points from a study where we collected individual-level GPS from GPS in people's cars or what people were wearing (Figure 41) This represents about 700 people that we tracked three times over four-year period. The top figure is the 16 million GPS points across all modes of travel. The figure on the bottom is the GPS points that we determined as walking, about 7 million GPS points (Figure 41). We determined this because

YOU CHANGE WHAT YOU MEASURE (WELL)

- Transportation agencies and related groups should be measuring health (and health behaviors) – riff on 2.1.3, 2.2.1

- Health = Active Transportation
- Pedestrian/bike counts tell me <1% about walking/biking
- Limited information and confidence in surveys or travel logs

• Measuring walking & biking

- What do we need to get a geographically and demographically representative sample of walking & biking at the level at which transportation planning and investments are being made?
 - How much walking and biking are happening? By whom? For what purpose?
 - How is walking changing over time? As the result of interventions?
 - Are we having an impact on inequities?



FIGURE 41 GPS Data points for all modes and walking.

people had accelerometers and travel diaries. It would be helpful if my local DOT and/or MPO had this information for a geographically and demographically representative sample. Health is AT, but pedestrian counts from my DOT tell me little about walking behavior or where walking happens. I have no confidence in surveys or travel logs that people will report how much walking they do or where they do it. They often miss walking to and from transit or walking to lunch from their office. We need to measure walking and biking at the local level or at least the scale at which we are making transportation decisions. We need a demographically and geographically representative sample of walking and biking so we can look at these changes. Our mayor is going to reduce arterial traffic speed limits to 25 mph for everything that is not a state road. It would be helpful if I knew where walking happened and I could look later to see what that is. One of things that we struggle with, as researchers, is that these policies happen and we don't have baseline data to know the impact. How much walking and biking is happening by whom, by what purpose, and as a result of interventions? What is the impact on inequities? If you can't get a geographically and demographically representative sample, can you sample in low-income communities of color, where we need to focus our work? We change what we measure; we change what we measure well.

We need to get equity right. This is how my hospital defines equity: "Be open and embrace the uniqueness of others." This is the worst definition of equity I've heard. I'm part of an excellent group to improve child health outcomes in our county, which defines equity as:

"...an ardent journey toward well-being as defined by the affected. Equity demands sacrifice and redistribution of power and resources in order to break systems of oppression, heal continuing wounds, and realize justice. To achieve equity and social justice, we must first root out deeply entrenched systems of racism."

If equity is giving different people what they need, we have to better understand the differences in needs of subgroups with known inequities in health. This builds upon on two recommendations from the *Research Roadmap*. What is a walkable environment from a physical disability perspective? From a different cultural perspective, what is walkable? There may be a minimum set of things to make a walkable environment but then how do different groups define safety? We need to understand how that affects their walking.

How can we transform our communities and transportation systems to not only meet minimal requirements for walkability or even equivalence to existing exemplars for walkability, but exceed the exemplars through an equity framework without gentrifying? We are fortunate to be part of a *REACH* grant, CDC's *Racial and Ethnic Approaches to Community Health* program. We are funding a transportation organization to do training with folks from *REACH* communities in order to engage in transportation discussions. How do you reach members of these communities, who have an interest in this work, but don't understand the language? We've talked about creating common language. Transportation language is hard for health folks to understand, so you can imagine how difficult it is for community members with no prior experience in transportation. How do we evaluate and figure out a system by which we can truly engage community? Health folks don't always do this well, but we are getting better. How do we help transportation folks to do the same? It's challenging because transportation is not a single issue; it is long-term and takes a long time. How do you have ongoing engagement that's not just a single focus group?

How do we follow the money? Is there any entity that benefits from your AT other than you? I don't think there is, and therein lies the problem. Our system is set up to disincentivize

active travel. There are financial benefits to many others; however, when you drive, there are benefits to automobiles and petroleum, but not when you are doing AT. We need to look not just at overall costs, but who benefits and who has to pay costs from different mode choices. We are working on a study with colleagues in Portland at Kaiser Permanente. We have access to a Kaiser sample and had done a survey on transit use. We broke up the survey sample into those who had high, low, and no transit use and, controlling for lots of other variables, found a significant difference in total costs to Kaiser—medication costs and outpatient costs. There may be lots of reasons that transit users have lower health care costs, but the most important thing is that Kaiser is paying the bill. If it's a closed system and they are interested in reducing costs for themselves, they might be interested in how people use transit. This is an example of identifying who has to pay the costs for different behaviors.

HEALTH INTEGRATION AND INSTITUTIONALIZATION IN TRANSPORTATION AGENCIES

SUSAN HANDY

University of California, Davis

This connection between public health and transportation is important. The level of rigor that public health brings to research has upped the game for us transportation researchers. In the intervening years, a lot has been done, but we have more to do.

There are 243 pages between the *Research Roadmap* and the *E-Circular* talking about the research needs we still have. I counted 122 specific needs in the Roadmap and 250 in the *Arterial Roads E-Circular*, so we have a long way still to go. The transportation process is so complex—there is a lot to understand—but also that we have so many deficiencies in transportation planning and policy process, regardless of this question of how do we insert health into the process. This comes through clearly in the *Roadmap*. We've talked about the problem with data—do we still not have a database on sidewalks? We have a lot of tools and models, but they are limited; they aren't getting better, and they are entrenched. Communication and messaging has come up several times; we just don't do a good job with this. One example of our slow progress is from one of the research needs statements, which was about the lack of commonly accepted tools for measuring access and equity in access. Now there is an NCHRP project working on that very issue.

The *Roadmap* focuses on the processes and not on the outcomes. We know a lot about the problems, the causes, and the likely effective strategies. Where we need help is in understanding how to make change happen. How do we get the transportation community to do things differently? Buehler discussed the need for political science research in transportation. It reminded me of an article by Marsden and Reardon from the UK about the need for studying governance and institutions in transportation. There were 10 research topics in the *Roadmap* and six that were prioritized. That's a step toward making something happen. The six of them together cover that question on how to make change.

Certainly, transportation in rural areas is something that comes up all the time, particularly in California and the question of VMT reduction. How do we provide access in a way that is less car-dependent? There are issues around safety and access in rural areas. There is a lot of talk about interesting new data sources and excitement about big data. I worry that we are

thinking of this as a silver bullet, and it's not. We will still need to do primary data collection. The issues around private sector ownership and management of those data will need more thought.

It is a thought-provoking exercise to read the *Roadmap*. There were a couple things that jumped out at me. One was a focus on disasters and resilience. There were some interesting transportation issues with the fire in Paradise, California, beyond getting cars out of there quickly. They had a recreational trail that some people used to get out, which raises questions about using facilities for multiple purposes. On the other hand, there was concern that the road diet on the main street had made evacuation difficult. There was backlash for those kinds of projects. There was another point about living near arterials and resulting health effects, and I thought about a conversation I had with the director of the Caltrans District 7 in Los Angeles about those experiencing homelessness who are living along freeways. Residential location choice and the connection between health, transportation, and affordable housing issues is something we could have more discussion about. I'm increasingly feeling like the ability to drive less and use active travel modes is a privilege and am wondering what we will do about that.

I will reflect on one more thing, which is how differently the public health and transportation fields think about evidence and evidence-based policy. Regarding Norm Garrick's presentation on the evidence for that policy for grids versus cul-de-sacs—it's not clear that there was any evidence to support the suburban grid style and yet, once we are doing it, we assume it's the right thing. The default is right and we need perfect evidence to move away from that. Some of it is tied to liability issues; the field is inherently conservative. What kind of values are we instilling in transportation engineers in our educational process? There is some progress and support for active travel within the transportation community. The *Arterials Roads E-Circular* indicated that *Complete Streets* is a public health paradigm, but it is also a transportation paradigm and gets support in transportation. Our problem is that we can't seem to let go of cars. There is a "throw everything at it attitude"—we'll invest in AT and transit, but keep building roads. I have been working on induced travel and am trying to get transportation officials to accept this idea, even though there is compelling evidence that it exists. We have to be less stubborn and overcome this resistance to make progress. The *Research Roadmap* is an important resource for research communities and an inspiration. The framework alone will be helpful.

DEVELOPMENT OF A NEIGHBORHOOD WALKABILITY INDEX FOR STUDYING ACTIVE TRANSPORT CONTEXTS ACROSS COMMUNITIES IN THE UNITED STATES OVER THE PAST THREE DECADES

ANDREW RUNDLE

Columbia University, Mailman School of Public Health

I came to this field of transportation and health from physical activity and obesity. I applied these ideas to New York City to understand how design affects physical activity, obesity, and diet. Since then, I've turned my attention to pedestrian injuries. Both of these reports spend a fair amount of text on pedestrian injuries. The research gap I see in the field, as exhibited in these reports, is the role of alcohol. Forty-five percent (45%) of pedestrians who are killed on our streets were drunk. This has been a static statistic for over ten years of Fatality Analysis Reporting System (FARS) data. The number of pedestrians who had blood alcohol level that

would put them in the drunk driving category stays static. There is a whole literature on the concentration on alcohol-serving venues and co-location of pedestrian fatalities and injuries. There is very little discussion about the intersection of transportation and alcohol-vending and -serving venues and how to design spaces to protect people who are imbibing alcohol and stepping out onto the sidewalk.

Many cities are using entertainment districts and nightlife as a driver of economic development. This idea is being pushed by alcohol companies, hospitality companies, consultants, and design firms as a way to revitalize downtowns. Washington D.C. announced the opening of the *Office of Nighttime Mayor*, whose duty is to promote nightlife. New York City has had a *Nightlife Mayor* for almost two years. There is economic development focus promoting nightlife and alcohol through bars, clubs, and restaurants. There's almost no public health advice on this topic. I've found only one piece of advice from a national organization, which was simply not to drink while walking because it impairs coordination and decision-making. Yet every year, 45% pedestrian fatalities involve alcohol (only 16% involve drunk drivers). We can't get to zero in *Vision Zero* without talking about alcohol.

I'm from New York City, but I also split my time in Western Massachusetts. It's a classic New England mill area with lots of abandoned textile mills and economic issues resulting from the hollowing out of the industrial base. What do we do with these old buildings and how to use this space to generate economic activity? An old mill is giant building with a giant parking lot on an arterial road and it either has a rail spur or canal next to it. We've done a good job of converting canals and rail spurs into biking and hiking trails; we have a developed trail system. It turns out these old industrial spaces are perfect for distilleries and microbreweries. We are converting these old warehouses into microbreweries. Within 15 minutes from my home on the bike trail, there are six separate breweries. We are creating these spaces that bring pedestrians and cyclists into spaces with parking, and cars driving off arterials to multiple bars and restaurants focused on selling alcohol. We've created a system that brings together these modes of transport to a place where the point is to consume alcohol.

Now, Massachusetts has legalized marijuana and New York City has stopped policing marijuana. In my experience, it is common to walk down the street and smell marijuana smoke, so walking and smoking is a thing. Now we have a second type of intoxication occurring among the pedestrian population. I haven't seen any statistics on being stoned and getting hit by a car. It's a new phenomenon in Western Massachusetts. This is the second type of economic development promoted by our governments that creates an intoxicated pedestrian state. My work now is thinking about intoxication, pedestrian activity, the economic plan to create intoxication, and then the transportation system that brings moving objects into the environment involving intoxicated pedestrians. Alcohol is not mentioned in these reports; *Vision Zero* barely mentioned alcohol. If 45% of our pedestrian fatalities involve drunk pedestrians, we can't get to zero without talking about alcohol.

QUESTIONS FROM THE AUDIENCE

Audience Andrew, my question is for you. I want to acknowledge that your take on being deliberate about how design for the use of people consuming alcohol and drugs is not what I usually hear. When you hear intoxicated pedestrians, we usually hear blame-the-victim language, which we can all agree is counter-productive. How do you broach this conversation in a way that is productive and does not lend credence to the idea of blaming pedestrians for their own injuries and deaths?

Rundle I don't have my full discourse down. I'm not a blame-the-victim person. It's very much about economic development decisions of cities to promote alcohol. We have to think about countermeasures, safety, and design. If we are creating intoxicated pedestrians with our economic development policies, we have to follow the conversation to its logical conclusion on how to protect those people.

Weir I want to respond based on my work on *Vision Zero* in San Francisco. The patterns we see in bars are not the same in all contexts. We see many more seniors killed in San Francisco, who are not intoxicated, represent about half of all pedestrian fatalities in San Francisco. In San Francisco, we are exploring the alcohol relationship with toxicologists at the medical examiner's office, but using *FARS* data is limited. There is an opportunity for linking health, transportation, and police data sources to better understand pedestrian fatalities. Last year, of the 20 people killed in San Francisco, five were those who were experiencing homelessness. There is an interaction with substance use, mental health issues, and people walking. Where are those experiencing homelessness able to live and where we are pushing them to live are often the in the most dangerous conditions. With respect to drivers and intoxication, we see a lot of hit-and-runs in fatal crashes and we don't know if the hit-and-run drivers are intoxicated, but we suspect many are. In addition to having calmed streets, another possible solution is using technology so that people that can't drive while intoxicated in the first place. We talk about AV, but let's look at advancing other technologies that can reduce fatalities.

Audience I'm at the University of Arizona. We are in the middle of an e-scooter pilot and finding that the vast majority of trips are at night. It looks like e-scooters are being used to travel to bars, so we have a lot of work to do in this area. Also because I'm in Arizona, we are focused on how hot the weather is. I'm a little disappointed that we are not talking about extreme weather, especially in a changing climate. How are we going to pivot quickly and examine how to make healthy habits doable in the new normal of high heat? How much is this being discussed?

Sandt In one of our interviews, LA Metro talked about how they were considering taking into account climate change models for design of transit stops and the aging populations using their facilities. We only scratched the surface on street trees policies and how trees are equitably or inequitably distributed across a city. Access to shade is an equity issue. I agree that it will be growing issue.

Audience In our work, we are seeing a lot of new non-choice users; that is, people who have had their licenses revoked, not driving offences, but for nonpayment of fines and fees. This tends

to be people of color. The revocation of a license is often the severance between that person and a job, family, food, and everything, especially if that person is not living in a place that has no other access than driving. Is there data on this? Are we creating more non-choice users simply through license revocation?

Dannenberg I have not seen any data. That is a question ripe for research: What happens to people when their licenses are revoked for health and economics, and other impacts?

Sandt There is a lot of discussion around this issue and alcohol. Some state highway safety plans have different administrative procedures for driving under the influence (DUI) offenses, so that topic is coming up in alcohol conversations. Certainly, our *Research Roadmap* recognized we have polysubstance issues, not just alcohol but prescription drugs that affect driving; and, when do you not just revoke a license, but recommend not driving based on medications. One of our research needs was around understanding travel needs among aging populations because this growing epidemic of people with Alzheimer's. My father has early onset; losing his license was a socially isolating event and placed a burden on family for meeting his travel needs. There are still questions in the transportation community about helping families, e.g., knowing when is the right time to stop driving, how to work with families and caregivers to meet travel needs, and understanding the safety implications. That's a body of research that is needed and should involve the health and medical community as well.

Bernardo Kleiner From the TRB side, we do have committees regarding the safe mobility for older persons, including issues on how to decide when they need to stop driving and the options afterwards, which addresses accessibility issues. But another issue of driver license revocation, there is also some research, because license revocation is not just tied to transportation behavior. It is being used punitively for a whole host of issues. There's research about separating this privilege of having a license, and using that as a punishment because it is so valuable.

Audience My question is about big data and preferences. I'm with Texas A&M Extension and I do a considerable amount of community engagement. With big data, we look at the routes people are using. It's not their preferred route or the best route, but it's their preferred best route because they are avoiding something. People use routes that mostly work, but there's often that section that they hate, but they have no choice but to use it. So how we use big data without making dangerous assumptions that these were the best or most meaningful routes for them?

Rundle We analyzed New York City GPS data using a route choice statistical model to understand what characteristics around someone's home predicted which parts of their neighborhood they used. I thought it would be crime, but that and all SDOH didn't actually predict what part of the neighborhood participants used. It was all urban design variables, intersection connectivity for instance. If you use GPS data, and assuming its representative, you can do route choice analysis. But, there are gaps there because those in your sample may not be representative, given the self-selection issues.

Handy In transportation, we call what people do *revealed preference*, but that's wrong—it is *revealed behavior*. We don't know their preference; that's why I argue that big data will not be enough. We still have to talk to people.

Audience This question is for Susan Handy. You talked about DOTs and the challenge of balancing values of engineers and other goals. State DOTs are often focused on building roads, so how do we build in a value change to that mission?

Handy If you look at state DOTs' mission statements, there is more talk about other purposes than building roads. It's a lot about leadership. At one point they were called Department of Highways, so the shift to Department of Transportation is a start. We need leadership at the top, but at the bottom up as well. We have younger people now who have been taught in different ways and they are changing the culture from within.

Sallis Also, we are all citizens and our elected leaders are there to serve us. We are informed citizens.

Moderator Rodriguez closed this session. He explained that the concurrent sessions were next. He also indicated that research questions would be put on flip charts and that participants could place a dot on a research question after the end of the breakout session.

DAY TWO: CONCURRENT BREAKOUT SESSIONS

Addressing the Future

CHRIS KOCHTITZKY

Centers for Disease Control and Prevention

LESLIE MEEHAN

*Tennessee Department of Health
Moderators*

Moderator Chris Kochtitzky welcomed participants to the Innovative Practices session and introduced the facilitators, Nisha Botchwey and Phil Bors.

MOVING INNOVATIVE PRACTICES FORWARD

NISHA BOTCHWEY

*Healthy Places by Design
Facilitator*

PHIL BORS

*Georgia Institute of Technology
Facilitator*

Bors and Botchwey created the following ten categories, and sorted the innovations and needs generated during the first day's discussions in the Innovative Practices session. In this Day 2 session, a handout of the previous day's ideas was provided to all participants, who added ideas with sticky notes on corresponding flip charts. Items in **bold** were added during this Day 2 discussion. In some cases, participants added language or a comment to existing innovations or needs and did not become new numbered items. Participants then discussed the ideas during a dot-voting procedure. Following the dot-voting process, participants divided into seven groups to further brainstorm on this limited set of items, i.e., those with five or more dot votes, which are indicated in *italics* below. In parentheses, the shorthand term for "innovation" is "Innov," for "research" it is "Res," for "relationships" it is "Relat," and for "unintended consequence," it is "Unint."

1. Programs and Practices

- a. Every Day Counts (EDC-5) STEP (Innov)
- b. Play Streets (Innov)
- c. YEAH! Youth intervention (Innov)
- d. Pop-up place making and place keeping/tactical urbanism (Innov)
- e. *Vision Zero* initiatives and SF Action Strategy (Innov)
- f. Story walks-libraries program book pages and walk to read and engage space (Innov)

- g. *How do we motivate individuals to take action, to actually utilize AT? (Need)*
- h. Move with the Mayor (Panel, John Clymer)
- i. AARP Pop-Up Place making Toolkit (Panel, Jana Lynott)
- j. Adaptive bikes and associated programs**
- k. History walks, cycling for transportation and economic development**
- l. Mentorship programs, pass down institutional knowledge to encourage more disadvantaged to come in health/transportation**
- m. “Walk with a Doc” program**

2. Strategic Implementation

- a. ID practices that exist now and figure out why aren’t they widely disseminated (Innov)
- b. Increase density in cities (Innov)
- c. Move *Complete Streets* plan into implementation to prioritize bike/pedestrian (e.g. Nashville) (Innov)
- d. Codify trail networks in MPO planning for transportation (Innov)
- e. Pedestrian-only streets (Innov)
- f. Design effective interventions to limit required enforcement. (Innov)
- g. Center for Arts and Sciences in Valencia, Spain – riverbed as urban greenway (Innov)
- h. Build decision-making tools at the project level. Translate public health into tools (Res)
- i. Research project to identify MPO and cities with health-oriented project selection criteria**
- j. Increase density to make area more navigable without a car**

Needs

- i. We know what works, we just aren’t implementing it on the ground. Master plans are not being implemented. *Complete Streets* policies adopted but not accountable for results. (Need)
- ii. Change who makes the decisions about transportation infrastructure and spending to include nontraditional partners, e.g. AARP, AHA, arts organizations, community-based organizations. (Need)
- iii. *The transportation planning process is very slow and community members lose interest and enthusiasm for projects. We need more “quick-win” projects. (Need)*
- iv. Unequal implementation of *Complete Streets*, which are more likely to be implemented in higher SES neighborhoods, isolated “*Complete Streets* to nowhere.” (Need)
- v. Transportation system not set up to prioritize pedestrians/bicyclists. “Squeaky wheel” implementation and “Squeaky NIMBYs” can kill AT projects. (Need)
- vi. Enforcement of policies that are already in place, e.g. bike lanes clear of parked vehicles. (Need)
- vii. Crash reports are often incorrectly coded by police officers because they may lack knowledge of how to accurately complete crash reports. (Need)**
- viii. Need zoning requirements to require minimum distances between highways and residential and sensitive uses**
- ix. Urban trails**

x. Focus on entire lifespan in AT implementation, children > older adults

Unintended Consequences

- (Research) Increasing density leads to increased exposure to poor air quality. What is the buffer to protect occupants? (Unint)

3. Funding

- a. Federal Highway Funding: Peer exchange to share information on countermeasures, innovative practices (e.g. Austin, TX) diverse geography exchange (Innov)
- b. NCHRP research papers - funding to take the paper to put into practice (Innov)
- c. Assist local leaders (\$ and TA) e.g., Tulsa, Oklahoma (Innov)
- d. FHWA Innovation Grants–SafetyU Program (Innov)
- e. State Highway Safety (program? funding?)
- f. NIH, NSF involvement in funding for research/translation (Res)
- g. Empower community to work on easy-to-implement interventions in their community. Engage with leaders to assist/connect to local and national funding sources (AARP, America Walks, etc.)**

Unintended Consequences

- (Equity) Inequity in funding projects. We need to prioritize areas needing the most help, e.g. Charlotte Greenway examples. (Unint)
- (Equity) Outcomes of transportation investments have realized little reflection regarding equitable distribution. It is widening inequities rather than reducing. (Unint)
- **Funding investments leads to gentrification**

4. Data and Surveillance

- a. Boston's 311 hotline data reviewed for sidewalk calls/conditions (Innov)
- Day 2 follow up – Boston no longer uses 311 data to prioritize repairs/improvements of sidewalks. Use a SDOH index with sidewalk quality overlay to prioritize project.**
- b. Community assessments led by community members, both qualitative and quantitative (Res)
- c. Rural assessments emphasizing access to hospital, doctor (Res)
- d. Using 311 as database is biased. People call 311 who are not afraid of interacting with government (undocumented, etc.)**

Needs

- i. Health data gap at local level. Other sectors are also missing local data. (Need)
- ii. Public health is not used to doing modeling/forecasting, unlike engineering disciplines. (Need)
- iii. Transportation field uses flawed modeling, e.g., LOS led to our car-centric landscape. (Need)

- iv. Public health still lacking analytic capacity for HIA and local data to plug in to models. (Need)
- v. **Bike/pedestrian counts. If we monitor Ks and As (i.e., injuries and deaths), how do we better track the overall number of people biking? Walking?**
- vi. **Transportation needs to utilize epidemiology experts and methods to guide study design and methodologies of data collection**
- vii. **Police stop reports with demographic information on who is being stopped and why**
- viii. **Address “data invisibility” where we can receive best practices for conducting research in communities that have been historically experimented in unethical ways**

Unintended Consequences

- (Data) Who owns it and how should it be used? What rules should govern Sidewalk Lab? (Unint)
- (Data and Equity) 311 calls (in Boston example) and limitations of data. (Unint)
- **What rules should govern private sector overall, not just Sidewalk Lab?**

5. Communities, Coalitions, and Partners

- a. *Build relationships with communities (churches, mosques, schools) so they lead research. (Innov), e.g. Schools policies on adaptive bicycles available for check out by students*
- b. How pull private entities together to innovate together? (Innov)
- c. Civics 101 for health and place for residents, community. (Need)
- d. Sustained partnerships for trust (Res)
- e. **Hire local organizations as consultants on transportation projects**
- f. **Community health works**

6. Tools and Technology

- a. Automatic counters -> surveillance of active transit use (Innov)
- b. TDM Apps for common users and underserved neighborhoods (Tools to assess land use and transportation) Increase awareness on where to find them (Innov)
- c. Strava and other bike Apps (Innov)
- d. Google Street View for Walkability (Innov) and to inventory sidewalks (Panel, Jeff Whitfield)
- e. Lyft Grocery Access App (Panel, Kate Glanz)
- f. **Relying on private services is not a long-term solution. Lyft just announced elimination of cash payment option for its “bike share for all” program in Bay Area, disproportionately impacting minority “unbanked” households.**

Unintended Consequences

- (Technology) Scooters and e-bike sharing results in injuries and littering of sidewalks (Unint). Seeing scooters as a problem can distract from the root problem—high-speed traffic and urban design that doesn't promote slow speeds and safe scooting

7. Research and Evaluation

- a. Research of new micro mobility technologies: use, equity and accessibility (Innov)
- Substitution research on micro mobility**
- b. Elevate CBPR, CBPA, and PAR Research. Build this through partnerships (Innov)
- c. Relationships with community leaders to be involved with research design (Res)
- d. Wayfinding ... “5 min walk to ...” “10 min bike to ...” Evaluation (Innov)
- e. Food access issues (Res)
- f. Standards of assessing LOS to VMT (Res)
- g. Connecting AT to climate crisis (Res)
- h. Research connecting safety, health and AT. How to ensure safety when increasing mode shift (Res)
- i. Micro mobility—decrease AT, increase injury? (Res)
- j. Comparing outcomes between SHSP in states with more versus less political input (similar to AASHTO centralized v. decentralized DOH measure) (Res)
- k. Measure social isolation, mental health, and opioid crisis (Res)
- l. Evaluate the impact of innovative strategies, Separate each of the different strategies when implemented together, unintended consequences, strategies to address these or prevent (Res)
- m. Quantitative metrics of social and economic benefits of active infrastructure (Res)
- n. Core set of variables that must be collected for each strategy (Res)
- o. Public transportation services to get people to places – health outcomes, costs, etc. (Res)
- p. We know what works but not how (Res)
- q. Evaluation – longer term (Res)
- r. Medical transportation (Res)
- s. Measuring social cohesion (Panel, Bryan Kiel)
- t. Automated vehicles – impact on health and AT**
- u. Research on new micro mobility norms, practices/models and impact on who and how the public is being served.**
- v. A measurement of the value of AT infrastructure on an individual level (i.e. are certain applications more meaningful in certain contexts). A tool to justify infrastructure in rural areas where “counts” are low.**

8. Intersectoral Collaboration

- a. *Rural: build capacity in rural areas that have been brought to urban focus -> coalition at health centers – assessment of bike connections (Innov)*
- b. Courses on public health and the built environment for university students – public health, planning and design fields (Innov)

c. Change language of “poor” and “black” to “low resource” and “people of color,” and “equity.” Colorado uses this type of language but not all federal agencies do. **Use “priority population” rather than “target” in the media for language that does not blame the victim.** (Innov)

d. Define commonly used terms - state DOTs often use the term “equity” referring to funding formulas that balance transportation spending across urban, suburban, and rural communities. More recently, the term has been used to clarify that certain neighborhoods/communities have, historically, lack the same investment and transportation funding. These have typically been communities with high proportions of people of color and low-income residents. (Innov)

e. We need a common definition of “rural.” (Need)
“Frontier” census classification should be included in designations. Others expressed concern with the term “frontier”

f. Convergence partnership (coalition of national funders) with public health as a convener. Think outside the box since the relationship may not be obvious. (Relat)

g. State DOT and DOH and local DOT and county health departments (Relat)

h. Task forces, e.g. Colorado Transportation and Health, organizations from both sides (Relat)

i. Gathering data is good but meaningful projects build collaboration and trust between agencies, e.g. with demonstration projects (Relat), Urban Land Institute – developers should be at the table since they build the environments

j. Health-oriented industries – how to use, advertise, motivate? (Relat)

k. More police on foot/bikes (Relat)

l. Law enforcement traffic enforcement specific to pedestrian/bike safety (Relat)

Must be cautious with involvement of law enforcement

m. Professional orgs can change practice standards and pool resources, e.g., ITE, AASHTO, NACCHO, CNU, the *Manual on Uniform Traffic Control Devices* (Relat)

n. Hospitals - Community health assessments; partnerships can help set priorities (Relat)

o. FQHC Centers and primary care organizations (Relat)

p. Universities, colleges – student analytic projects (Relat)

q. Funders – state departments, foundations (Relat)

r. Census (Relat)

s. Parks – local, state and national (Relat)

t. Business community: Local business owners and chambers of commerce; Big business and their foundations (Relat)

u. Libraries (Relat)

v. Urban Land Institute – access to developers, realtors, architects (Relat)

w. Youth sports organizations (Relat)

x. U.S. Green Building Council (Relat)

y. Cross-sector data partnerships linking how to collect, analyze and disseminate data (Relat)

z. Collaborative of eight national professional membership orgs (Panel, Sagar Shah)

aa. Strategic highway safety plans – include pedestrian, bike, and strategies to reduce injuries and deaths. Four E’s (engineering, enforcement, education, and emergency response), be collaborative, need to move public health more at the table

9. Equity and Inclusion

- a. Wheelchair charging stations strategically located to promote walking and rolling for people with physical disabilities (Innov)
- b. Community walk audits (focus on people with disabilities or a variety of needs) (Innov)
- c. UC Berkeley Anti-Displacement Risk (Innov)
- d. Pittsburgh reviewed crash maps overlaid with community feedback. Low-income high crash areas overlap with low community feedback areas. Planners went to the low feedback areas to understand what they need to advocate for safer streets. (Innov)
- e. With organizations, how to break down silos? (Relat)
- f. National Association of Governors, power at executive level in states (Relat)
- g. School systems (Relat)
- h. Utilities are major land owners (Relat)
- i. Connect advocacy organizations across topics – mobilize justice, disability organizations, equity organizations, arts (Relat)
- j. Border Patrol suggested as resource, but with strong counterpoint from some individuals against their involvement (Relat)
- k. Build the economic case = bipartisan (Relat)
- l. Physical disability (Res)
- m. Who can benefit the most from transportation innovation (Res)
- n. Access to healthcare in rural areas – system wide, chronic depression, active transp. (Res)
- o. Intersection of aging, race, and rural (Res)
- p. Equity considerations in all research (Res)
- q. Multimodal equity (Res)
- r. Equity lens in planning, e.g. Better Bike Share Partnership (Panel, Nicole Payne)
- s. **Charleston, South Carolina offers \$5 bike share for lower-income residents – no smart phone or bank account needed**
- t. **Mobile work stations/vans for city/project staff to work directly in the community onsite, available to answer questions, engage with community**
- u. **Get more automated photo enforcement at state level. It is colorblind and eliminates racial profiling by police.**

Needs

- i. Rural communities are often forgotten in the AT discussion and underfunded. They may only have access to “dumbed-down” urban interventions that do not fit in a rural context. (Need)
- ii. *Groups representing the least advantaged people should be directly involved in solutions and innovations. (Need)*
- iii. We need to consider how to reduce inequity from *Complete Streets* rather than perpetuate it. (Need)
- iv. We need better transportation options because they are so critical for daily living needs. (Need)

v. We need law enforcement to be more community-led. Law enforcement needs systems of accountability to address and evolve from historical bias in policing. *Vision Zero* tends to be very law enforcement-oriented and can hinder buy-in among communities that already have low trust with police. (Need)

vi. *The transportation planning profession is not demographically diverse. We need more inclusive agencies with different perspectives.* (Need)

vii. Connect urban resources to rural communities

Unintended Consequences

- (Equity) Displacement – People of color are pushed to the fringe, who is AT for?
- *Green Gentrification*, e.g. Atlanta Beltline. New infrastructure signals that neighborhoods may be flipped by developers looking to invest. (Unint)
- Over-surveillance and policing of communities of color; Problematic data sharing with law enforcement; Education for police (Unint)
- Our society is aging and we do not typically consider older adults as a key equity group. (Need)
- Equity considerations: Those who can /can't pay. The least taxed often have the greatest need. How to include them? (Relat)

10. Communications and Messaging

- a. Communication/marketing (Relat)
- b. Communication outside of academia about innovations (Res)
- c. There is enough research – create stories from what we have (Res) **Create stories around access, equal access, directed at decision-makers and voters**
- d. Where do you go to find the information? (Res)
- e. Communications around transportation SDOH. Machine learning and AI to understand effective (Res)
- f. Using maps and visual images to help decision-makers envision improvements (Panel, Gretchen Armijo)

Needs

- i. We lack messaging about AT and health that resonates with transportation decision-makers, e.g. government officials, elected leaders, governors, mayors, city managers. (Need)
- ii. *Complete Streets* can come across as “sloganeering.” We need to focus on how to get pedestrian /bicycle infrastructure in place. (Need)
- iii. The health care sector is preoccupied with insurance coverage. (Need)
- iv. Health and other AT advocates in communities often know of countermeasures (e.g. LPI) but do not appreciate the complexity of unintended consequences from specific engineering choices. (Need)
- v. *Data alone is not sufficient in persuading policy-makers. We need to be better at storytelling.* (Need)
- vi. Narratives for translation (Res)

Unintended Consequences

- (Communications) Promotion of one mode, e.g. ride share, can “peel off” ridership for another mode like transit. (Unint)

MOVING INSTITUTIONAL RELATIONSHIPS FORWARD**ANN STEEDLY***Planning Communities, LLC**Facilitator***MARK FENTON***Transportation, Planning, and Public Health Consultant**Facilitator*

Steadly Yesterday, we talked about best practices and effective relationships as well as the gaps, needs, and poor relationships across transportation and health. We also focused on the opportunities to integration—how to get it into the day-to-day. Our goal today is to inform a broad agenda to advance productive institutional relationships. We identified eight themes that emerged yesterday. Our task is to identify where the key work needs to be done. The call to action is: What are we going to do about it, collectively, and what I am going to do about it individually?

Fenton The challenge is not to talk generally about problem, but to talk about concrete solutions. If we’re serious about getting nonprofits involved (think back to the California Endowment presentation), we need to ask what it would take to effectively institutionalize this. Let’s push ourselves to consider what those solutions would look like. Provide a “what, who, how, and timeframe.”

Steadly Mark and I were involved in a North Carolina Context-Sensitive Solutions pilot, and the Tennessee Department of Transportation did peer exchange with North Carolina. We trained 2,500 people. However, practices were not implemented in North Carolina—it had not been institutionalized. Tennessee implemented those practices because they had institutionalized it.

Fenton Another example is Massachusetts, where communities are required to pass *Complete Streets* Policy to make them eligible for special funding stream. Beyond policy, I want to know what is on the ground and that we have data on implementation. We want that level of detail today.

Institutionalizing is superior to recommending: how can we make that happen?

Steadly Facilitators will be stationed at each of the eight topics, two topics at each station, and will write down your comments.

1. Formalize Cross-Disciplinary Agency Expertise and Roles (e.g., MPOs, CHNAs, community health improvement plans Boards)

- Asset mapping with contacts and organizations
- Customer Relationship Management formal handover forms which include contacts for current and new staff
- Multiple people at multiple levels (database main contact)
 - Whose contact, when we last checked in with them
 - Whole matrix of relationships
- Staff rotation between U.S. DOT and CDC (e.g., CDC and Department of Defense)
 - E.g., Six months rotation
 - Personal relationships but formalize the process
- Incorporating health into the Metropolitan Transportation Plan (MTP)/Long Range Transportation Plan (LRTP)
 - Make it a priority
 - Holding a conference on how to do this
 - Committee formalize with health and within the work program
- Health representation on MPO Technical Advisory Committee and Policy Boards and transportation representation on Community Health Needs Assessment (CHNAs) and community health improvement plans (CHIPs)
 - We need to better understand their process and system (e.g. Savannah, Georgia pooled resources to do a population-based survey)
- What is the incentive to make these initiatives a priority and provide resources?
 - Are there high-level policy changes at the federal level? Can we look at together?
 - Health policy at the MPO level/regional planning level with health focus
 - Transportation policy at the county level
 - Human resources to capture collaboration efforts
 - Ensuring annual employment plan steps to learning
 - Expanding knowledge of this area
 - Health not included in the transportation improvement program (TIP)
 - Colorado—health is in the goals of the MTP/ LRTP

2. Federal and State Requirements, Research, and Tools Applied to Daily Practice

- Enhancing and linking transportation and health research datasets
 - Joining the data
 - Enhance your data record with health
 - Childhood Arthritis and Rheumatology Research Alliance (CARRA) – opportunity to link research data
- HSIP –have a health improvement program, with data-driven process and funding attached
- Some way to elevate health in transportation project before it gets built –data-driven
- Child fatality task force, crash injury task force and different professions on that task force
- Health, transportation, and air quality – congestion mitigation funds/plans
 - Look at asthma rates. Pilots with small air quality monitors

- Hospital and ER rates and where they live and nearby transportation facilities
 - Standards for AT and roadway projects with evaluation
- Work with engineers on innovative practices/experiment
 - Barrier is the data – collecting enough data. Doesn't have to be a three-year study

3. Education, Certification, Training: Integrate Across Disciplines

- University: funding for transportation x and health y partnership – move beyond initial champions/ “interdisciplinary”
 - How to integrate/institutionalize
- Certificate programs (and industry interest)
 - E.g., Minnesota defensive driving training – what are key messages?
 - Incorporate public health messages
 - Target state and civil service staff
 - Online driver education
 - Minnesota people-friendly driving curriculum (bike-centric)
- Credential groups merge, disorganized for user, hard to keep up
- Certified Health Education Specialist (CHES)– programmatic focus, not relevant to work
 - Valued within public health
- APHA does not have a huge transportation focus
 - Earn credits at annual meeting
- Health data sets in civic roles
- Goal: work ourselves out of job, eliminate need for stand-alone office (culture change)
- Integrate throughout agency – what does this look like in education?
 - Engineering
 - Standards treated less as gospel, limitations
 - Integrate walking, biking designs into Green Buildings
 - Peer sharing/learning
 - FHWA program: bring states together to tackle a common program; Emulate for transportation and health
 - Workforce issue? Hot topic.
 - Public Health
 - Incorporate into public curriculum, core competencies
 - Public health versus programmatic. Policy, Systems, and Environment (PSE)
 - Injury prevention, physical activity
 - Bike helmets – often polarizing
 - Health in all Policies but need understanding of transportation practices
 - Some states and localities have permanent embedded public health liaison in their DOTs
 - Survives leadership changes
 - Professional development/mobility within and between agencies
- Who are power players in each silo?
- Succession planning – desktop guide for incoming staff, staff departures, retirement

- Reconsider/integrate work differently
 - Job descriptions/roles
 - Incorporate into employee training and evaluation
 - Could increase attendance at TRB, other conferences among state DOT employees
 - Increase training opportunities for public agencies, especially those that are “not in the field”

4. Data Collection and Performance Measures

- E.g., pedestrian crossing not needed because the numbers don’t support it—make sure data tells a story
 - Use common sense and context
 - Revealed preference versus revealed behavior
 - Mismatch with risk/funding/logic to pedestrian projects
 - Needs: Ensure data and context are guidance, not gospel
 - E.g., incorporate performance-based design measures
 - What guidance sticks? How do context connect to goal or outcomes?
 - Accessibility, access need, better resources for health
- Federal support for shift from LOS
 - What do we shift to? (decrease VMT, emissions, etc.). Challenge in providing measures perceived as fuzzy compared to the A-F grade with LOS
 - VMT is elegant LOS replacement because clear relationship to health
 - Missing: how to prioritize people movement?
 - Challenge: gas tax money decreases if VMT decreases – new incentive?
 - We’ve been ignoring this so far
 - FHWA doing studies, grants, but nothing specific
 - States increase gas tax, other taxes to compensate
 - Look for international examples
 - Higher taxes, fees, use LOS?
 - Goals based on safety; better education on countermeasures
 - TRB Interstate study – recommended increase gas tax
 - State budgets – 30% based on VMT
 - Goals: decreased VMT is great for health; political will needed
 - Other measures: safety, goal shift
 - Signalized intersections – resistance and changes to LOS.
 - What to measure?
 - Crossing time? San Francisco increased crossing time citywide
 - Pedestrians “not following the ‘system’” – pedestrian compliance, change signal timing
 - How to develop a new compliance measure?
 - More specific guidance/research on where to change or priority factors
 - *Vision Zero* validates data gaps, needs funding (opportunity)
 - AVs and safety
- Analogy: Traffic modelers and air quality modelers
 - Do not talk to each other, different models, etc.

- TRB did cross-walking data protocol – not just health and transportation project
 - Goal: bring cross-sector data together. Must create demand for data first. Hard to get data from existing systems
 - Do we need to shift our metrics to tell the story – Do we need compliance for story
 - Crash injury: Creating surveillance system based on general health surveillance system
 - Need to figure out performance measures, work with state health departments and DOTs
 - Minnesota: Spatial analysis and identified common characteristics of pedestrian crashes, also added destination, priority populations
 - FHWA Safety Data initiative – Risk (not just waiting for FARS). Can risk be a warrant, instead of x fatalities?
 - Wouldn't include trips because unsafe routes (privilege of choice)
 - Lack exposure data (tie to safety goals)
 - Challenge of safety vs other priorities
 - Need data on socio demographics to address equity, gaps
 - Use to prioritize, engage with stakeholders
 - Rural equity: numbers aren't there, assessed by standards for larger communities.
- Context and narrative
- Physical activity: trails use shoulders but don't appear in any data
 - Design manual says context-sensitive
 - Traffic calming: what speed are you designing for?
 - Trying to create AT division – slow process
 - Minnesota Office of Transit and AT
 - Who can access state DOT data?
 - States can add AT to the Behavioral Risk Factor Surveillance System (BRFSS) – how many do this?
 - “We don't own it, we don't have it, we don't care” – data needs for AV testing
 - Challenge: collecting data for AV testing
 - Network data would help understand gaps

5. Incorporating Health and Equity into Local and/or Regional Infrastructure Projects, Prioritization, and Programs

- Prioritizing with fatalities data. Local transportation planners and engineers, traffic incident data (law enforcement), health department (epidemiologists), equity stakeholders (local)
 - Data-driven decision-making (beyond performance measures) that includes US DOT, state DOTs, MPOs, and local health departments
 - Quality of Life data
- Installation of crosswalks and/or yield to pedestrian control
 - Crash priority locations or a study
 - Local engineering/department of public works/ transportation/state DOT (funding)
 - Require staff training/ technical assistance
 - Nonprofits, smaller communities

- Educate local transportation planners and policy-makers on how to set project goals that reflect criteria
 - Health and equity – Quality of Life measures
 - Nonprofit or agency creates campaign on transportation and health
 - Engage populations, underserved or with needs
- Context-based project planning
 - Including state-owned roads as “main streets”
- Standardizing health and equity metrics
 - CDC, U.S. DOT, Transportation and Health Tool
 - SDOH and chronic disease

6. Engaging “Difficult” to Engage Partners/Stakeholders (e.g., utilities, emergency responders, schools, underserved populations)

- Engage local disability community
- Creating a who’s who of transportation and related contacts, transportation process for stakeholders
 - Understanding stakeholders and how to meet them where they are
 - Performance measures for community
 - Creative outreach (e.g., get on bus, serve food)
 - Share best practices
 - Small, nonprofit
 - MPOs and planners
 - Federal aid qualified health
 - Health and advocacy groups
 - TRB public involvement committee
 - Approach health departments
 - Community health workers and clinics
 - Tie to funding requirements
 - NEPA check boxes, revisions
 - Context-based outreach and planning
 - Defined by demographics and beyond census

7. Leverage/Empower Nongovernment Partners

- Collection of data and case-making can be done well by partners
- Technical assistance systemization at federal level – long-term technical assistance versus episodic
 - Technical assistance to activate
 - Train-the-trainer program to build capacity
- State-level DOT – data available and accessible
 - Allow public to comment on data performance measures
- Funding periods are so short – two round funding process show PSE change
- Structure and formalize multi-agency collaborations
 - Update curricula to reflect

- Charge an organization with stakeholder/organization/partner identification and workgroup establishment—prioritization of partners
- Graduated granting and technical assistance processes – require health and equity
- Process broadly require asset mapping and technical assistance framework (proof of concept by state or federal)
 - Bottom up planning process

8. Connecting Land Use Stakeholders and Land Use Decision Processes

- Plain language explanations as corresponding document or as plan itself – requirement
 - Requirements to enforce private sectors requirements about what happens with document
- Community-centric planning required from beginning, not reflective activities
 - E.g., local community boards – who appoints boards? Equitable selection process-election codified process.
 - Empowerment not engagement
- Intermediaries that prevent unintended consequences
- Documenting transit needs at community level – identifying trade-offs
- Time
 - MPOs and Council of Governments redefine community engagement
- Community-based organizations as intermediaries for who is representative
- Determine selection of community health boards - democratization
- U.S. DOT – non-formula funding is available, recipients are used to using funds the CDC gives them. They don't understand how they work.
 - How are transportation dollars really spent and selected?
- NGO partners do understand and could be partnered in

Meehan introduced herself and outlined this session, which contained three parts. The first portion had four lightning round presentations with Chanam Lee (Texas A&M), Yochai Eisenberg (University Illinois, Chicago), Ted Mansfield (RSG), and Binbin Peng (University of Maryland). Then the next part was discussion with the audience. The last portion included speakers from a state DOT, Ana Ramirez Huerta, and the FHWA, Victoria Martinez. After the session, participants were invited to place dots on research questions written on sheets of paper that had been identified in the *NCHRP Research Roadmap for Transportation and Public Health*, the *E-Circular 239: Arterial Roadways Research Needs and Concerns*, and research ideas that had emerged from this conference.

HEALTH BENEFITS OF TRANSIT USE: PRELIMINARY RESULTS FROM THE ACTIVE EL PASO STUDY

CHANAM LEE

Texas A&M University

This is part of larger 5-year NIH grant to look at the impact of BRT on physical activity and other health outcomes. We've been talking about the importance of interdisciplinary collaboration and with the partnerships on site in El Paso. This made this research project a reality. The motivation came from the fact that we have been making a link between the environment and AT, but to make that final step to the causal impact, there have been a lot of barriers. There have been opportunities for natural experiments to help tackle this issue. Through causal investigation, we have been able to tackle some of the mediating effects; for example, perhaps low-income people are not able to live in highly walkable areas, and therefore their walking levels might be lower than others. Another example is the moderating effect of older adults with cognitive and physical decline; if you live in a walkable area, the impact on the ability to remain active might be lower. Those are true relationships and pathways that we have not been tackling enough because of our inability to do randomized control trials. We can't randomize where people live or randomize where there are sidewalks interventions.

These natural experiments came into our agenda as something feasible and exciting. While the researchers don't have full control, there are plenty of full natural experiment opportunities ranging from policies to small and large changes in the environment. My team has been working on two types of natural experiments. One is relocation, where we follow people who are moving from an auto-oriented to a pedestrian-oriented environment. That project is currently going on and we are finishing up our fifth year in Austin. The other is the current project that I'm sharing today, *Active El Paso*, where people remain in their current neighborhood but new things come in. I've seen other projects looking at the impact of grocery stores, playgrounds, or trails. For us, it's BRT. Our motivation comes from sedentary living and continued high rates of obesity and related disparities. There is growing evidence that transit can be an interesting and multifunctional way of promoting physical activity, especially for those who have limited access to mobility options. For those suffering from high rates of obesity or physical inactivity, it can become an appealing option for being active.

Despite the potential, the use of public transportation remains low at 5%, but is a little higher for the Hispanic population. BRT is growing in appeal to lower density metropolitan areas compared to other types of mass transit, and it seems to have stronger potential to be more feasible. BRT has flexibility and cost benefits of the conventional bus system but also brings the capacity, speed, and reliability of light rail. It seems to be optimal choice for cities like El Paso; moreover, working with train engineers, synchronized traffic signal times can cut for travel time. The first pilot line shows high ridership and a large percent of new users who had converted from car use, about one-third. That got us enough initial evidence and motivation to move this forward. They opened the line when we were writing the proposal. They just opened in the fall 2019 with 51 stations and a 25 mile-long corridor. We designed a pre-post case comparison design and have just finished the baseline data collection. Currently, we are working on the first follow-up. We were facing challenges in recruitment, but now retention is an issue. Here's our data for the survey and the objective measures, including data from the GPS, accelerometer, and the travel diary for 1 week (Figure 42).

Transit users walked significantly more than non-users, especially for transportation purposes; they also have more moderate and vigorous physical activity. There is no difference between body mass indexes (BMI). The results also show that we have potential health-related outcomes in terms of transit use, moderate to vigorous physical activity, AT, and social interactions. There were some significant group differences; i.e., social interaction benefits were greater for older adults and certain physical activity seemed to be greater for non-Hispanic whites. Younger adults also had more social interaction benefits.

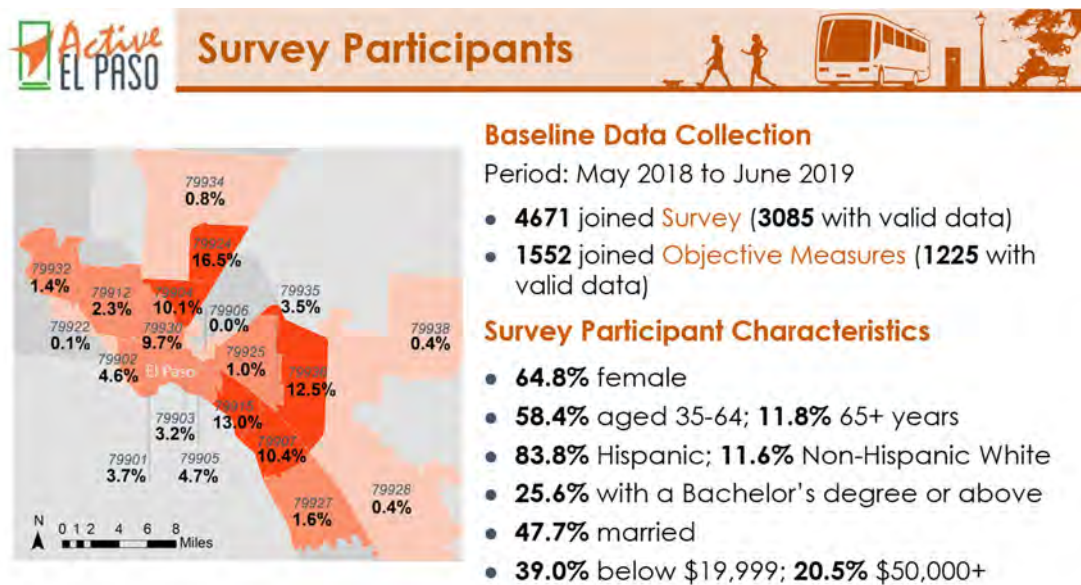


FIGURE 42 *Active El Paso* survey data.

ARE COMMUNITIES IN THE UNITED STATES PLANNING FOR PEDESTRIANS WITH DISABILITIES? FINDINGS FROM A SYSTEMATIC EVALUATION OF LOCAL GOVERNMENT BARRIER REMOVAL PLANS

YOCHAI EISENBERG

University of Illinois at Chicago

I'm in the Department of Disability and Human Development at the University of Illinois at Chicago. There have been a few mentions of designing streets for all users, so one of the recommendations is to design for streets for all ages. With older adults, we are also talking about disabilities, as people age into having a disability. Today, we are going to look at this from the implementation side and what's going on in terms of implementation. Are communities planning for people with disabilities?

We are focusing on barriers that pedestrians with disabilities experience in the public right-of-way. These barriers affect people's access and community mobility as they try to travel. Further, this restricted access affects participation in important health-promoting activities, such as the ability to get to the fitness center, walk around a neighborhood, and to access food. This is all part of the first-last mile. The issue is that these barriers are not going away and local entities

need to deal with them. Partly, because it's the law. The 1990 Americans with Disabilities Act, Title 2, requires local entities with more than 50 employees to address this issues and anyone in charge of roadways to deal with these issues. Several large lawsuits highlight the enormity of problem. There was a case in the city of Sacramento in 2002 and one in the city of Seattle in 2017. There's a project called *Project Civic Access* (32) that is run by the Department of Justice that has developed 221 settlement agreements in every state in the U.S. This inspires nearby entities to act because they don't want to have a lawsuit filed against them.

The template to address such issues is called the *American with Disabilities Act Transition Plan*, which has been a requirement for long time. In 2015, there was stronger push from the USDOT to the states, requiring them to have plans and enforce this at a local level.

Our goal was to look at Americans with Disabilities Act (ADA) Transition Plans. They provide an understanding of current conditions through an inventory of facilities and lay out a plan for improvement. How are these barriers going to removed, when are they going to be removed, who is responsible, and what are the priorities for public participation? Our research questions were first, what is going on? What proportion of communities had a plan? What was the quality of the plan? Having a plan doesn't mean it will be implemented and effective. What do they tell us about pedestrian environment accessibility?

We developed an audit tool with an expert panel of engineers, planners, architects and lawyers. We got a random sample of local public agencies around the country, based on the 2012 Census of Government. We did a descriptive analysis of how they met the requirements and what were the quality indicators. Only 13% of the sample had an *ADA Transition Plan* available, but only seven of those 54 actually met all of the requirements for an *ADA Transition Plan*. Some examples of quality indicators include: targeting outreach to people with disabilities—it's important, but often not done by all the plans; and identifying funding sources—how can it be effective if funding isn't identified? Other indicators involve plans monitoring progress, or signing the plan into an ordinance so it can be accounted for.

Further, in terms of understanding the level of barriers, these are important data sources; those that are done well report on those barriers. Forty-eight percent of sidewalks still have barriers, 65% curb ramps have barriers, and 50% of traffic signals have barriers (Figure 43). Our next steps involve wrapping up interviews with ADA coordinators. We're learning lessons about the role of the state DOT to put pressure on local agencies. Indiana is good example of putting on pressure and providing resources for training in order to make those plans. We are looking for examples where *ADA Transition Plans* are integrated into other kinds of plans, such as transportation plans and pedestrian plans, so they are not seen as another thing to do. We are starting to use *Google Street View* to monitor change over time. For the field as a whole, these plans represent interesting data sources because they collect microscale data. They sometimes

	mean	sd	min	max	number reporting
Sidewalks	48%	30%	11%	80%	9
Curb ramps	65%	23%	7%	100%	23
Traffic signals	50%	30%	15%	100%	6

FIGURE 43 Percentage of Public Right-of-Way, PROW, with barriers.

use different machines to roll on the sidewalks and collect data on the cross-slope and so on. There are opportunities for crowdsourcing the gathering those data. Eventually, we hope to see how barrier removal leads to health impacts—are people being physically active—can we trace that back to barrier removal?

QUANTIFYING THE HEALTH IMPACTS OF TRANSPORTATION INVESTMENTS TO SUPPORT ROUTINE TRANSPORTATION DECISION-MAKING: A CASE STUDY IN RALEIGH, NC

THEODORE MANSFIELD

Resource Systems Group, Inc.

I'm a data scientist with RSG. I'll present a case study application of integrating a health impact model into a travel demand to support routine transportation decision-making in Raleigh, North Carolina. The premise of this presentation is, can we retool our current tools to address health? By "our" tools, I mean those that we use to forecast travel, like travel demand models. Fundamentally, a transportation–health impact model must begin with some behavioral predictions. There is a change in built environment and we infer a change in behavior. This can take various forms. It can be built into the model itself by applying an elasticity from the literature, such as an increase in the sidewalk network by x% and then see a y% increase in walking. They can be user-specified; for example, we expect to see a 10% mode shift and what the health implications of that are. They can also be outputs from other models, such as a travel demand model. There are previous applications, and they often use aggregate results, such as per capita walk trips, as the behavioral change.

The innards of travel demand models can provide more disaggregate behavioral information to support health impact modeling. A model is made up of smaller sub models that are chained together, creating a picture of travel that is sensitive to land use change and population over time. For example, a mode choice sub model describes whether you choose to walk, bike, drive, or take transit on any given journey. We see in the mode choice model that the yellow cells are the physical activity-affected cells (Figure 44). There are many details inside these models that have health implications.

In Raleigh, we assessed a number of future development scenarios in the context of a long-range planning effort, which included a highway expansion, congestion pricing, transit-oriented development (TOD), and smart mobility hub (i.e., transit villages) scenarios. We ran the regional travel model, but we preserved the intermediate steps. We left them disaggregated and then aggregated them before putting them into a traditional population attributable fraction model. That's a traditional health impact model.

As illustrated in Figure 45, the highway scenarios in general are lower with some isolated increases in walking. But the most interesting case is the congestion charging scenario, which shows an increase overall, given that automobile travel is more difficult in this scenario. In the TOD scenario, we see increased walking in densest part of the region where transit investments were focused and in the mobility hub we see increases in walking in the isolated transit villages. We can feed those into the health impact model and we see a similar spatial pattern. We see an interesting spatial dynamic because we able to do this at a disaggregate level.

The innards of travel demand models can provide disaggregate behavioral information

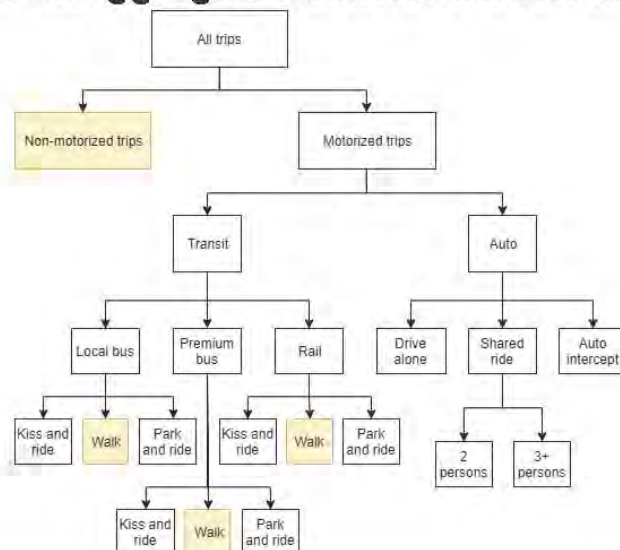


FIGURE 44 Travel demand models.

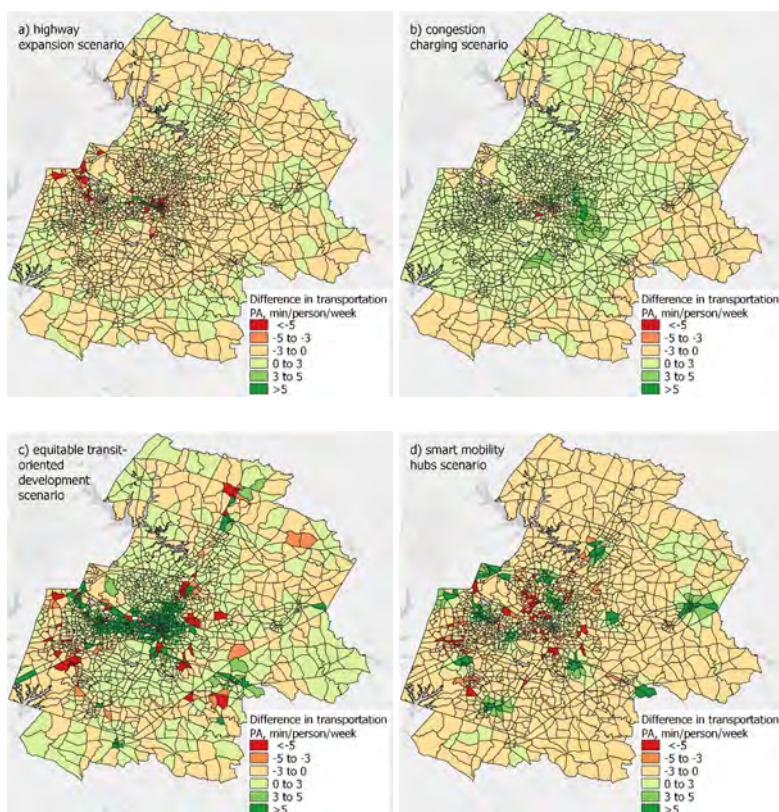


FIGURE 45 Future development scenarios, Raleigh, North Carolina.

The integration of our current modeling tools with a health impact model is useful because it allows direct comparison with other cost-benefit post-processors. The same model results also fed into traditional transportation metrics. In the public materials provided as part of the ongoing phase of this planning effort, these health metrics sit alongside things like the highway performance measures used in traditional planning process. By using these models, we can also think about a wider range of potential scenarios. We looked at tolls and transit service quality, which may not be established in built environment literature. Using these in-practice tools we can get a wider range of behavioral things to consider. All models are wrong but some are useful—we need to remember that. We have to be careful, especially with active modes, whether or not the model is designed for that purpose, how well is it capturing those behaviors, and how sensitive the model is. The larger point is, once you have done the integration, any improvements of the model in those aspects will improve the rest of the analysis. Future directions are promising. There are a lot of new open source, modular software models now, like GitHub and Python to do travel demand modeling. Passive data may help improve the sensitivity of travel models to built-environment factors, although we're not sure yet.

ESTIMATING HEALTH IMPACTS OF ACTIVE TRAVEL BEHAVIOR USING AN INTEGRATED TRANSPORT AND HEALTH IMPACT MODEL: PRINCE GEORGE'S COUNTY IN MARYLAND

BINBIN PENG

University of Maryland

I'm from the National Center for Smart Growth at the University of Maryland. I'm funded by the Maryland DOT (MDOT) and the Maryland Department of Public Health (MDH) and we are working on quantifying the health benefits of active travel behavior. Today, I'm presenting a case study we did for Prince George's County, Maryland, using an integrated housing and health impact model. We are living in automobile-dependent, urban transportation systems that lead to tremendous health problems. There is support for AT improvements. Residents in Prince George's County specifically are faced with a high risk of obesity and cardiovascular diseases associated with lack of physical activity. Given the well-established "active travel - physical activity - health outcomes" causal chain, we think it is important to model it and quantify it to help assess health benefits of active travel. Meanwhile, state and county-level agencies, such as MDOT, MDH, DPW, and Department of Parks and Recreation are all in need of assessing the benefits of policies, plans, and projects for supporting AT. In addition, the literature shows a growing trend of estimating health benefits of active travel at the disaggregated level. Therefore, we did a case study in Prince George's County (Figure 46).

This model considers the health impacts of AT through three major pathways: physical activity, air pollution, and road traffic crashes. We collected Prince George's County specific data in these three major areas and used the same model as the previous speaker, the *Population Attributable Fraction Model* (33), to capture the percentage change of the relative risk in exposure-weighted disease risk from the baseline scenario to a future scenario. In the formula, the harm is the relative risk of the health outcome at given exposure level and the exposure level can mean different things for different aspects. The change in the burden of

- PAF is a percent change formula: relative change in exposure(x)-weighted disease risks from baseline distribution, P, to alternative Q:
- $$PAF = \frac{\int_{x_{min}}^{x_{max}} RR(x)P(x)dx - \int_{x_{min}}^{x_{max}} RR(x)Q(x)dx}{\int_{x_{min}}^{x_{max}} RR(x)P(x)dx}$$
- RR is the relative risk of the health outcome at a given exposure level, x
 - For physical activity, exposure x, is the hours per week spent in walking, bicycling, and all other physical activity
 - For air pollution, exposure x, is the ambient concentration of fine particulate matter (PM_{2.5})
 - For road traffic injuries, exposure x is the miles traveled by parties to a collision
- $\Delta BD = BD \times PAF$
- Health outcome measure: Disability Adjusted Life Years (DALY)
 - Years living with disability + Years of Life Lost due to premature death

FIGURE 46 Population attributable fraction equation.

disease is the multiplication of the baseline burden of disease and fraction formula. In this model, the health outcomes are measured by *Disability of Adjusted Life Years (DALY)*, which is the sum of years living with a disability and years of life lost due to premature death.

We found that active travel brings tremendous health benefits even considering traffic crashes and air pollution. However, in some scenarios, the negative effect—that is, death—brought by crash almost negated the health benefits from active travel and associated physical activity. So we built three “what if” scenarios for Prince George’s County (Figure 47). In scenario one, we assume people walk one mile a day on average, keeping everything else constant. In scenario two, we assume people bike 1.5 miles per day on average, and in scenario three, we assume people walk one mile per day plus a have a reduced car VMT in the entire environment. We observe significant health benefits in all three scenarios. In scenario one, if everyone walked one mile per day, we would reduce 24 deaths in the entire county and have a corresponding three DALYs avoided. If we assume that people bike 1.5 miles every day, we would reduce four deaths in total. Why does biking more have fewer deaths than walking more? Because this model considers the risk of being hit on the road differently for pedestrians and cyclists. We infer that it is more dangerous to bike than walk.

Change in Disease and Injury Burden, Scenario = 1		Source of Benefit = 1				Scenario = 2				Scenario = 3			
Disease Category		Deaths		DALYS		Deaths		DALYS		Deaths		DALYS	
Source		PAF	N	PAF	N	PAF	N	PAF	N	PAF	N	PAF	N
1-Both	Cardiovascular disease	-0.050	-35	-0.071	-754	-0.011	-8	-0.022	-235	-0.050	-35	-0.071	-755
2-PA Alone	Cardiovascular disease	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0
0-PM Alone	Cardiovascular disease	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0
PA(adl)	Cardiovascular disease		-35		-754		-8		-235		-35		-755
PA	Diabetes	-0.059	-5	-0.079	-283	-0.014	-1	-0.025	-88	-0.059	-5	-0.079	-283
PA	Dementia	-0.016	-4	-0.022	-72	-0.002	-1	-0.003	-9	-0.016	-4	-0.022	-72
PA	Depression	0.000	0	-0.041	-126	0.000	0	-0.014	-43	0.000	0	-0.042	-126
PA	Colon Cancer	-0.018	-0	-0.025	-9	-0.004	-0	-0.006	-2	-0.018	-0	-0.025	-9
PA	Breast Cancer	-0.021	-1	-0.026	-29	0.000	-0	0.000	-0	-0.021	-1	-0.026	-29
PM _{1.5}	Lung Cancer	0.000	-0	0.000	-0	0.000	-0	0.000	-0	0.000	-0	0.000	-0
PM _{2.5}	Respiratory Diseases	0.000	-0	0.000	-0	0.000	-0	0.000	-0	0.000	-0	0.000	-0
PM _{2.5}	Inflammatory Heart Disease	0.000	0	0.000	-0	0.000	0	0.000	-0	0.000	0	0.000	-0
PM _{2.5}	Acute Resp. Infections	0.000	-0	0.000	-0	0.000	-0	0.000	-0	0.000	-0	0.000	-0
	Sum of Above		-45		-1272		-10		-378		-45		-1274
RTI	Road Traffic Injuries	0.555	21	0.445	961	0.150	6	0.145	313	0.628	24	0.502	1,086
	Net		-24		-310		-4		-65		-22		-185

FIGURE 47 “What if” travel scenarios in study.

In the end, we hope this study can give information to decision-makers to help them prove the investment of AT. It is critically important to think about how to improve the road environment while encouraging people to walk and bike. HIAs should be part of the planning process. Urban design should be multimodal, accommodating non-motorized modes.

QUESTIONS FROM THE AUDIENCE

Moderator Meehan invited the panelists to the front of the room for questions and dialogue.

Audience I'm still confused about our capacity to model transportation behavior. Sometimes it sounds like we have a lot of models and sometimes they sound like they are terrible. Are these accurate models?

Mansfield It's an emerging criticism of the travel demand modeling community in general. It is true, when validated, transportation demand models don't perform very well. However, they are being used in practice to support a wide range of decisions; they underpin most of the decisions of MPOs. There is a pragmatic argument that, in the current decision-making paradigm, health is not there. Is it better to not have it in the conversation or is it better to use these imperfect vessels to get health into the decision-making process? I generally agree with the criticism of the models and I hope they get better, but there's also a pragmatic side of where we can interface in the process.

Audience I want to make a plug for another area of research. I want to focus on how health can impact transportation or how health concerns can impact travel behaviors. One implication of that would be to improve travel models in practice. There is evidence that people who walk or bike sometimes consider health as a benefit to them, so maybe there is some self-selection bias that we need to consider. I think it's useful for informing our interventions to consider the degree to which we consider physical activity or not, maybe there is an education component. The degree to which safety issues are barriers or concerns about policing are a barrier can also influence those interventions.

Mansfield I agree. Even if the travel model doesn't consider those factors now, if we get a better idea of self-selection, for example, we can then get those individual characteristics into the travel model. Then any health impact model built on top of it will be more sensitive to those pathways. Building that linkage now is a pro-active way to be ready for when that research is done.

Lee Another thing is exposure. Exposure measures seem to be available at an aggregated level, so personalized monitoring of exposure is important but challenging. The intermediate aspect is important. Some of the AT outcomes become insignificant when considering attitudes and safety perceptions—sometimes the environment influences the safety perception and therefore the active travel outcome. The direct paths sometimes disappear when controlling for intermediate outcomes. These are good points that help us determine where to intervene, is it here or there? Interventions need to be specific and when we have direct and aggregated model, we may be intervening where it's wrong or not a high priority.

Audience Last time I was here, one of my presentations was about an aggregated ITHIM and I pointed out that we needed to get below the MPO level. In using for RTP setting in particular, all those relative risks are incredibly sensitive to personal attributes. It's less about the travel part, and more that we don't have the population knowledge of where people will be and what they will look like in the future.

Mansfield From the travel modeling perspective, there is increasing use of activity-based models, which are more schedule-based on an individual level. In these models, the population is synthesized, and statistically representative of the real population, but you have individual travelers who have characteristics that can be linked back to the behavioral and health literature. Part of it is getting over the hump of building this disaggregated tool set and making sure we are linking in the right place. Both travel and health modeling can grow together by building connections earlier.

Peng The model we used, ITHIM, was a data-hungry model that required 15 input data items from different aspects including environmental, social, and economic data. Some of these data was aggregated into age and gender to maximize the ability to capture different attributes from different persons. The crash data we collected was processed by facility type and by severity of crash. No models are perfect, but we are maximizing the rationale in a process. We call it a model, but it's some mathematical equations to justify and linking the social aspect together in an organic way. We are playing with mathematic equations every day. For example, when you get on a scale, you are using your mathematical mind to think about your weight loss or gain. I believe capturing the personalized attributes is an important thing to think about in the future.

Lee The aggregated level for transportation demand modeling or mode choice is one thing, but for promoting active travel, you need the next level of detail. Even to promote transportation walking, different environmental attributes come into play. For promoting children walking to school, the evidence on land use mix in goes in a different direction. Primarily residential neighborhoods are better for children walking to school, versus mixed use, which is better for the general population. The context is another level of challenge. It's the next level that we acknowledge as a challenge. How do we go from here to streamline policy and modeling applications to be plugged into something regional or at a massive level is another thing to think about.

Audience In this research, one of things I think about is the issue of dosage. When we talk about health impacts, there is a threshold or dosage that tilts to those impacts. I'd like to know how those are accounted for. Secondly, as an environmental psychologist, I wonder about the flipside of the demographic distribution and population characteristics. How have you taken into account the environmental characteristics that promote health effects, such as views, aesthetics, vegetation type and density? Walking on a concrete sidewalk versus walking in a vegetated landscape maybe have different effects on health. Are those things you are thinking about?

Mansfield One of the issues is sensitivity to these factors. It would be wonderful to include microscale factors into a behavioral model of travel across a region. The research is not quite there yet. I'm not sure we understand those pathways well enough to model them across a

population and I don't know whether those data are available across the region. To speak to the dosage question, my model focused on physical activity as health impactful measure. I used a meta-analysis on transportation and physical activity that describes the dosage-response function across a range of physical activity levels, controlling for all other factors, such as physical activity in other domains and individual characteristics. That's the status of the epidemiological literature. The response is to do probabilistic modeling where there are uncertainties around those functions. If I were to take the same model and simulate it a thousand times, we would draw a different value of risk assessment function and we would get a probabilistic estimate. Whether that's useful for decision-makers is another question. There's potentially some modeling tools can be used.

Lee That points to another missing discussion. The stress reduction and mental health effects of walking. I'm doing some pilot studies on pedestrian health related to exposure to nature, and also controlling for other negative exposure outcomes. I'm coming from landscape architecture, which is a field that tends to pay more attention to aesthetics and landscape elements. Sometimes the dose is not enough. It's not easy to apply that concept in the built environment, but maybe the sidewalk is not the right dose. Maybe we need a sidewalk and shade or sidewalks and protected crossings. There might a package of attributes that make up the right dosage for changing behavior patterns. That level of discussion is something I feel I should be looking into, and get more input from others in landscape architecture and other disciplines.

Audience In the spirit of disaggregating our analyses and plugging research ideas, I want to encourage us as we go from an aggregate level to smaller spatial geographies, to have an overlay of equity. This is a real opportunity, if not a mandate, to look at the distribution of benefits. My mission is to take blanket statements, like cycling is good for health, and ask, is it good for everyone? There's research that shows that physical activity outweigh the injury and pollution exposure risks, but different populations are cycling in different types of environments. How in your modeling work have been addressing equity or where do you see the opportunity for it?

Mansfield I agree. One of the powers of disaggregation is the ability to look at those populations. In my application, the model is disaggregated that households are grouped into market segments and they are divided by income and vehicle availability. To the extent to which the population you want to consider is a low-income zero-vehicle household, the model is able to look at that. However, if factors are not in how the model is segmented, they are jumbled up into the market segmentation of the model. The North Carolina Capital Area Metropolitan Planning Organization in Raleigh was interested in this question. In the materials we presented to the technical steering committee, they did have equity breakdowns of all the measures, not just the health measures, so to the extent we could, we disaggregated them to communities of concern.

Eisenberg Populations of older adults and people with disabilities are a key population to examine, especially in low-income communities, where the rate of disability is higher. We need to think about inputs into the model but also the outcomes. *Disability Adjusted Life Years* as an outcome has a conflict in populations with disabilities and the disability literature. How to model for the people who have disability already? What are the potential interventions that would prolong their life or help them live a more healthful life?

Lee For transit, we talk about the concept of captive users; they are especially vulnerable. Dealing with equity at these different spatial perspectives, we need to dig into the reasons behind it. Some of the populations that we work with we see attitudinal and cultural barriers that are different from other groups. For example, some cultures call the school bus the “loser cruiser.” We once talked with a local population in El Paso about the health benefits of walking and their first response was, “I have a car.” That was the reason they are not walking. A negative connotation of AT may be different or differently impact population segments. We should think about the deep roots and factors that underlie the expressed disparities.

Audience There is a difference between transportation modeling and health impact modeling. There are strengths and weaknesses in both parts. Health impact modeling is based on robust epidemiological evidence that provides dose-response functions for multiple health outcomes. Health impact modeling for transportation is mostly focused on air pollution, physical activity, and traffic incidents. On air pollution and physical activity, we have non-linear dose-response functions that give us more certainty in the assessments. Unfortunately, the available dose-response functions for air pollution and physical activity often comes from a healthy adult population who are mostly between 18-64 years old, so many populations are left out of this assessment, like children, or those with some health issue. Quantitative health impacts assessments on transportation are not reflecting the reality and needs of society.

Moderator Meehan Meehan thanked the panelists and introduced Ana Ramirez Huerta from the Texas Department of Transportation.

HEALTH IN TRANSPORTATION: ACTIVE TRANSPORTATION

ANA RAMIREZ HUERTA

Texas Department of Transportation

Today I will talk about research needs and opportunities when thinking about health and transportation. As a DOT representative, I will talk about what is useful for practitioners. I want to talk about the end cycle of research, which is research dissemination.

For a practitioner, easy access to up-to-date comprehensive research equals time savings. For dissemination strategies, three words come to mind: **economies of scale**. From a practitioner’s perspective, I want to be able to access more research, at a larger scale, with fewer documents: research in bulk. What does that look like? It doesn’t look much different than the *Research Roadmap* we heard about here. How can we get an overview of the state of the literature, which could be in the form of synthesis statement, meta-analyses, or literature reviews? I can look at one meta-analysis that may contain findings from 400 published articles. On the question of whether it is replicable or representative, let the practitioner hone in on specific articles within that literature review that may be more applicable to their geographic location. Those documents become *a road map*.

The other thing is this idea of repository or a one-stop shop. Could we have a repository online where we have an overview of research documents and also include tools, performance measures, and surveys? I’ll touch on survey tools. From a DOT perspective, we ask what is health? As was said yesterday, the community is context expert—they know what health means.

I need to create a survey instrument to ask people how they define health, what their health priorities are, and what their health concerns are. I reach out to my local governments, nonprofits, and MPOs. We have focus groups and tap into our local AARP to develop survey instruments. Had I been able to access a repository, I would have asked one of you: do you want to increase your sample size? I'm trying to implement this great survey you've developed. That is real synergy between practitioners and researchers.

For research topics, I want to talk about how we fund AT. It's important because that affects what's on the ground and that affects health outcomes. Projects get funded through a competitive call for projects at the federal, state, or local level. As part of these, you always have a benefit-cost analysis. When you monetize benefits, you have average positive impact multiplied by the number of users. But we don't have a good sense of how to estimate number of users. We have a disconnect by order of magnitude between what we used as research estimates and data collected on the ground. We collected 14-day temporary counts—we have 300 of those, we have six permanent counters and have done many other things. We bought everything we can and we still can't figure it out. If we can't figure out the number of users, we can't estimate the benefits that will fall into the benefit-cost that will affect my travel demand model, which will affect my funding, which will affect my infrastructure, which will affect health outcomes.

Another issue is that we have to expand upon the benefits we are estimating. Typically, we estimate for emissions reduction, volatile organic compounds, and nitrogen oxide (NO_x), but we have not captured health benefits. We need to quantify those and incorporate them. I want a meta-analysis that tells me the average BMI reduction, so I can use my count data and multiply it by *something* so I can make the case for the following: first, the need to collect more data; and secondly, the need to continue to fund AT because it affects health. I'm not doing a good job of making the case at the MPO or DOT levels.

Another research opportunity is around seniors and AT. In Figure 48, this is a segment where we could see increases in adult bicycling trips, which hasn't been explored enough. Lots of people bike when they are young, but when do they re-enter the biking community? What were the experiences that led them to re-enter? If we knew this, we could increase bike trips.

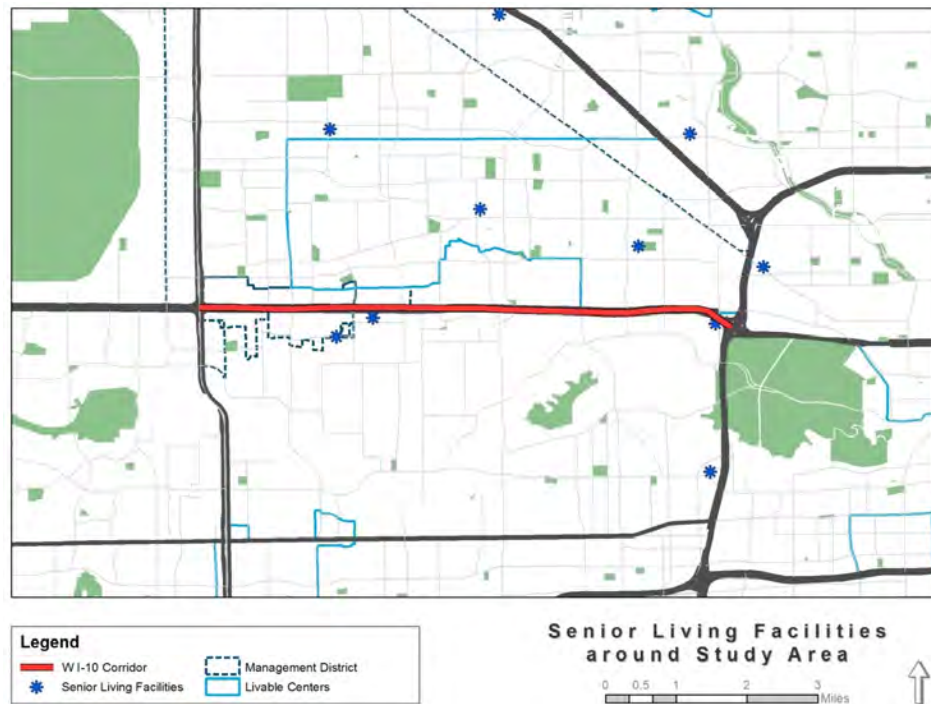


FIGURE 48 Senior population around 110 West Corridor–Houston, Texas.

Like Jeff Lindley said yesterday, it's important to integrate health into what we already have instead of having another process. Whether we like it or not, we have travel demand modeling and we have planning studies. We had a planning study of the Interstate 10. It's very wide and a very busy interstate. South of I-10 is a high-income community and north of I-10 is a lower-income minority community. The health data has been incorporated for the first time with our health partners in the city health department, which links higher percentage of obesity and higher percentage of sedentary adults associated with these lower-income groups and minorities. The reason we chose this area is because there have been three studies of the same area in four years. None of these planning studies looked at hospitals, clinics, or community centers. If we don't look at them, then we don't consider them as origins or destinations. We don't look at accessibility or how those services perform for those vulnerable populations. We have census data at the tract level and that's how far planning studies go. In this area, we have seven senior living centers, which were not talked about in those previous studies, and again, not looking at them as origins or destinations. Planning studies are a place where we can incorporate health quickly. The outcomes are projects that are part of the project pipeline.

We are rethinking the way we participate. At project conception and scoping (Figure 49), the community is coming up with ideas of what they need and we co-initiate the project. We guide a core group of people through the process. In the planning and funding process, we translate those needs into the goals of long-range planning and the evaluation criteria for the TIP, so we tap into institutional goals to make them fundable. We received six million dollars to work with this group on planning and evaluation. We carried them through the planning, design, and evaluation process. It's not the nonprofit leaders or directors, but members of the community. When you bring the community along, it becomes a capacity-building exercise for them. The community is empowered. They know the transportation process, how to get funding, and know how to lobby. In terms of equity, at the MPO we have geographic data layers to overlay on environmental justice areas and we value any layers for senior living and clinics. But we don't have a good handle on equity between rural and urban areas. There is no transit and less funding in rural areas overall.

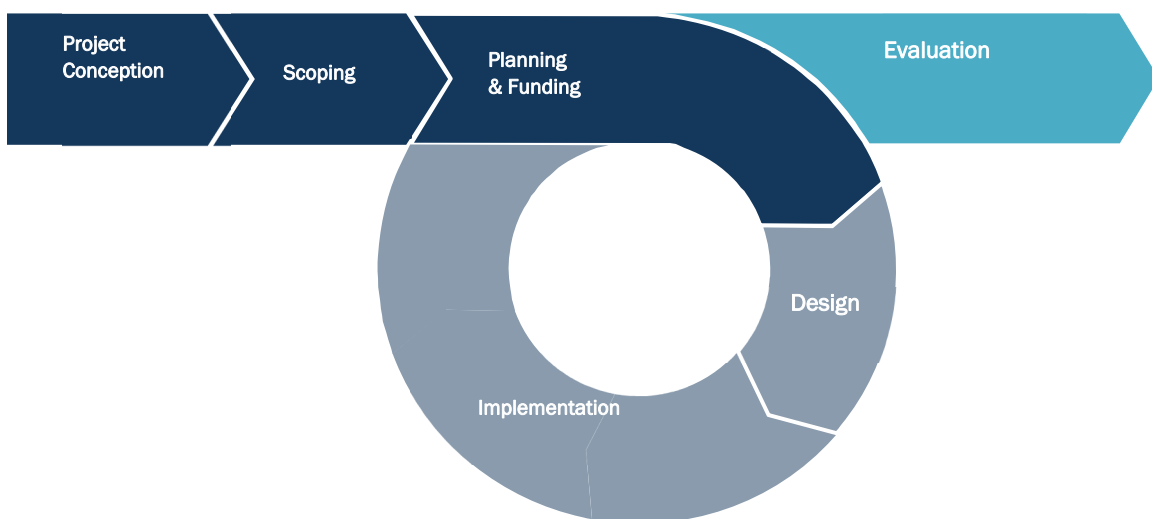


FIGURE 49 Project development cycle.

ADDRESSING HEALTH DISPARITIES AND EQUITY THROUGH FHWA POLICY AND INFRASTRUCTURE INVESTMENTS

VICTORIA MARTINEZ

Federal Highway Administration

I'm going to pick up on points that have been said here and also talk about the FHWA's priorities. We talked about models earlier. In a lot of models we work with, a factor of two is considered a good fit. Data availability is a challenge. We have more opportunities for gathering data, but they can cost a lot of money and there are privacy concerns. From an FHWA point of view, we are developing policies for the entire country — small and large communities and urban and rural communities—so having requirements for new data is probably not going to happen at the federal level. I get nervous about some places for interventions. How do we figure out when and where is best to intervene? I also work in air toxics and criteria pollutants. How do we balance of what some people are dealing with every day, such as working two jobs? I saw research that mapped job growth, low-income housing, and the amount of time rides take on the bus system. Who is going to ride two and a half hours by transit? That person would get a car, even if half of their income is spent on it.

What I liked hearing this morning is when you put people first, amazing things happen. For example, the discussion about going from access control to putting people first. I don't know at the federal level that it will translate perfectly. When I started working on health and transportation issues in 2009, we were talking to staff at the RWJF, and they asked why we weren't working on health. We, at the Office of Environment and Planning, were working on air quality, water quality, noise pollution, and vehicle fatalities, so we thought we were working on health. It wasn't exactly the same, but that started a conversation and allowed us to think more broadly. We might not call it "health" in our everyday language. In one of the breakout sessions another person said; "delivering health without calling it health." Safety and reducing fatalities has been and will always be our mission statement. How we develop our infrastructure to ensure mobility for all users, whether that's the ADA definition or more broadly, is important. We've moved away from the word "mobility" in order to get away from the idea of vehicle access because it is about multimodal access.

I want to mention federal funding programs and case studies, such as the framework for integrating health into transportation corridor planning, mentioned earlier. We have several programs to fund AT, including the surface transportation block grant programs and Transportation Alternative Program (TAP) (34). We also have a large Recreational Trails Program (35), an effort where we work with other agencies to bring communities that live near parks and trails to those parks, as well as tourists. The Congestion Mitigation Air Quality Improvement (CMAQ) (36) program has also funded AT. We have developed a community connection toolboxes and the community impact assessment guide. There's also a large environmental justice program. There is the Coordinating Council on Access and Mobility (CCAM) (37), which is an FTA program that brings together 11 agencies to coordinate care. One agency might pay for you to go to hospital, but you can't pick up medications on the way home with that same allocation of funding, so they work to coordinate that. Another effort from our, Office of Transportation System Management and Operations, takes existing infrastructure and collaborates across jurisdictions and disciplines to integrate multimodal solutions, such as road diets.

There are opportunities to bury highways that run through cities or remove them in some cases. State DOTs can be stewards for good ideas. The U.S. DOT held a summit on access and mobility about the idea of complete trips, which is focused on ADA, elderly, and low-income populations being able to make complete trips. There will be a funding program to support research and implementation of complete trips.

QUESTIONS FROM THE AUDIENCE

Moderator Meehan opened the floor for questions.

Audience Across multiple fields, meta-analysis is the primary point where corporations try to influence the literature by publishing a lot in one area. Be aware of the author and funding sources.

Audience Regarding the call for data, how do we build partnerships to use data that we've already collected? I've actually tried to share cycling data with our MPO and it's not being used.

Huerta Sometimes MPOs and others don't know how to use it. That's why open data sources are so important. I realize meta-analysis may be taken advantage of, so have a board or core group to curate the evidence in a repository, and curate studies and implementation practices so we can see how are others doing it. It is a lot about personal relationships, but we have to think about to institutionalizing them.

Audience One person in the audience stated that it was their opinion that it would be helpful if FHWA would change the language in guidance documents of "should consider" to "shall accommodate" and be more forceful with state DOTs to help them do what they want to do. Regarding funding, how are the AT projects getting paid for? The pushback I get from my state DOT is reluctance to prioritize such projects because cyclists and pedestrians don't pay for gas, which a primary revenue source for the DOT. If electric cars are not paying for gas, 50 years from now, how are things getting paid for?

Martínez The wordsmithing of the shall/should is something of legend; it will take years to change. When I talked about context-sensitive solutions a decade ago in my agency, I was not taken seriously. Then, 5 years later, the same agency got awards for their context-sensitive solutions. People do change. There is room in our regulations that allows these things.

Audience A paper about the 10 most important estimates needed to link health and transportation in practice would be helpful. Get practitioners and researchers together to get our best estimates now, with caveats, which will help in practice.

Huerta At FHWA, we have this two-year study on the health and transportation link. That's what we want to provide to the Texas DOT and across the U.S. We will end up with a report with lessons learned and what is needed.

DAY TWO: CLOSING SESSION

Making It Work in a Transportation Environment

ED CHRISTOPHER

*Transportation Planning Consultant
Moderator*

Moderator Ed Christopher described this session in which the facilitators from the breakout concurrent sessions will summarize their sessions. Afterwards, Jennifer Toole delivered the closing keynote presentation.

REFLECTING ON INNOVATIVE PRACTICES

PHIL BORS

Healthy Places by Design

NISHA BOTCHWEY

Georgia Institute of Technology

Bors I'm Phil Bors with Healthy Places by Design. We spent day one generating ideas about innovations with equity lens, to advance health and AT. We did a gallery walk exercise, with four stations for people to brainstorm on innovations, the needs and where are we stuck, and the overlap with collaboration and research because they are all co-mingled. Then, we had a whole group conversation around unintended consequences. That's something we can't take our eye off when we are looking for innovations because they may perpetuate inequity or lead to other problems. After the session, the facilitators did a content analysis, and developed ten categories. The whole group got a handout of five pages of innovations, unmet needs, and unintended consequences. We circled back to the group and asked for clarification, to see if we missed anything, we had space to add those things. We highlighted some areas and then broke into small groups to workshop those areas that floated to top.

Botchwey On the five pages, we collected 160 innovations, 30 needs, and other unintended consequences. The categories that rose to the top include: current innovative programs and practices; strategic implementation; funding; coalitions, communities, and partnerships; data and surveillance; tools and technology; research and evaluation, intersectoral collaboration; equity and inclusion; and communications and messaging.

With that set of categories we did the dot-voting and seven topics that rose to the top include: how to motivate individuals to take action to use AT; build decision-making tools at the project level to translate public health into tools; empower community to work on easy-to-implement interventions; build relationships with communities so they lead; consider AVs' impact on health and AT; build capacity in rural areas; and examine equity considerations in all research. There were two needs that floated to the top: (1) it is important to address groups

representing the least advantaged people--these should be directly involved in solutions and innovations and (2) the transportation planning process is slow and community members lose interest and enthusiasm, so we need more quick-win projects to keep the community engaged.

Christopher Christopher noted that the term “unintended consequences” is new and useful term considering the impacts that transportation has had on communities. He introduced Mark Fenton and Ann Steedly.

BUILDING STRATEGIC INSTITUTIONAL RELATIONSHIPS

MARK FENTON

Transportation, Planning, and Public Health Consultant

ANN STEEDLY

Planning Communities, LLC

Fenton This is an example of how institutional relationships make projects. For this project in Montana, the CDC funded that state department of health, which in turn funded the University of Montana, to help the local SRTS program to ask the local public works department for a crosswalk. Public works started with a low-cost version but later built a full complete street. It's a great example of working at the state level to the local level and across sectors. It shows how relationships matter.

This is the top line summation of our takeaways. This 2005 article in the *New England Journal of Medicine* (38) suggested that children today are at risk of a shorter life expectancy, and now Woolf and Schoomaker (39) have confirmed that has happened. The article discusses how the diseases of sedentary living are where we are spending the most on health care. With the health-related decisions we are making now, we are paying the price with the next generation.

Here are some big takeaways from our session. First, imagine a grid with relationships, and you throw the relationship on the grid. For example, local communities and utilities may not always have a good relationship because the utilities are often not perceived as being concerned about bike lanes. Another example is the state DOT and the U.S. DOT, which has a strong relationship by requirement. There were eight takeaways:

1. We need to do a better job with land use decision-makers and the boards that regulate to local community understanding.
 - a. Require truly representative public engagement and use community groups to get the right people in the room.
 - b. Plain language correlates to zoning ordinance and require it to be disseminated fully.
 - c. Process requirements at least at MPO level for anything they fund. Across the board, we need to require, not recommend.
2. Institutionalize the power of non-government partners. Institutionalize phased grant making. First, have true community engagement and asset mapping in a corridor study, for example, then you get funds for the planning process. Only once the planning process is

complete, do you then get money for building. This could be built into a process. If it's not required, it is not going to happen.

3. Formalize cross-disciplinary roles, participation, and expertise.
 - a. Require health professionals on MPO advisory boards.
 - b. Require transportation expertise with CHNA, CHIPs.
 - c. This could result in long-range transportation plans and CHIPs to be in alignment.

Steadly To the eight topics from first day we added more ideas. We had action cards to carry back home to reinforce the idea that everything to be actionable. Ideas needed to be something that we can institutionalize.

4. Apply federal and state research, tools, and requirements into daily practice.
 - a. This applies to *Vision Zero* and other areas: data collection needs better coordination at the national level. NHTS data could point to health outcomes and BRFSS could capture travel.
 - b. Require health considerations in surface transportation block grants
5. Institutionalize cross-disciplinary transportation and health education, certifications, and training
 - a. Do peer exchanges across entities, a smaller state could learn from another state, and the same exchange could happen at the MPO and county level.
 - b. University education and continuing education requirements for including cross-disciplinary content. Jeff Lindley is a great resource for integrating health into ITE, for example.
6. Data collection and performance measures.
 - a. If we require performance measures for health instead of measures like LOS, over time it will be easier to get data we want.
 - b. Create central repositories and conveners for data: network data, collision, mode share, health, and rural areas.
7. Incorporate health and equity into routine local and regional infrastructure projects, prioritization, and programs
 - a. At the early point in the process of vision and project planning, before prioritization, incorporate health and equity. It might require a nonprofit convener to get that into process.
 - b. Require measures for health and equity and tie the funding allocation to it. If you don't put in those metrics, equity is a backside evaluation.
8. Intentionally engaging "hard to engage" stakeholders.
 - a. Involve difficult-to-work-with groups like utilities and emergency response, as well as disadvantaged groups. Create health-side solutions, not just transportation solutions. Develop simple fact sheets as well as typical transportation contacts, and get those into hands into health stakeholders so they feel empowered and won't feel intimidated by process.
 - b. Update compliance requirements with more robust engagement. Talk with TRB public involvement committee about adding better requirements for hard to reach populations.

c. Fenton: Schools are a hard environment to work in. Schools are not required to report mode share. If schools were required to report transportation mode share, I think the school board would be amazed by the empty school buses.

Fenton The word “required” is the key word. These are great ideas, but how do we get them implemented on the ground? There will be aversion to this, as transportation is heavily regulated already, but the regulations are just to get cars to move faster. The rules should be different, and you can make a strong case that this is less government and more work at the community level.

IDENTIFYING RESEARCH NEEDS AND OPPORTUNITIES

DAVID BERRIGAN

National Cancer Institute, National Institutes of Health

LESLIE MEEHAN

Tennessee Department of Health

Berrigan One of the things we did was extract nine research areas and asked people to place dots on them. We found four natural groupings of topics and I’ll share the top two. One was additional research in diverse populations to address inequities, including processes, pedestrian and bicycle culture, and establishing health equity performance metrics. The second was to enhance surveillance of transportation behaviors and environments, including looking at emerging data streams, the NASEM report, Implementing Strategies to Enhance Public Health Surveillance of Physical Activity in the United States, and addressing current data gaps. Other groups included addressing economic aspects of AT, research evaluation on emerging technologies, policies, and practices, and dissemination and training across disciplines. From the material produced, we have a lot of specific ideas and recommendations.

Meehan At the first conference five years ago, the intersection between health and transportation was new and innovative. We were coming together for the first time. Subsequently, the TRB Executive Committee had a dedicated meeting on transportation and health in 2017 at the Annual Meeting. Since then we’ve seen two TRB projects: one was a guidebook on how health and transportation can talk to one another via common points and datasets. It’s an overview of how health and transportation can interface. The other research-themed publication is the circular on arterials issued by the health and transportation subcommittee. In addition to TRB, other groups such as Smart Growth America have created publications highlighting health. One example is on MPOs addressing health in the transportation planning process. In our breakout sessions, we identified many important research ideas that we focused into a research agenda.

CLOSING KEYNOTE

JENNIFER TOOLE

Toole Design

These are some of the highlights I heard from the conference. Minnesota DOT has a vision that includes a public health angle and has done great work with Native American communities. Jeff Lindley from ITE spoke on their initiative on transportation and health and the growing awareness of health: it's about what our members need to know. This is different from the ITE of the past; there is a new ethos. Anna Ricklin discussed *Health in All Policies* culture change, so people are thinking of these on their own, and thinking about health as our part of own humanity.

Here are some barriers to collaboration and healthy transportation that we heard at this conference:

- Transportation policy and the focus on moving cars faster
- Transportation spending is not enough for AT
- Lack of collaboration between transportation and land use
- Lack of requirements to measure the health impacts of projects
- Too many auto industry advertisements
- Bike and pedestrian communities are not lobbying enough

The vast majority of people who make transportation decisions mostly drive cars. Their approach is based on what they know. The only way to change their perspective is through fundamental organizational change.

I'm presenting two different angles for addressing our challenges in the future. The first is a big picture idea about the values behind the work we do as transportation professionals and health professionals. The second is practical, which the practitioner's path forward. I work on projects for city and state governments, with 17 offices across the country, so we are engaged in different markets and are seeing some trends.

The transportation industry has been very siloed and focused less on people and more on performance. The very foundation of the profession is siloed with the three Es: engineering, education, and enforcement. Even in the structure of the U.S. DOT, these silos remain, with FHWA focused on highways and National Highway Transportation Safety Administration focused on education and enforcement. The first time the three E's were used in print was in 1925 with an article by Paul Hoffman. The article states: "Vast strides have been made toward reducing the rate of highway accidents... This work was accomplished by a careful and well-administered program of Education, Enforcement, and Engineering, the now famous three E's of safety." Note that Paul Hoffman was also the president of Studebaker. The *Manual on Uniform Traffic Control Devices* (40) tells us how to do engineering in a dispassionate, non-emotional way, all in the name of efficiency. Engineers put together design and guidelines for their work, the express purpose of which is to take the guesswork out of engineering.

I propose that those three Es are failing us. It no longer a sufficient basis for how we do our work; it is too rigid and siloed to serve communities that are committed to achieving *Vision Zero*, redressing historical inequities, reversing climate change, and improving the quality of life for everyone. Yesterday, Norm Garrick showed us that post-1950s towns in California have higher crash rates. We used to build streets for people that also accommodated cars. Our

engineering standards now produce a system that is for cars but not for people. We need to hold the transportation profession to a higher standard. We need to use this within organizations to talk about the reasons behind the work that we do and the reasons why our organizations must change.

I propose three new E's: ethics, equity, and empathy. For our professions, there is a code of conduct: engineers must "hold paramount the safety, health, and welfare of public." Planners have the same code of ethics and so does landscape architecture. I'm sure there is a similar code of ethics in public health. Is it ethical for transportation consultants to bribe a client to win work? No. That's an easy one. Is it ok for me to buy a client a beer? Most of the conversations about ethics are like this, where one person or group is unfairly benefitting from a relationship or decision.

Is it ethical to put a bus stop on a road with six lanes and 35,000 vehicles per day and not create a safe way for people to access it? This bus stop is from Columbia Pike from Silver Spring, Maryland, and won Streetblog's (41) contest for sorriest bus stop in country (Figure 50). In this case, the county put in the bus stop to serve people who live in the neighborhood. However, the road is owned by the state and they weren't interested in putting in a traffic light here to allow people to cross safely. Is it ethical to prioritize a travel time for one person over the safety of another person? This gets at the heart of the most important decisions that transportation professionals make on a daily basis.

This is a screenshot of a video taken by chance while in Seattle, Washington (Figure 50). This incident occurs in a wide intersection that prioritizes the speed of vehicles over safety. This could be an intersection in any city in the U.S. It has been prioritized for "throughput" with a wide curb radius built for large trucks, so passenger vehicles can make turns at higher speeds. In this video, at this intersection, the car got the green light at same time as the bicyclists on the corner got the "walk" signal. They are entering the same street space at the same time. I want to show this video to emphasize the importance of their ethical duty to keep people safe.



Is it ethical to...

To put a bus stop on a 50 mph, 6 lane road with 35,000 vehicles per day, but not create a safe way for people to access it?

- Yes
- No
- It depends

TOOLE
DESIGN



FIGURE 50 Ethical considerations.

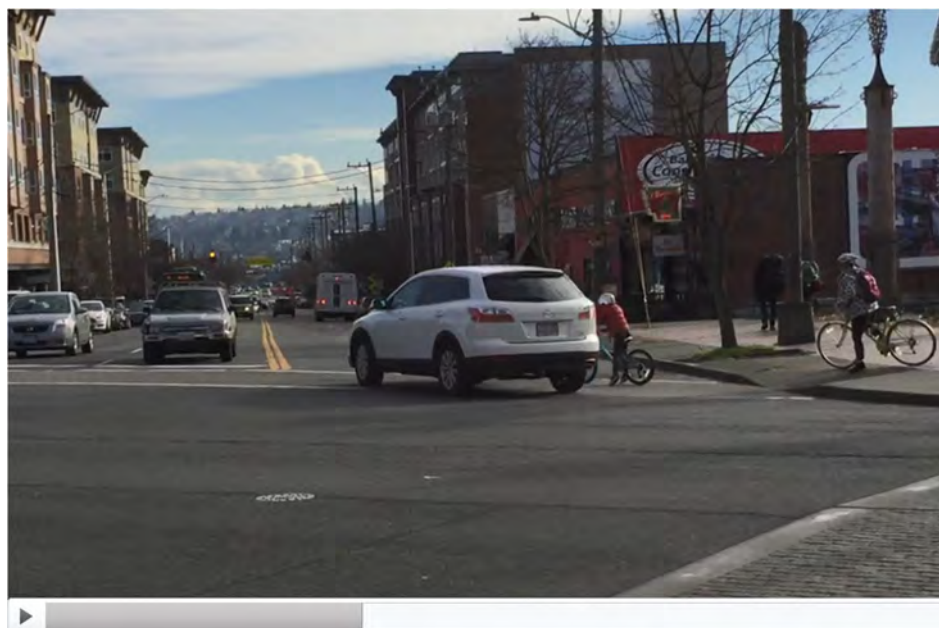


FIGURE 51 Intersection in Seattle, Washington (video screenshot).

Similarly, there was a trail crossing where a girl was almost hit by a car. This crossing was supposed to have been improved years ago and had been bogged down in contractor issues, but someone caught that interaction on video. The crossing was fixed in two weeks. Video is powerful. It can help bring home the message of what happens when we prioritize speed over safety.

Another important *E* is equity. Communities have been unfairly burdened because they are different from those in power. From redlining to urban renewal to Jim Crow laws, those historical inequities have impact today. Our work must actively seek to reverse those inequities and invest in these places in a way that does not displace people through gentrification.

The third *E* is empathy, which is the most important one of all because if you have empathy, the others fall into line. Empathy is the capacity to see and feel what another person is experiencing. It's hard to emphasize with other modes if you have never taken that mode. For example, there are 3.6 million people with disabilities in this country who can't leave their homes because they don't have a transportation option—this is about seeing the world through their eyes. It's easy for planners, designers, and engineers to fall into the trap of assuming that everyone thinks the way they do. A commitment to listening to people is an essential part of challenging those assumptions and, in turn, better understand the perspectives, experiences, and motivations of the people for whom we design.

Recently in Montgomery County, Maryland, council members participated in a transit challenge. I recommend this for leadership in your government and for transportation professionals. Five out of the 10 councilors took transit, biked, walked and scootered every trip and related their experience about it. It helped them to empathize.

Finally, I want to give you practical guidance based on trends we are seeing in country, which has to do with radical change in implementation to create networks of bicycle facilities over short period of time. If we want to make a difference in climate, health, and safety, we have to build networks fast. That's not easy to do in this country.

This is a street in Rosslyn, Virginia, connecting Rosslyn and the Key Bridge and leads into Washington, D.C. (Figure 52). There are a lot of people walking as this is a major trail to jobs and culture. The problem we had is that people were getting killed at this intersection, at the on-ramp to I-66. We started planning to fix this and 19 years later are now building the improvements that we have been planning for so long. It's been enormously complicated. The Virginia Department of Transportation (VDOT) owned the road, Lee Highway, and was uncomfortable with a road diet. Because a road diet was a big deal for VDOT, it took long time to get a crossing at the highway and connect jobs and to federal parkland. This is an example of how people get fatigued about how long it takes to build a project.

The trend we are seeing is rapid implementation. It is fueled in part because of frustration at the local level about the process and because of federal funding, which has stayed static. Many of these projects have been funded through transportation bonds, such as those in Austin, Seattle, Los Angeles, and other places. The goal of one rapid implementation project in Houston, Texas was to build out bicycle network as fast as possible. About a month ago, we were able to see work on the ground, which was a 17-mile bike ride and only three miles were not protected bike lanes (Figure 53).

Another project is in Seville, Spain. Seville built a network of bike facilities, with 40 miles in one year. They went from seven miles to 75 miles in four years, and then added 20 more in next three years after that (Figure 54). They took a small town and made it bike-friendly overnight. Seville is the best to-go example because it's a very car focused city, and where everyone owns a car. I would contend it is a better example for us than other countries that have spent the past 30-50 years changing their transportation system. Their projects are not fancy—the bike lanes are two-way on one side of street because they knew it could be faster. It has half of the upset merchants. This hit all the themes of conference: innovative, research (before/after), and collaboration.



FIGURE 52 Lee Hwy Intersection, Rosslyn, VA.

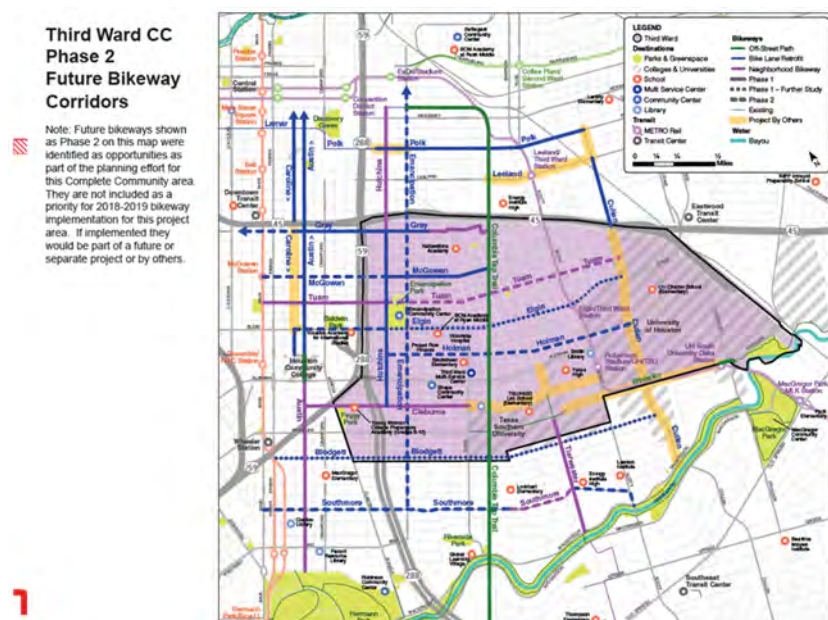


FIGURE 53 Bikeways Corridors Project Implementation.



FIGURE 54 Image source - Marqués et al., 2015, Marqués and Hernández-Herrador, 2017.

The bike advocacy groups in Seville banded together with disability advocates to make this happen. Part of what caught people's attention are the results from infusion of bike network construction: during the time period in which they were building the cycle tracks, they saw a significant jump in bike riders and a reduction in crashes. This is what makes people interested in rapid implementation.

Consider the use of consultants for in-house staff augmentation. With these bonds, once the funds are spent, agencies don't need staff, so contracted staff doesn't have a government burden over a long time. Start projects with a summit to agree what's acceptable in terms of design. Completely overhaul the project and engagement process. Use existing street space and

minimize new construction. In some places, they don't even develop construction drawings—the projects are field engineered. This requires a high level of coordination between departments.

Here are some of the challenges. Managing the public process is difficult because it is so condensed. Long delivery periods are also problematic because by the time you build the project, the people who participated in the process are not around. A shorter process is an opportunity, but it does require a new approach to meaningful engagement to ensure equity is being addressed. Another challenge is that technicalities can bog things down, such as conflicts over road ownership. Also, the design standards might be antiquated. If the construction industry is not ready to rapidly implement, there are coordination and capacity issues.

Right now, there is no better time to innovate. We authored a multimodal network guide for FHWA and there are other resources coming online to help guide agencies to build innovative infrastructure. Our moral and ethical duty as transportation professionals is to make institutional change.

QUESTIONS FROM THE AUDIENCE

Moderator Ed Christopher opened the floor for questions.

Audience The BRFSS (42) could be linked to travel data. The state has an opportunity to add questions to BRFSS. The state is also able to geocode data they collected, which could make one able to link BRFSS data to travel or environmental data. Talk to your state BRFSS coordinator.

Christopher Jeff Whitfield had a project with the U.S. DOT to take the National Health Interview Survey (NHIS) (43) data and add transportation variables to the respondent records without asking the respondents for additional data. You can append data to the record, like how far the respondent lives to the nearest bus stop, what is the traffic on the respondent's street, or are there sidewalks nearby, which allows deeper research to happen.

Whitfield We had a pilot study with the U.S. DOT using national health interview data from four states, and with GIS took VMT from highway performance management data. Using the point location of residents, we can draw a buffer around them to find the traffic density around their home. We did this for four states and are in process of scaling up to all 50 states.

Audience Pennsylvania has an opportunity with our interagency health equity group that has the state DOT and 13 state agencies working with program funding, education related access, community resources, and walkability.

Audience In that Virginia example, I wonder how many people died in that 20-year period? My first thought is that this will benefit communities that are more organized. I would try to make the process equitable. I have one example of a failure. In Houston, part of the way that facilities got built quickly was to do planning and construction almost simultaneously. But there was a historical black community along the route and they didn't have enough time to do outreach, so they made assumptions about what the black community would want. They thought the black community wouldn't want a lot of investment because it might cause gentrification. But it turns out, the black community said, "That's not at all what we wanted. You left us out."

You didn't spend as much in our community." We often approach problems when we think we know best. We need to listen better.

Christopher Intermodal Surface Transportation Efficiency Act changed the direction for MPOs because it called for public involvement. The pushback was, why we have to do this, it will slow things down. There is a mindset that "we know what to do, we're the experts."

Audience For the three Es, I wonder how local jurisdictions or other engineers think about code of ethics and how they will respond to it. There will be some engineers that will worry about this shift in ethics. It helps a lot that the ITE Journal June issue had an article on this very topic.

NEXT STEPS: FUTURE DIRECTION

JANET WOJCIK

Winthrop University, Moderator

BERNARDO KLEINER

Transportation Research Board

Wojcik Thanks everyone here today, especially TRB staff, Bernardo Kleiner and Gary Jenkins, and the planning committee who met for a year by conference call. We wanted to make this an interactive conference, beyond the interactions at receptions or committee at most conferences. This conference was not just lectures but opportunities to make new connections set the agenda, so we can move the field forward. So much has changed in 5 years and there will be rapid change in 5 more years. Thank you to the speakers, breakout session facilitators, and poster presenters.

Kleiner Kelly Rodgers, the rapporteur, will create a document that captures the heart of the discussions and presentations made here. People will be able to take that and use it as a framework to build upon.

For next steps at TRB, staff and volunteers will work to integrate these conversations into discussions of relevant standing committees and NCHRP project opportunities. Staff from the Health and Medicine Division of the National Academies were here and we will continue the dialogue with them as well.

Who is taking good ideas back with you? How many can do it all by yourself? A lot of this is about collaboration and making connections. Thanks to NIH and CDC for supporting this and thanks to Ed Christopher and Janet Wojcik for co-chairing the planning committee.

References

1. Urban Design: Transport and Health Series. *The Lancet*. Vol. 388, No. 10062, pp. 2837–2958, 2016. Available at <https://www.thelancet.com/series/urban-design>. Accessed March 25, 2020.
2. Giles-Corti, B., A. Vernez-Moudon, R. Reis, G. Turrell, A. Dannenberg, et al. City Planning and Population Health: A Global Challenge. Series: Urban Design, Transport and Health. *The Lancet*, Vol. 388, pp. 2912–2924, 2016. Available at [https://doi.org/10.1016/S0140-6736\(16\)30066-6](https://doi.org/10.1016/S0140-6736(16)30066-6). Accessed March 25, 2020.
3. Stevenson, M., J. Thompson, T. Héricks de Sá, R. Ewing, D. Mohan, et al. Land Use, Transport, and Population Health: Estimating the Health Benefits of Compact Cities. *The Lancet*, Vol. 388, pp. 2925–2935, 2016. Available at <https://www.sciencedirect.com/science/article/pii/S0140673616300678?via%3Dihub>. Accessed March 25, 2020.
4. *Community Guide Preventive Services*. Public Health Foundation. Available at <http://www.phf.org/programs/communityguide/Pages/default.aspx>. Accessed March 25, 2020.
5. Sallis, J. F., C. Spoon, N. Cavill, et al. Co-Benefits of Designing Communities for Active Living: An Exploration of Literature. *International Journal of Behavioral Nutrition and Physical Activity*, Vol. 12, No. 30, 2015. Available at <https://doi.org/10.1186/s12966-015-0188-2>. Accessed March 25, 2020.
6. Pucher, J., J. Dill, and S. Handy. 2010 Infrastructure, Programs, and Policies to Increase Bicycling. *Preventive Medicine*, Vol. 50, No. S1, pp. S106–S125, 2016.
7. *2018 Benchmarking Report on Bicycling and Walking*. League of American Bicyclists. <https://bikeleague.org/benchmarking-report>. Accessed March 25, 2020.
8. Wikipedia contributors. Environmental Gentrification. *Wikipedia, The Free Encyclopedia*. Available at https://en.wikipedia.org/wiki/Environmental_gentrification. Accessed March 25, 2020.
9. Mecklenburg County Government. Mecklenburg County Greenways. <https://www.mecknc.gov/ParkandRec/Greenways/Pages/default.aspx>. Accessed March 25, 2020.
10. Pedestrian and Bicycle Information Center. *PedbikeINFO*. Available at <http://www.pedbikeinfo.org/>. Accessed March 25, 2020.
11. Roberts, J. D., S. Mandic, C. S. Fryer, M. L. Brachman, and R. Ray. Between Privilege and Oppression: An Intersectional Analysis of Active Transportation Experiences Among Washington D.C. Area Youth. *International Journal of Environmental Research and Public Health*, Vol. 16, No. 8, p. 1313, 2019. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6518066/>. Accessed March 25, 2020.
12. Buehler, R., J. Pucher, and A. Bauman. Physical Activity from Walking and Cycling for Daily Travel in the United States, 2001–2017. *Journal of Transport and Health*, Vol. 16, 2020. Available at <https://www.sciencedirect.com/science/article/pii/S2214140519305110>.
13. *National Household Travel Survey 2001–2017*. Oak Ridge National Laboratory. <https://nhts.ornl.gov/>. Accessed March 25, 2020.
14. Committee on Strategies for Implementing Physical Activity Surveillance. Implementing Strategies to Enhance Public Health Surveillance of Physical Activity in the United States. National Academies of Sciences, Engineering, and Medicine, Washington, D.C., 2019.
15. DiGioia, J., K. E. Watkins, Y. Xu, M. Rodgers, and R. Guensler. Safety Impacts of Bicycle Infrastructure: A Critical Review. *Journal of Safety Research*, Vol. 61, 2017, pp. 105–119. Available at <https://www.sciencedirect.com/science/article/pii/S0022437517301524?via%3Dihub>. Accessed March 25, 2020. <https://doi.org/10.1016/j.jsr.2017.02.015>.
16. *Vision Zero*. Vision Zero Network. Available at <https://visionzeronetwork.org/>. Accessed March 25, 2020.
17. *Designing All Ages and Abilities Bikeways*. National Association of City Transportation Officials. Available at https://nacto.org/wp-content/uploads/2017/12/NACTO_Designing-for-All-Ages-Abilities.pdf. Accessed March 25, 2020.

18. U.S. Climate Resilience Toolkit. National Oceanic and Atmospheric Administration. Available at <https://toolkit.climate.gov/tool/social-vulnerability-index>. Accessed March 31, 2020.
19. Move with the Mayor. National Forum for Heart Disease and Stroke Prevention. Available at <https://www.nationalforum.org/collaborations/mwtm/>. Accessed March 31, 2020.
20. U.S. Centers for Disease Control and Prevention. Division for Heart Disease and Stroke Prevention. Million Heart in Municipalities Took Kit. Available at <https://millionhearts.hhs.gov/tools-protocols/tools/municipalities.html>. Accessed April 22, 2020.
21. Feigon, S., and C. Murphy. *TCRP Research Report 18: Shared Mobility and the Transformation of Public Transit*. 2016. <https://doi.org/10.17226/23578>.
22. *Innovative Solutions for Universal Design*. Center for Inclusive Design and Environmental Access. School of Architecture and Planning, University at Buffalo. Available at <http://www.thisisud.com/>. Accessed April 3, 2020.
23. Robert Wood Johnson Foundation. *Active Living Research*. Available at <https://activelivingresearch.org/>. Accessed April 3, 2020.
24. Martinez, C. *Building Strategic Institutional Support*. Presented at the Conference on Health and Active Transportation, Washington, D.C., 2019. Available at <https://vo-general.s3.amazonaws.com/aa19ba5e-d033-4518-a915-e3c52ec931b7/6143cf3a-e834-4956-a509-1c01fdc35c3f?AWSAccessKeyId=AKIAJ4PRWO26HAX3IOCA&Expires=1672265098&response-content-disposition=inline%3B%20filename%3D%22AOW-BHC%20Neighborhoods-Kern%20for%20Craig.mp4%22&response-content-type=video%2Fmp4&Signature=99je3HvWwXSDc6ghG02Jc%2FWt3Wk%3D>. Accessed April 3, 2020.
25. *Embark Richmond Highway Plan*. Department of Planning and Development, Fairfax County, Va., Available at <https://www.fairfaxcounty.gov/planning-development/embark-richmond-highway>. Accessed April 3, 2020.
26. Sandt, L., A. West, S. Johnson, K. Brookshire, K. Evenson, L. Blackburn, K. Peach, M. Tartala, A. Ricklin, S. Shah, D. A. Rodriguez, J. Corburn. *NCHRP Research Report 932: A Research Roadmap for Transportation and Public Health*. 2019. <https://doi.org/10.17226/25644>. Accessed April 6, 2020.
27. *Transportation Research E-Circular 239: Arterial Roadways Research Needs and Concerns: Informing the Planning, Design, and Operation of Arterial Roadways Considering Public Health*. 2018. <http://www.trb.org/Main/Blurbs/178557.aspx>. Accessed April 6, 2020.
28. McAndrews, C., K. Pollack, D. Berrigan, A. Dannenberg, and E. Christopher. Understanding and Improving Arterial Roads to Support Public Health and Transportation Goals. *American Journal of Public Health*, Vol. 107, 2017, pp. 1278–1282. Available at <https://ajph.aphapublications.org/doi/full/10.2105/ajph.2017.303898>. Accessed April 6, 2020.
29. *Transportation Health Tool*. U.S. Department of Transportation. Available at <https://www.transportation.gov/transportation-health-tool>. Accessed April 6, 2020.
30. Marsden, G., and L. Reardon. Questions of Governance: Rethinking the Study of Transportation Policy. *Transportation Research Part A: Policy and Practice*, Vol. 101, 2017, pp. 238–251. Available at <https://doi.org/10.1016/j.tra.2017.05.008>. Accessed April 6, 2020.
31. Fatality Analysis Reporting System. National Highway Traffic Safety Administration, Washington, D.C. Available at <https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars>. Accessed April 7, 2020.
32. *ADA Project Civic Access*. Civil Rights Division, U.S. Department of Justice, Washington, D.C. Available at <https://www.ada.gov/civicac.htm>. Accessed April 8, 2020.
33. Levine, B. What does the population attributable fraction mean? *Preventing Chronic Disease*, Vol. 4, No. 1, 2007, p. A14. Available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1832135/>. Accessed April 8, 2020.
34. *Fixing America's Surface Transportation Act (FAST Act)*. Federal Highway Administration, U.S. Department of Transportation. Available at <https://www.fhwa.dot.gov/fastact/factsheets/transportationalternativesfs.cfm>. Accessed April 8, 2020.

35. Recreational Trails Program. Office of Planning, Environment, and Realty, Federal Highway Administration, U.S. Department of Transportation.
https://www.fhwa.dot.gov/environment/recreational_trails/. Accessed April 9, 2020.
36. Congestion Mitigation and Air Quality Improvement (CMAQ) Program. Office of Planning, Environment, and Realty, Federal Highway Administration, U.S. Department of Transportation.
https://www.fhwa.dot.gov/environment/air_quality/cmaq/. Accessed April 9, 2020.
37. Coordinating Council on Access and Mobility, Federal Transit Administration, U.S. Department of Transportation. Available at <https://www.transit.dot.gov/coordinating-council-access-and-mobility>. Accessed April 9, 2020.
38. Olshansky, S. J., D. J. Passaro, R. C. Hershow, J. Layden, B. A. Carnes, J. Brody, et al. A potential decline in life expectancy in the United States in the 21st century. *New England Journal of Medicine*, Vol. 352, No. 11, 2005, pp. 1138–1145. Available at <https://www.nejm.org/doi/full/10.1056/NEJMSr043743>. Accessed April 22, 2020.
39. Woolf, S. H., and H. Schoomaker. Life Expectancy and Mortality Rates in the United States, 1959–2017. *Journal of the American Medical Association*, Vol. 322, No. 20, 2019, p. 1996, 2016. Available at <https://doi.org/10.1001/jama.2019.16932>.
40. *Manual on Uniform Traffic Control Devices*. Federal Highway Administration, U.S. Department of Transportation. Available at https://mutcd.fhwa.dot.gov/kno_2009r1r2.htm. Accessed April 9, 2020.
41. Streetsblog. <https://www.streetsblog.org/>. Accessed April 9, 2020.
42. Behavioral Risk Factor Surveillance System. National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health, U.S. Centers for Disease Control and Prevention. Available at <https://www.cdc.gov/brfss/index.html>. Accessed April 9, 2020.
43. U.S. Centers for Disease Control and Prevention. National Center for Health Statistics.
<https://www.cdc.gov/nchs/nhis/index.htm>. Accessed April 9, 2020.

APPENDIX A

Poster Sessions

PROGRESS IN PUBLIC HEALTH AND TRANSPORTATION: CHANGES IN STATE- AND REGIONAL-LEVEL PREVALENCE OF ACTIVE COMMUTING TO WORK FROM 2005–2017

GEOFFREY WHITFIELD

Centers for Disease Control and Prevention

Background

Increasing commutes made by walking, riding a bicycle, or public transportation (active commuting) can increase physical activity and reduce congestion and is a shared goal of public health and transportation (1, 2). State public health and transportation agencies can work together to implement environmental and policy strategies (e.g., *Complete Streets*) to support active commuting (3). Since 2005, the American Community Survey (ACS) has provided consistent, annual journey to work data for the nation and states, but state- and regional-level changes in the combined prevalence of walking, bicycling, or taking transit to work since 2005 have not been reported.

Purpose

To examine changes in the prevalence of active commuting to work from 2005 to 2017, stratified by state and Census region.

Methods

ACS is a representative survey of approximately 1% of U.S. households, administered by the U.S. Census Bureau (4). Employed ACS participants aged ≥ 16 years (2005 $n=1.3$ million, 2017 $n=1.5$ million) reported the primary mode of transportation to work in the past week. Participants who reported walking, biking, or taking public transit (bus, streetcar, subway, railroad, and ferryboat) were classified as active commuters. Prevalence of active commuting to work for the first (2005) and last (2017) ACS cycles was estimated by Census region and state; territories and Washington, D.C. were not included. Differences between years were tested with adjusted Wald tests and deemed statistically significant at $p<0.05$. All analyses followed ACS guidelines for weighting and variance estimation.

Results

From 2005 to 2017, the prevalence of active commuting to work increased in the Northeast from 17.4% (95% confidence interval [CI] 17.2–17.6) to 19.6% (19.4–19.7), including increases in CT (2005 to 2017: 6.9% to 7.7%), MA (12.4% to 16.1%), NJ (13.6% to 15.2%), NY (31.8% to 35.0%), and Pennsylvania (8.9% to 9.6%), and a decrease in NH (4.1% to 3.1%). The prevalence

increased in the South from 3.7% (95% CI: 3.6-3.8) to 3.9% (3.8-3.9), including increases in DE (2005 to 2017: 3.8% to 5.2%), KY (2.6% to 3.5%), NC (2.5% to 2.9%), SC (2.4% to 2.8%), and VA (5.5% to 7.3%), and a decrease in LA (4.0% to 3.3%).

The prevalence increased in the Midwest from 5.5% (95% CI: 5.4-5.6) to 5.9% (5.8-6.0), including increases in IL (2005 to 2017: 11.3% to 13.1%) and MI (3.2% to 4.1%). The prevalence increased in the West from 7.2% (95% CI: 7.1-7.4) to 7.9% (7.8-8.0), including increases in CA (2005 to 2017: 7.9% to 8.4%), CO (6.4% to 7.0%), HI (9.9% to 12.3%), OR (9.0% to 10.3%), and WA (8.2% to 10.5%), and a decrease in ID (4.8% to 3.7%). Changes in the states not listed above did not reach statistical significance.

Conclusions

Since 2005, the prevalence of active commuting to work has increased in all four Census regions and 17 states. However, the prevalence remains low ($\leq 5\%$) in more than half of U.S. states, particularly in the South and Midwest. Public health and transportation agencies at multiple levels of government can work collaboratively to implement policy, systems, and environmental strategies to increase active commuting.

References

1. Federal Highway Administration. Strategic Agenda for Pedestrian and Bicycle Transportation. U.S. Department of Transportation, Washington, DC, 2016.
2. Office of Disease Prevention and Health Promotion. Healthy People 2020 Topics and Objectives: Physical Activity. U.S. Department of Health and Human Services, Washington, DC, 2010. <https://www.healthypeople.gov/2020/topics-objectives/topic/physical-activity/objectives>. Accessed 17 May 2019.
3. Zaccaro HN, Atherton E. Bright Spots, Physical Activity Investments that Work-*Complete Streets*: Redesigning the Built Environment to Promote Health. *Br J Sports Med*. 2018; 52(18):1168-1169.
4. United States Census Bureau. American Community Survey Methodology. U.S. Department of Commerce. Washington, DC. <https://www.census.gov/programs-surveys/acs/methodology.html>. Accessed 16 May 2019.

OPPORTUNITIES TO IMPROVE COMMUNITY MOBILITY THROUGH COMMUNITY HEALTH NEEDS ASSESSMENTS

ALEXANDRA KING

Community Transportation Association of America

Background app.180-181nd Purpose

As a part of the Affordable Care Act, tax-exempt hospitals are required to perform CHNAs every 3 years to identify the obstacles to improving community health, and then to create an action plan to address those obstacles. CHNAs, if used correctly, can be a helpful tool for communities. They identify important opportunities to improve public health by ensuring that hospitals have critical information needed to accurately meet the needs of their population. They also provide a unique chance to improve the coordination of hospital benefits with other services and initiatives,

with the goals of improving community health, well-being, and equity in access to healthcare services.

Description

This research provides an overview of CHNAs, examples of what steps certain communities, guided by their CHNAs, have taken to address mobility challenges, and what, if any, impact such strategies have had. The report also identifies opportunities and strategies for mobility professionals to play a greater role in the CHNA process and engage local healthcare entities in community mobility issues.

Lessons Learned

Community engagement is at the core of the CHNA process. It is vital for hospitals to remain accountable and responsible to community stakeholders who contribute time and energy to the process. Mobility professionals who remain engaged in the process have the opportunity to improve overall engagement and partnership with not only the local hospital, but other stakeholders in the process as well. It is important for mobility sector representation in CHNA discussions to bring both awareness and understanding of the impact of overall mobility on health and well-being.

Conclusions and Implications

It is critical for mobility professionals understand CHNAs and the mobility challenges that local hospitals articulate. By doing so, mobility professionals can apply their expertise to improving health outcomes in their communities. To help, this report explains CHNAs, what steps certain communities, guided by their CHNAs, have taken to address mobility challenges, and what, if any, impact such strategies have had. The report also identifies opportunities and strategies for mobility professionals to play a greater role in the CHNA process and engage local healthcare entities in community mobility issues.

Next Steps

The research outlines three key steps mobility professionals can take to begin to leverage the CHNA process to improve transportation access for patients and all community residents: 1) Identify your local hospital(s) and review their past CHNAs, 2) Create a relationship with your two local hospital, clinic, or healthcare system, and 3) Invite healthcare leaders to transportation planning meetings.

References

1. The Centers for Disease Control and Prevention. (2013). Community Health Assessment for Population Health Improvement: Resource of Most Frequently Recommended Health Outcomes and Determinants. Retrieved from https://wwwn.cdc.gov/CommunityHealth/PDF/Final_CHAforPHI_508.pdf.
2. U.S. Department of Treasury. Internal Revenue Service (2015, February). Internal Revenue Bulletin 2015-5. Retrieved from https://www.irs.gov/irb/2015-05_IRB

3. Association for Community Health Improvement, Community Health Assessment Toolkit, Retrieved from <http://www.healthychcommunities.org/Resources/toolkit.shtml#.XBpeeRNKiqQ>.
4. Gale, J., Croll, Z., Zoll, L., and Coburn, A. (2018, November). Critical Access Hospitals' Community Health Needs Assessments and Implementation Plans: How Do They Align?" Retrieved from http://www.flexmonitoring.org/wpcontent/uploads/2018/11/CAH-Community-Health-Needs-Assessments-and-Implementation-Plans-BP-_39.pdf.
5. National Center for Mobility Management. (2014, September). Transportation to Healthcare Destinations: How A Lifeline for Patients Impacts the Bottom Line for Healthcare Providers. Retrieved from <http://bit.ly/2nvaMm2>.
6. National Center for Mobility Management. (2014, September). Resource Guide for Conversations between Transportation Professionals and Healthcare Professionals. Retrieved from <http://bit.ly/2nhcXJs>.

PROMOTING PARTNERSHIPS TO SUPPORT COMMUNITY-INFORMED ACTIVE TRANSPORTATION SAFETY AND MOBILITY

JILL COOPER

University of California, Berkeley

Background

AT planning and programming may be elusive to communities who are historically underserved, under-resourced, or marginalized. Further, these communities face disproportionate traffic risk. Meaningful engagement with communities is critical for developing culturally and context-sensitive AT projects. In California, UC Berkeley SafeTREC and the nonprofit CalWalks implement the Community Pedestrian Bicycle Safety Training (CPBST) program, which uses principles of CBPR to work with communities to address traffic safety through community organization principles advanced in public health theory and practice.

Scope–Objectives

The CPBST aims to eliminate pedestrian and bicycle injuries from traffic crashes. Results are measured at the community and program levels through several process and outcome objectives. This paper reports on evaluation of community-level objectives.

Outcome

Increase safety measures in participating communities, including infrastructure, policy, programs, events and campaigns that aim to improve pedestrian and bicycle safety.

Process

At each workshop, facilitators and participants develop solutions to local pedestrian and bicycle safety issues.

Methods

Three selection criteria are used to identify communities for the workshops: collision/injury history; social and geographic equity; community readiness to act on actions developed at the workshop. Community readiness is fundamental to ensuring CBPR elements. Once communities apply and are selected, they participate in a several-month facilitated workshop planning process designed to build on existing partnerships and safety efforts. The community partner develops a planning committee of representatives from stakeholder groups and professionals, which determines the focus and logistics of the workshop. The project team reviews documents prior and conducts a site visit with the committee to understand local collision data and qualitative safety concerns. Workshops last about three hours and include an educational and interactive presentation by the project team, a group walking/bicycling audit near the site, facilitated brainstorming, and development of actionable next steps addressing health and safety improvements. Within two months, the project team provides the community with a report that summarizes activities and potential next steps, such as applying for grants, developing plans and programs, or convening working groups. Upon request, the facilitation team will provide follow-up support to the community.

Results

Follow-up interviews of thirteen sites informed outcomes and progress on increased local solutions and safety measures objectives. Five communities reported that the walking assessments helped prioritize projects for improvements. Seven sites had or were submitting new proposals for safety infrastructure projects or programs. Two communities had installed safety infrastructure in the workshop's focus area in the 6-9 months between workshops and the follow-up interviews.

Conclusion

Evaluation of the CPBST found workshops often provided the catalyst to enhance partnerships among professionals to address local safety issues and spearhead tangible improvements for walking and bicycling safety in communities. Further, the social aspect of the walking audit also enabled community participants to identify and coalesce around common safety improvement priorities.

References

- Barajas, J. M., K. M. Beck, J. F. Cooper, A. Lopez, and A. Reynosa. How Effective Are Community Pedestrian Safety Training Workshops? Short-Term Findings from a Program in California. *Journal of Transport and Health*, 2019. <https://www.tandfonline.com/doi/full/10.1080/15389588.2018.1527031>.
- Fearer, J., and K. Beck. P23—Walking the Talk: Using Community-Based Participatory Research to Increase Underserved Communities' Capacity to Improve Pedestrian Safety. *Journal of Transport and Health*, Vol. 3, No. 2, 2016, pp. 575–576. <http://dx.doi.org/10.1016/j.jth.2016.05.026>.
- Hwang, J., K. Joh, and A. Woo. Social Inequalities in Child Pedestrian Traffic Injuries: Differences in Neighborhood Built Environments near Schools in Austin, TX, USA. *Journal of Transport and Health*, Vol. 6, 2017, pp. 40–47. <https://doi.org/10.1016/j.jth.2017.05.003>.

- Maciag, M. Pedestrians Dying at Disproportionate Rates in America's Poorer Neighborhoods. August 2014.
- Minkler, M., A. G. Blackwell, M. Thompson, and H. Tamir. Community-Based Participatory Research: Implications for Public Health Funding. *American Journal of Public Health*, Vol. 93, No. 8, 2003, pp. 1210–1213. <https://doi.org/10.2105/AJPH.93.8.1210>.
- Rincon Whitcomb, E., T. Dang, and V. Garibay. A37—Breaking the Cycle: Embedding Equity in Active Transportation Planning. *Journal of Transport and Health*, Vol. 3, No. 2, 2016, pp. S26–S27. <https://doi.org/10.1016/j.jth.2016.05.068>.

A DECADE OF BENCHMARKING BIKING AND WALKING

KEN MCLEOD

The League of American Bicyclists

Background

Bicycling and Walking in the United States: 2018 Benchmarking Report (Benchmarking Report) is the 6th edition of the report initially created in 2007 by the Alliance for Biking and Walking. The scope of the report is to provide federal, state, and local comparative data about bicycling and walking in an accessible document. The comparative longitudinal data contributes to the understanding of health and AT by monitoring benchmark data and highlighting positive and negative outcomes.

Methods

The methods of the Benchmarking Report include the collection of data from federal sources, original and third-party data for cities and states, and survey data for cities and states. Major federal data sources include the American Community Survey for commuting data and demographics, the NHTS for travel data, the FARS for traffic fatality data, the Fiscal Management Information System for federal spending data, and the BRFSS for physical activity and chronic disease data. Longitudinal survey question topics include bicycle and pedestrian planning, education and training relevant to bicycling and walking, state and local funding for bicycling and walking, and infrastructure for bicycling and walking.

The comparative data in the Benchmarking Report is complemented by a “Make Your Case” Chapter that explores 10 subjects and discusses areas where data could be improved; demographic, social, and economic differences prevalent in bicycling and walking; and the role of bicycling and walking within the larger realm of public health.

Results

The main result of the Benchmarking Report is comparative longitudinal data for the United States, all 50 states, the 50 largest cities in the United States, and 19 smaller cities. Comparative longitudinal data show that more states and cities are taking steps to improve bicycling and walking, that despite these efforts in many places bicycling and walking fatalities increased in recent years, that rates of bicycling to work have increased in most states and cities over the last

decade while rates of walking to work have not, and that bicycling and walking commute rates usually are associated with rates of physical activity in states and cities.

The comparative data generally shows that states and cities that plan for bicycling and walking, adopt and iterate *Complete Streets* policies, and pursue infrastructure improvements tend to have better results in terms of the rates of people biking and walking, the safety of people biking and walking, and better health outcomes. These associations can be valuable for policy-makers considering whether or how to invest in improving bicycling and walking.

Conclusion

The 2018 Benchmarking Report provides a wealth of comparative data that can help build relationships at the intersection of health and AT, identify research needs and opportunities to advance, and promote innovative practices. Participation in this conference would allow attendees to engage with the decade-long monitoring of the Benchmarking Report and help benchmark monitoring meet the needs of health and AT practitioners.

BEYOND KABCO: IMPROVING OUR UNDERSTANDING OF PEDESTRIAN AND BICYCLIST INJURIES WITH HOSPITAL DATA

KATHERINE PETICOLAS

Carolina Center for Health Informatics

Background

AT, including walking and biking, has considerable health, social, and environmental benefits (1). However, many U.S. communities lack a comprehensive infrastructure to support safe AT and the political will to accelerate investment in safe network development. Even as the U.S. is undergoing a pedestrian traffic fatality crisis, in which the pedestrian fatality rate has increased by 37% from 2009-2017 (2), the health and other impacts of these crashes and key crash prediction variables that can be leveraged for injury prevention remain unclear. Improved and integrated data are vital to inform stakeholder actions and build collaborative intra-agency partnerships to address safety barriers that limit active travel. We developed a strategic Implementation Plan to create an integrated crash-health outcome surveillance system for North Carolina. As a first step, we linked statewide crash and hospital encounter data for pedestrians and bicyclists. The results can inform future planning, injury prevention, and policy decisions.

Purpose

Linking crash and health data has the potential to create a more comprehensive understanding of the nature and severity of pedestrian and bicyclist injuries and broader health outcomes. This, in collaboration with key stakeholders, will inform the development of a transportation system that encompasses the needs of all road users.

Methodology

To demonstrate the feasibility of data integration, we linked 2017 North Carolina pedestrian/bicyclist crash data with hospital encounter data from the North Carolina Healthcare Association (NCHA). Since hospital encounter data contain personally identifiable information protected under HIPAA, NCHA performed the linkage. NCHA matched records based on crash/hospital admission date, age, gender, five-digit residential ZIP code, and residential street address, using deterministic methods. Throughout the linkage process, we solicited feedback and provided updates to stakeholders through regularly scheduled facilitated discussions.

Results

NCHA linked hospital encounter records for 27% of pedestrians (N=810) and bicyclists (N=295) identified in NC crash reports in 2017. We used health metrics, such as diagnosis codes, hospital admittance status, length of stay, and discharge disposition, to describe the nature and severity of injury. These metrics yielded valuable insights. For example, while most of the injured pedestrians were <60 years of age. The majority of patients this age were discharged home from the emergency department, while older adults, who made up a relatively small proportion of the patient population, were much more likely to be admitted to the hospital for their injuries

Conclusion

This project demonstrates a widely replicable stakeholder engaged process for linking crash and health outcomes data for the study of pedestrian and bicyclist injuries. It also contributes to the science and best practices around pedestrian and bicycle data linkage methods and demonstrates the knowledge gains produced by linked data systems.

References

- Promoting AT: An Opportunity for Public Health. American Public Health Association, Washington, D.C., 2012.
- Retting, R. *Pedestrian Traffic Fatalities by State: 2018 Preliminary Data*. Governors Highway Safety Association, 2019. Available at <https://www.ghsa.org/resources/Pedestrians19>.

CLASSIFICATION AND REGRESSION TREE ANALYSIS TO DETERMINE BEST PERFORMING WALKABILITY METRICS FOR STUDIES OF PHYSICAL ACTIVITY AND PUBLIC HEALTH

RONIT DALMAT

University of Washington, Urban Form Lab

Background

Walkability is difficult to quantify consistently or clearly for public health research and practice, in part because prominent metrics are (1) produced using proprietary black-box algorithms (i.e. Walk Score); (2) lack enough resolution to characterize precise activity locations (e.g. Environmental Protection Agency Walkability Index [EPA Index] characterizes at the census block group level); and (3) either lack consistency over time (e.g. changes to Walk Score algorithm in 2014) or are unlikely to be available longitudinally (e.g. EPA Index).

In contrast, transit ridership is driven by built environment components traditionally included in walkability metrics (e.g. land use, residential density, and employment density). Available at the transit stop level, it also captures aspects of place to which people frequently walk that may not score as high by other walkability metrics (e.g. Park-N-Ride lots, or car-oriented thoroughfares between high-density neighborhoods with parking constraints). Furthermore, ridership data are regularly collected and updated by transit authorities, with growing real-time availability. We hypothesized that transit ridership may capture walkability as well as traditional metrics, while having practical advantages over those metrics.

Objective

We assessed the relative performance of five walkability metrics (transit ridership, employment density, residential density, EPA Index, and Walk Score®) in predicting objectively measured outdoor walking activity.

Methods

We assembled a dataset of 72,900 GPS points recorded by 567 participants enrolled in the Travel Assessment and Community Study, which objectively measured mobility patterns of a sample of King County, Washington residents before and after the installation of a light rail system (1, 2). Participants wore accelerometry and GPS devices and recorded travel diaries for approximately 7 days. These data were processed to identify physical activity bouts, and every recorded GPS point was categorized as either walking or non-walking according to a previously published algorithm (3). We used classification and regression trees to model five walkability metrics for each GPS location, adjusting for four sociodemographic features of the participant who recorded that GPS point (age, gender, household income, and household vehicle count). Walkability predictors were compared for their relative utility to predict walking versus non-walking activity occurring at an XY location (using Gini importance index).

Results

Residential density performed best in predicting whether walking or non-walking movement is occurring at an XY point, according to an overall measure of variable importance. Walk Score ranked second, with EPA National Walkability Index and transit ridership in close third and fourth positions, respectively. Employment density ranked fifth.

Conclusion

Our results suggest residential density performs better than Walk Score for the prediction of whether someone is walking at an XY location in urban King County, Washington. Transit ridership was as predictive as EPA Index. Residential density and transit ridership should be considered as single-component walkability metrics for public health studies requiring readily accessible longitudinal metrics. Further research will explore the replicability of these findings in other urban settings and extend this conceptualization of walkability to explore which metrics are best predictive of walking duration.

References

- Kang B, Moudon AV, Hurvitz, PM, Reichley, L, & Saelens, BE. Walking Objectively Measured: Classifying Accelerometer Data with GPS and Travel Diaries. *Med Sci Sports Exerc.* 2013; 45(7):1419-1428. doi: 10.1249/MSS.0b013e318285f202.
- Moudon, Saelens, Hallenbeck, and Rutherford. A Report on Participant Sampling and Recruitment for Travel and Physical Activity Data Collection. 2009. Available at: ntl.bts.gov/lib/31000/31700/31738/VernezMoudon_EffectofLight_Rail.pdf.

EVALUATING MODAL SHIFT IN RESPONSE TO ELECTRIC SCOOTER SHARING SERVICES IN OAKLAND, CALIFORNIA

MELODY LIN

University of Washington

Background

Shared electric scooters, commonly referred to as e-scooters, have recently emerged as a micro mobility option where riders use smartphone applications to rent dockless e-scooters. This new form of mobility provides opportunities to facilitate short trips and provide connections to public transit. E-scooters also have the potential to replace bicycle and pedestrian trips, but little is known about the effect of e-scooter usage on traveler behavior in practice. Previous work examined the relationship between e-scooter use and mode choice through summary statistics, finding that e-scooters generally replace vehicle trips and walking (1–5). However, despite an overall substitution of active travel modes due to e-scooters, some reports also show a percentage of riders increasing their rates of walking and bicycling (2).

This paper presents the results of an online survey of e-scooter share riders in Oakland, California, and explores the impact of e-scooters on mode choices including the use of AT, automobiles, and other forms of shared mobility. This work extends previous findings by

examining impacts to a comprehensive list of modes and analyzing the underlying causes of modal shift trends (1–5).

Purpose

Transportation planners and policy-makers require an understanding of the opportunities and challenges posed by the rapidly growing number of mobility options in order to make informed decisions about infrastructure and related policies. This analysis adds to our limited understanding of the relationship between e-scooter use and popular mode choices.

Methodology

Working with OakDOT staff, the author drafted an online survey covering mode choice and scooter use. The survey was made available in three languages and was distributed to scooter riders by two scooter companies and to the general public via the OakDOT website. Lime distributed the survey to a random sample of 20% of its Oakland riders, while Bird sent the survey to all its Oakland riders. There were 763 usable survey responses that were used in this analysis.

Results

E-scooters appear to compete directly with active travel, with 42% and 30% of riders saying they would have walked or biked to their destination, respectively, had an e-scooter not been available. Riders also reduced their vehicle use since the arrival of the new mobility service, with 58% of riders indicating that they have reduced usage of ride-hailing services. In contrast, the survey indicates that e-scooters may complement public transit use, with more riders using public transit more often (17%) as opposed to less often (10%) after e-scooters were introduced.

Conclusion

Survey results show Oakland e-scooter riders are reducing travel via automobile, similar to findings from other cities. There is also evidence of reduced active travel, although 13% of respondents say they walk more often after using e-scooters compared to 35% of respondents saying they walk less often. This analysis assumes that changes in riders' mode choices are caused by the introduction of e-scooters, although other factors may have influenced travel behavior over the same time period. As the e-scooter market continues to expand, it will be critical for decision-makers to understand their effects on traveler behavior in order to harness potential benefits and mitigate impacts.

References

1. Portland Bureau of Transportation. 2018 E-Scooter Findings Report. Portland Bureau of Transportation, 2019.
2. City of Santa Monica. City of Santa Monica Shared Mobility Device Pilot Program User Survey Results Conducted 01-25-2019 to 02-15-2019. 2019, p. 28.
3. City of Bloomington. City of Bloomington Scooter Survey Report. 2019.

4. City of Denver. Electric Scooter Data & Survey Results. Denver the Mile High City. <https://www.denvergov.org/content/denvergov/en/denver-council-district-13/news/2019/electric-scooter-data---survey-results-.html>. Accessed Jun. 12, 2019.
5. Skip. Skip Survey Insights: How San Francisco Rides. Skip, Apr 02, 2019.

A TALE OF TWO REGIONS: LINKING THE TRANSIT BUILT ENVIRONMENT TO HEALTH OUTCOMES

NICOLE GEITEBRUEGGE

TransLink (South Coast British Columbia Transportation Authority)

Background

Studies have shown that transportation and infrastructure investments enhancing AT can affect people's travel and physical activity behavior. Within this context, TransLink, the regional transportation authority for Metro Vancouver, is investigating the relationship between living in proximity to the region's Frequent Transit Network (FTN)¹ and health outcomes.

Previous studies conducted within Metro Vancouver inform this research. TransLink (1) found that 38% of those living in proximity to the FTN used sustainable transportation² for all trips, about twice as much as those living beyond the FTN (18%). Another collaborative study (3) investigating the relationship between built environment and health outcomes reveals that people living in highly walkable areas are less likely to be obese and less likely to have a diagnosed chronic disease. Other research (2) suggests using AT modes for commuting decreases the odds of being overweight or obese by 33% compared to commuting by car.

This study expands previous findings by exploring whether health outcomes are better for people living within proximity to the FTN compared to those living outside the FTN. It applies health-based evidence to transportation planning, decision-making and policy development by helping to understand:

- Sociodemographic differences of those living inside versus outside the FTN
- Health benefits associated with living near FTN
- If living near the FTN is associated with certain types of lifestyle/travel behavior

Methodology

The study uses 2014 MHMC survey data (4), representing 28,000 Metro Vancouver residents aged 18+. The data provides detailed information about lifestyle, health, well-being and neighborhood characteristics. This dataset is combined with GIS-polygon data representing the 2014 FTN by respondent postal code. This allows for investigating how health outcomes might associate with the presence/absence of frequent transit services within walking distance^{3***} of a residence.

Frequency analysis is used to describe demographics, self-reported health status, lifestyle and built environment of those living within and outside the FTN. Furthermore, multivariate logistic regression is applied to investigate the relationship between proximity to the FTN and health/lifestyle factors with adjustments for socioeconomic variables. For both analyses, people

living within the FTN are further separated into those living near rapid-rail FTN versus bus-based FTN.

Findings

Preliminary results suggest people living within the FTN are less likely to be obese and have higher odds of walking more than 30min for commuting compared to those living outside the FTN. However, results also reveal higher odds of mental health issues for those living within the FTN. Furthermore, these relationships are more pronounced for people living close to the rapid-rail FTN compared to bus-based FTN. The research will be completed by September 2019 and detailed final results will be available for this conference.

Conclusion

The research objective is to investigate whether living near the FTN is associated with health outcomes. The study applies cross-sectional data and therefore cannot provide evidence that living near the FTN causes an improvement in health outcome. Other factors not included in the MHMC survey affecting health outcomes, e.g. air or noise pollution, are not considered. Preliminary results reveal positive and some negative health outcomes associated with living close to the FTN.

Notes

1. FTN is a network of corridors along which transit service is provided at least every 15 min (both directions) throughout the day and evening, 7 days a week.
2. Walking, cycling or transit.
3. 800 m: rapid transit station; 400 m: frequent-bus corridor (crow flies).

References

- TransLink. A Tale of Two Regions. A regional data analysis within and beyond the FTN.2013.https://transitgis.org/download/Tale-of-2-Regions-J_Pacheco-Raguz.pdf.
- My Health, My Community. Transportation and Health in Metro Vancouver.2016.
https://myhealthmycommunity.org/wp-content/uploads/2019/04/Transportation_Report_web.pdf.
- UBC Health & Community Design Lab. Where Matters—Health and Economic Impacts of Where We Live.2019.Collaborationbetween UBC Health and Community Design Lab and multiple government agencies including TransLink.<https://health-design.spph.ubc.ca/where-matters-health-economic-impacts-of-where-we-live-2/>.
- My Health, My Community Survey (MHMC). 2014 Survey Results.
<https://myhealthmycommunity.org/explore-results/>.

EVIDENCE TO INFORM A CYCLING AND WALKING INVESTMENT STRATEGY

ANGIE CRADOCK

Harvard T.H. Chan School of Public Health

Background

In the United States, one out of ten students travel to school using physically active modes of transportation like bicycling (1.1%) and walking (9.6%), and among U.S. workers, one in 25 commutes to their job on foot (2.9%) or bicycle (1.1%) (1). Increasing the use of physically AT may be a cost-effective and sustainable strategy to increase population physical activity and improve health (2, 3) when compared to car travel.

Purpose

Researchers used a difference-in-difference analytical strategy to calculate the absolute difference over time in the percentage point change in the proportion of commuters getting to work via a bicycle or by walking in counties with “high investment” in funding that supports bike and pedestrian facilities compared to the difference over time in similar counties with “low investment” in these resources.

Methods

Researchers used 2000 U.S. Census Bureau and the five-year 2016 American Community Survey data on the transportation mode that workers in counties with a population over 100,000 regularly reported using to get to and from work in the past week. Physically active modes included bicycling and walking. Researchers summarized county-level data from the Fiscal Management Information System of the FHWA (4) on federal funding obligated annually overall and for bicycle and pedestrian uses for fiscal years (FY) 1992 through 2015. “High investment counties,” counties at or above the 90th percentile for per capita federal funding were compared to similar “low investment” counties with per capita investments lower than the median level (i.e., 50th percentile). Researchers identified matched comparison communities among counties with similar baseline commuting rates, population size, density, metropolitan status, and county demographics, car ownership, and prior investment in bicycle and pedestrian infrastructure and programs (5). Comparisons between intervention and comparison counties were estimated using linear regression models accounting for matched pair indicators.

Results

Only 2% of total transportation funding is dedicated to programs that support bike and pedestrian projects or infrastructure, but this varies by location. In high investment counties, 5.3% of all federal transportation funding is invested in biking and pedestrian infrastructure compared with just over 1% in low investment counties. High investment counties averaged just over \$9 per person in walking and biking infrastructure compared with low investment counties that averaged about \$1.50 per person. The share of commuters who biked to work increased significantly more between 2000 and 2016 in those counties that invested more in projects to support walking and

biking than in similar counties that did not invest as much. The difference-in-difference analysis comparing high investment counties with state-matched low investment counties suggests that high investment in bicycle and pedestrian funding was associated with an increase of 0.33 (95% CI 0.16, 0.49, $p < 0.001$) in the mode share of commuters traveling to work by bicycle.

Conclusion

Many communities may not invest sufficiently to support growth in biking and walking for transportation, recreation or exercise. Federal funding for bike and pedestrian projects can play a role in increasing the proportion of workers using a bike to get to and from work.

References

1. 2017 National Household Travel Survey. Federal Highway Administration, 2018. Available at <http://nhts.ornl.gov>. Accessed December 2018.
2. Lee, I.M., E. J. Shiroma, F. Lobelo, et al. Effect of Physical Inactivity on Major Non-Communicable Diseases Worldwide: An Analysis of Burden of Disease and Life Expectancy. *Lancet*, Vol. 380, No. 9838, 2012, pp. 219–229.
3. Kelly, P., S. Kahlmeier, T. Goetschi, et al. Systematic Review and Meta-Analysis of Reduction in All-Cause Mortality from Walking and Cycling and Shape of Dose-Response Relationship. *International Journal of Behavioral Nutrition and Physical Activity*, Vol. 11, 2014.
4. Cradock, A. L., P. J. Troped, B. Fields, et al. Factors Associated with Federal Transportation Funding for Local Pedestrian and Bicycle Programming and Facilities. *Journal of Public Health Policy*, Vol. 30, 2009, pp. S38–S72.
5. U.S. Department of Agriculture Economic Research Service. 2015-ERS County Typology Codes. Available at <http://www.ers.usda.gov/data-products/county-typology-codes/documentation>. Accessed December, 2018.

CYCLING WITHOUT AGE: AN INNOVATIVE PROGRAM TO IMPROVE THE QUALITY OF LIFE FOR OLDER ADULTS

PAULA MCNIEL

University of Wisconsin, Oshkosh

Background

The Cycling Without Age (CWA) program was introduced at a long-term care campus in the United States and expanded to additional sites in the local community to enhance the quality of life for older adults. CWA is a program designed to provide the trishaw rider with a trishaw bicycle ride as one to two individuals sit in a specially outfitted trishaw that is attached to the front of a specially designed bicycle driven by trained volunteer drivers. The program participants of CWA spend more time outdoors, enjoy touring the community in trishaws, and develop intergenerational relationships with their volunteer pilots. The program strengthens ties between the long-term care campus residents and the greater community. This long-term care campus became the first older adult care services provider in the United States to become a licensee and convene a coalition to launch the CWA program.

Purpose

Limited research has been done in this area since trishaw bicycle rides are new to the older adult care field. The CWA program was introduced to enhance the quality of life in persons residing in the long-term care facility. The aim of this study was to examine the impact of the CWA program on trishaw riders and trishaw pilots at a long-term care facility in the United States.

Methods

A qualitative study was conducted to analyze the effectiveness of the CWA program. The qualitative design consisted of a phenomenological approach to collect data through semi-structured face to face interviews. A total of 27 interviews were conducted with 16 riders and 11 pilots at a long-term care facility in the United States over a two month period.

Results

Researchers identified five phenomenological themes. Three themes were identified with the 16 older adult riders: 1) a breath of fresh air, 2) wave, chat and remember, and 3) sit back and relax. Two themes were identified for the 11 volunteer pilots: 1) change in frame of mind, and 2) mental and physical rewards.

Conclusion

The study findings confirmed the positive impact of the CWA experience for long-term care residents and pilots. The CWA program provided an opportunity for more meaningful interactions between long-term care residents, family, staff and community volunteers participating in the program. The clinical relevance for the CWA program can be seen as the older adult population continues to expand, long-term care facilities, older adult community centers, and community programs can use the activity of CWA as a new strategy for patient-centered approach to care. The CWA program is a unique way to engage family members in being a partner in care through becoming a volunteer pilot or enjoying a trishaw ride together with their family member. Since the CWA program is relatively new, it provides an opportunity for leadership and community engagement to create a CWA chapter in a community. In this case the CWA introduction was a community project engaging the long-term care campus, senior center, police department, city planning office, bicycle business, university nursing school, and older adults living on the campus.

References

- Anderson, N. D., T. Damianakis, E. Kröger, L. M. Wagner, D. R. Dawson, M. A. Binns, and D. Albarracín. The Benefits Associated with Volunteering Among Seniors: A Critical Review and Recommendations for Future Research. *Psychological Bulletin*, Vol. 140, No. 6, 2014, pp. 1505–1533.
- Andersson, I., E. Pettersson, and B. Sidenvall. Daily Life After Moving into a Care Home: Experiences from Older People, Relatives and Contact Persons. *Journal of Clinical Nursing*, Vol. 16, No. 9, 2007, pp. 1712–1718.

- Campbell, J. L., C. Quincey, J. Osserman, and O. K. Pederson. Coding In-Depth Semistructured Interviews Problems of Unitization and Intercoder Reliability and Agreement. *Sociological Methods & Research*, Vol. 42, No. 3, 2013, pp. 294–320. doi: 10.1177/0049124113500475.
- Chang, P., L. Wray, Y. K. Lin, E. Anne, L. M. Martire, and M. M. Frank. Social Relationships, Leisure Activity, and Health in Older Adults. *Health Psychology*, Vol. 33, No. 6, 2014, pp. 516–523. Available at <http://dx.doi.org/10.1037/hea0000051>.
- Cycling Without Age. About. Retrieved from <http://cyclingwithoutage.org/about/>.
- Cycling Without Age. The Pilot. Retrieved from <http://cyclingwithoutage.org/the-pilot/>.
- Cycling Without Age. Social Media. Retrieved from <http://cyclingwithoutage.org/social-media/>.
- Firman, J. Nine Strategies to Transform Community Service Organizations That Assist Older Adults. *Generations*, Vol. 38, No. 2, 2014, pp. 60–66.
- Fitzsimmons, S., and D. P. Schoenfelder. Evidence-Based Practice Guideline: Wheelchair Biking for the Treatment of Depression. *Journal of Gerontological Nursing*, Vol. 37, No. 7, 2011, pp. 8–15. doi: 10.3928/00989134-20110602-03.
- Konrath, S., A. Fuhrel-Forbis, A. Lou, S. K. Brown, and E. Anne. Motives for Volunteering Are Associated with Mortality Risk in Older Adults. *Health Psychology*, Vol. 31, No. 1, 2012, pp. 87–96. Available at <http://dx.doi.org/10.1037/a0025226>.
- Olsson, A., C. Lampic, K. Skovdahl, and M. Engström. Persons with Early-Stage Dementia Reflect on Being Outdoors: A Repeated Interview Study. *Aging & Mental Health*, Vol. 17, No. 7, 2013, pp. 793–800. doi:10.1080/13607863.2013.801065.
- Orr, N., A. Wagstaffe, S. Briscoe, and R. Garside. How Do Older People Describe Their Sensory Experiences of the Natural World? A Systematic Review of the Qualitative Evidence. *BMC Geriatrics*, Vol. 16, No. 1, 2016, p. 116. doi: 10.1186/s12877-016-0288-0.
- Ryu, J., and J. Heo. Relaxation and Watching Televised Sports Among Older Adults. *Educational Gerontology*, Vol. 42, No. 2, 2016, pp. 71–78.
- Sørensen E., and J. Torfing. Co-Initiation of Collaborative Innovation in Urban Spaces. *Urban Affairs Review*, 2016. doi: 10.1177/1078087416651936.
- Thomas, J. E., B. O'Connell, and C. J. Gaskin. Residents' Perceptions and Experiences of Social Interaction and Participation in Leisure Activities in Residential Aged Care. *Contemporary Nurse*, Vol. 45, No. 2, 2013, pp. 244–254. doi: 10.5172/conu.2013.45.2.244.
- Wilson, J. F., and K. M. Christensen. The Relationship Between Outdoor Recreation and Depression Among Individuals With Disabilities. *Journal of Leisure Research*, Vol. 44, No. 4, 2012, pp. 486–506. Available at <http://www.remote.uwosh.edu/login?url=https://search.proquest.com/docview/1282594429?accountid=9355>.
- Yeung, J., Z. Zhang, and T. Kim. Volunteering and Health Benefits in General Adults: Cumulative Effects and Forms. *BMC Public Health*, Vol. 18, No. 1, 2017, pp. 1–8.
- Zander, A., E. Passmore, C. Mason, and C. Rissel. Joy, Exercise, Enjoyment, Getting Out: A Qualitative Study of Older People's Experience of Cycling in Sydney, Australia. *Journal of Environmental and Public Health*, 2013, p. 6. doi:10.1155/2013/547453.

HEALTH, SAFETY, AND ECONOMIC BENEFITS OF IMPLEMENTING ROAD DIETS

LAUREN BLACKBURN

VHB

Background

The scope of the STEP program is to reduce pedestrian crash risk by promoting the implementation of proven pedestrian safety countermeasures. The safety benefits of road diets, and other STEP countermeasures, have been evaluated nationally and across multiple land use and development contexts. For example, road diets are a proven safety countermeasure shown to reduce all types of crashes up to 47% in suburban areas. The STEP program highlights road diets, and six other proven countermeasures for improved pedestrian safety, as a strategy to reduce pedestrian crash conflicts, moderate speeds and crash severity, and provide opportunities for bicycle or pedestrian networks. Training, guidance, and outreach conducted through the EDC and STEP programs have helped increased implementation of Road Diets and improved pedestrian safety, public health, and economic prosperity.

Purpose

Pedestrian safety is a significant threat to pedestrian mobility, quality of life, and public health. Pedestrian crash rates across the U.S. and in most states have increased, overall since 1990 and dramatically since 2014. In response to these disturbing trends, FHWA developed the STEP program. STEP promotes road diets and six other proven countermeasures for improved pedestrian safety through virtual and in-person training, free guidance, and case study resources.

Methodology

Road diets are where the number or width of vehicle travel lanes across a roadway have been reconfigured. The most common form of a road diet is the conversion of a four-lane, undivided roadway to a three-lane road including a center, two-way turn lane. The safety benefits of road diets are measured by the reduction in all crashes, moderation of traffic speed, and reduction in crash severity. The economic benefits of road diets are measured by the changes in retail visits and expenditures, and the health benefits are measured by increased walking, bicycling, and transit riders.

The FHWA EDC and STEP programs integrate high quality crash modification factors (CMFs) into guidance and marketing materials designed to increase implementation road diets and other STEP countermeasures. For example, FHWA highlights the CMFs produced by two road diet research studies. Pawlovich, et al. (2006) reviewed road diets in Iowa and developed a CMF of .81 for urban areas (19% crash reduction factor). Persaud et al. (2010) reviewed road diets at multiple locations and developed a CMF of .53 for suburban areas (47% crash reduction factor).

As part of the EDC-3 Road Diet innovation (2015-2016), FHWA developed guidance for agencies to use when evaluating the potential for lane reductions or road diets. This program sponsored multiple workshops, webinars and peer exchanges to increase awareness of the safety,

economic, and health benefits of road diets. As part of the EDC-4 STEP innovation (2017-2018), FHWA evaluated reports related to road diets and the other STEP countermeasures to develop the 2018 Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations. This guide introduces a six-step process for practitioners to follow to identify sites for pedestrian safety improvements and initial options for countermeasures per roadway conditions and safety issues noted. STEP continues as part of EDC-5 (2019-2020) to offer free training, webinars, technical assistance and educational materials describing the health, safety, and economic benefits of road diets and other pedestrian crossing countermeasures.

Results

As part of EDC-3, multiple states advanced their implementation of road diets by participating in training event, developing guidance, and testing installation of road diets on local and state-system roads. During EDC-4, 22 states developed action plans for advancing their use of the STEP countermeasures, including road diets. As part of EDC-5, over 30 states have enlisted for additional training or technical assistance as they analyze crash data, refine decision-making tools, and pilot the STEP countermeasures. As a result, states are pursuing opportunities to implement road diets and other pedestrian crossing countermeasures.

Conclusion

STEP has become an important national program to promote pedestrian safety. However, pedestrian and roadway safety are often not the primary focus of public health, and pedestrian safety should be elevated as a strategy for increasing access to physical activity and reducing serious injuries or fatalities along roadways. Therefore, the STEP program and guidance supporting road diets should be part of the national conversation about the intersections between health and AT.

References

- Knapp, K., et al. Road Diet Informational Guide. FHWA, 2014.
- Blackburn, L., et al. Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations. FHWA. 2018.
- Pawlovich, M. D., W. Li, A. Carriquiry, and T. Welch. Iowa's Experience with Road Diet Measures—Use of Bayesian Approach to Assess Impacts on Crash Frequencies and Crash Rates. *Transportation Research Record: Journal of the Transportation Research Board*, No. 1953, 2006.
- Persaud, B., B. Lan, C. Lyon, and R. Bhim. Comparison of Empirical Bayes and Full Bayes Approaches for Before–After Road Safety Evaluations. *Accident Analysis and Prevention*, Vol. 42, No. 1, 2010, pp. 38–43.

HEALTHY MOBILITY MODEL FOR HEALTHY COMMUNITIES

CURTIS OSTRODKA

VHB

Background

Health risk factors are heavily influenced by a community's built and social environment. Development and application of VHB's innovative "Healthy Mobility" GIS model correlates land use, urban design, and transportation data in assessing the built environment's impact on public health. This correlation also allows for a broader ability to factor health into community and transportation planning. While available at a regional or county level, is difficult to find public health data at discrete levels (neighborhood or suburban corridor) without labor intensive surveying and costly HIAs. Although there is recognition of the linkage between health and mobility factors, there is little consensus on how to obtain this data with no universal standards defined, and few readily available models to work with.

Purpose

The "Healthy Mobility" Model, using evaluation factors associated with increasing mobility, provides a community health profile for a study area and identifies mobility and urban design enhancements to improve health outcomes. The Model can be added to the standard transportation modeling process, allowing for consideration of a community's health. Once the baseline community health profile is established, alternative scenarios can be modeled to determine if changes in design or mobility factors influence health outcomes. The Model is designed to promote Healthy Community Design (HCD) and can be utilized by both the public and private sector.

Methods

VHB used applied technology and big data to correlate available demographic, urban design, and transportation data with published health data at the census-tract level. The outcome is a community health profile, which allows for neighborhood or corridor planning at a localized level. The Healthy Mobility Model uses an ordinary least squares regression analysis to provide quantitative results about which urban design and mobility factors have the most significant statistical correlation with improved health outcomes. This model can help planners and decision-makers recommend or prioritize physical improvements that will have the greatest contributions to improved community health.

Results

This topic addresses an extremely important and relevant issue—the role that planners play in promoting healthy communities. HCD requires that public health, planning and design, and academia professionals work together to develop tools that can be used to analyze the role that design and transportation plays in promoting better health outcomes. Participants will learn about the relationship between public health and the built environment, including the principles of

HCD, health data, innovative tools, successful planning strategies, and best practices for building capacity with decision-makers to routinely include health in the planning process at the local, regional, and state levels. Case studies will be highlighted as examples.

Conclusion

The Healthy Mobility Model will continue to be refined by expanding the data to include additional values and parameters, as well as expand into larger geographic coverage. As development of the Model continues, it will be viable for use in areas without published health data at the Census tract level. While the Model is not intended to replace sound professional judgment, it serves as a useful analytical tool to guide and inform decision-making.

References

- Cervero, R., and K. Kockelman. Travel Demand and the 3Ds: Density, Diversity, and Design. *Transportation Research Part D: Transport and Environment*, Vol. 2, No. 3, 1997, pp. 199–219.
- Ewing, R., and R. Cervero. Travel and the Built Environment: A Synthesis. *Transportation Research Record: Journal of the Transportation Research Board*, No. 1780, 2001, pp. 87–114.

BUILD IT, BUT THEY MIGHT NOT COME: BREAKING DOWN BARRIERS TO ACTIVE TRANSPORTATION

TORSHA BHATTACHARYA

Rails-to-Trails Conservancy

Background

A 2011 review of the effects of trails on physical activity did not find conclusive results (1). A few studies observed no increases in physical activity, while perceptions trail proximity was associated with an increased odds of physical activity in others (2). The factor most associated with trail use is access, in one study trail use differed with greater perceived distance to the trail, a difference that was supported by objective measures (3, 4). In this research demographic factors, built environmental and perceptions are used to predict trail use behavior among randomly selected adults in the United States.

Purpose

The scope of this research was to understand the barriers that prevent people from engaging in physical activity on trails. This study was conducted to better understand why some people use trails and greenways while others do not, what each groups' motivations and barriers are to walking and bicycling on trails and to gain insights into the ways to overcome these barriers.

Methods

A survey software was used to conduct a random nationwide survey about people's perception and habits regarding physical activity on trails. The survey questions asked respondents about their home zip code, frequency of trail use; awareness of neighborhood trails; personal characteristics; recreational activities; purpose, barriers, and motivations for walking/bicycling on trails; and travel mode preferences. Due to the nature of the variables, logistic regression was used to analyze the survey data. The dependent dichotomous variable was current trail use as revealed respondents. Independent variables included trail access, awareness, perceptions, demographics of the respondents.

Results

Odds of trail use for people who are aware of trails in their neighborhood is 6.07 times that of people who are unaware. Odds of trail use for people with access to trails is 1.23 times that of people without access. The results point to the significance of building more trails nationwide so that more people can easily get to trails without any significant barriers. Odds of trail use for people riding a bike is 1.31 times that of people walking.

Conclusions

This research used qualitative and quantitative data to analyze people's trail use across the United States. The concept of build it they will come holds true in a lot of situations. But research shows that in some cases trail use is limited to certain sections of the population and therefore the associated health benefits of trail use is not distributed equitably among the population. In case of trails, even if people have access, they might not use it for a variety of personal, cultural, and financial reasons. But the most important finding from this study is the impact of increasing awareness on people's trail use. While building trails is of primary importance, education and programmatic interventions that increase the awareness of trails, especially among non-trail users, and encourage diverse group of people to use trails might have a disproportionately large impact on increasing trail use.

References

- Starnes, H. A., P. J. Troped, D. B. Klenosky, and A. M. Doehring. Trails and Physical Activity: A Review. *Journal of Physical Activity and Health*, No.8, 2011, pp. 1160–1174.
- Pierce, R. J., A. V. Denison, A. A. Arif, and J. E. Rohrer. Living Near a Trail Is Associated with Increased Odds of Walking Among Patients Using Community Clinics. *Journal of Community Health*, Vol. 31 No. 4, 2006, pp. 289–302.
- Abildso, C. G., S. Zizzi, L. Abildso, J. C. Steele, and P. Gordon. Built Environment and Psychosocial Factors Associated with Trail Proximity and Use. *American Journal of Health Behavior*, 2007.
- Brownson, R. C., R. A. Housemann, D. R. Brown, J. Jackson-Thompson, A. C. King, B. R. Malone, and J. F. Sallis. Promoting Physical Activity in Rural Communities Walking Trail Access, Use, and Effects. *American Journal of Preventive Medicine*, Vol. 18, No. 3, 2000, pp. 235–41.

WALKABLE NEIGHBORHOODS AND OBESITY OVER TIME: FINDINGS FROM THE NATIONAL REGARDS STUDY

NATALIE COLABIANCHI

University of Michigan

Background

Previous studies reported that walkability is associated with increased physical activity and less obesity, although the evidence is mixed (1–6). Many of these previous studies are limited by their cross-sectional design and/or limited variability in terms of geography, age and race. Walk score, a valid measure of walkability, has been used in a number of studies across the globe to examine the association between walkability and various health outcomes. Although the calculation of walk score is propriety, its use allows uniformity of methods across studies.

Purpose

We examined the association between walk score and overweight/obesity status over time in a national sample of black and white adults aged 45 and older. Further, we examined whether the association between walk score and overweight–obesity status was modified by age, race, or gender.

Methods

The Reasons for Geographic and Racial Differences in Stroke Study (REGARDS) enrolled 30,239 participants in 2003–2007. Participants who completed both the baseline in-person examination (2003–2007) and the follow-up in-person examination approximately ten years later were included in this analysis ($N = 13,477$). The walk score was categorized into three groups: car-dependent, somewhat walkable, and very walkable/walker's paradise. BMI was calculated based on objectively measured height and weight and classified into weight status defined as overweight or obese versus normal weight or underweight. Logistic regression was used to calculate odds ratios (OR) of the association between walk score and weight status at follow-up, adjusted for baseline BMI, age, race, gender, income, education, marital status, urban city, neighborhood SES and health conditions (diabetes, hypertension, dyslipidemia, and smoking status). Interactions between walk score and weight status by age, race, and gender were examined in separate models.

Results

Participants living in very walkable neighborhoods had a 20% lower odds of being overweight or obese at follow-up compared to those who lived in a car-dependent neighborhood even after controlling for baseline BMI (OR = .80; 95% CI: .65–.98). Adults in the lowest tertile of age had the strongest associations relative to older ages. Young adults in very walkable neighborhoods had a 29% lower odds of being overweight–obese at follow-up (OR = .71; 95% CI: .50–.99). In addition, women had a stronger association relative to men. Women in very walkable neighborhoods had a 25% lower odds of being overweight/obese at follow-up (OR =

.75; 95% CI: .57–.98). There was no difference in the association between walk score and weight status by race.

Conclusion

This large national biracial study confirms other studies that reported positive health effects from neighborhood walkability. We advance knowledge by showing that weight status at 10- year follow-ups was associated with walkability even after accounting for baseline BMI in particular for women and younger adults. While the walk score obtained in our study was for the participant's baseline address, the walk score reflects current neighborhood conditions and not the neighborhood conditions at baseline. The findings suggest that policies to improve the walkability of neighborhoods might have an important effect on obesity, which is associated with many negative health outcomes.

References

- Camhi, S. M., P. J. Troped, M. Garvey, L. L. Hayman, A. Must, and A. H. Lichtenstein, et al. Associations between Walk Score and objective measures of physical activity in urban overweight and obese women. *PLoS One*, Vol. 14, No. 3, 2019.
- Chiu, M., B. R. Shah, L. C. Maclagan, M. R. Rezai, P. C. Austin, and J. V. Tu. Walk Score(R) and the Prevalence of Utilitarian Walking and Obesity Among Ontario Adults: A Cross-Sectional Study. *Health Rep.*, Vol. 26, No. 7, 2015, pp. 3–10.
- Chudyk A. M., H. A. McKay, M. Winters, J. Sims-Gould, and M. C. Ashe. Neighborhood Walkability, Physical Activity, and Walking for Transportation: A Cross-Sectional Study of Older Adults Living on Low Income. *BMC Geriatrics*. 2017; 17(1):82.
- Cole R, Dunn P, Hunter I, Owen N, Sugiyama T. Walk Score and Australian adults' home-based walking for transport. *Health Place*, Vol. 35, 2015, pp. 60–65.
- Duncan, D.T., J. Meline, Y. Kestens, K. Day, B. Elbel and L. Trasande, et al. Walk Score, Transportation Mode Choice, and Walking Among French Adults: A GPS, Accelerometer, and Mobility Survey Study. *International Journal of Environmental Research and Public Health*, Vol. 13, No. 6, 2016.
- McCormack, G. R., A. Blackstaffe, A. Nettel-Aguirre, I. Csizmadi, B. Sandalack, and F. A. Uribe, et al. The Independent Associations between Walk Score ((R)) and Neighborhood Socioeconomic Status, Waist Circumference, Waist-To-Hip Ratio, and Body Mass Index Among Urban Adults. *International Journal of Environmental Research and Public Health*, Vol. 15, No. 6, 2018.

IMPACT AND MITIGATION OF TRAFFIC NOISE AND AIR POLLUTION IN SOMERVILLE: A HEALTH LENS ANALYSIS

SHARON RON

Metropolitan Area Planning Council (Metro Boston)

Background and Purpose

Near-highway air and noise pollution are significant public health problems that have resulted from top-down policy- and decision-making. In the 1970s, the heart of a thriving neighborhood in the City of Somerville, Massachusetts, was demolished for the construction of Interstate 93 (I-93). Today, over 200,000 vehicles drive through this environmental justice neighborhood,

exposing residents to elevated levels of traffic related air pollution (TRAP) and noise. We have documented high exposure to TRAP – particularly to ultrafine particles – and shown associations with blood biomarkers of inflammation in Somerville residents. We also documented traffic noise in the area that exceeds the FHWA noise abatement criteria and health-based levels.

In response to our findings and resident concern, representatives of the neighborhoods near I-93 sought to apply an innovative Health in All Policies tool in order to 1) elevate awareness about how current TRAP and noise impact residents' well-being and 2) explore how noise barriers might mitigate these exposures.

Description

To advance these goals, we used HLA to engage residents and decision-makers and elevate health considerations in a public process for noise barriers. Evidence was gathered through outreach, interviews with topical experts, and literature reviews. Recent air monitoring on the I-93 corridor was applied and a noise study and risk assessment was conducted to estimate health outcomes and mortality for area residents due to their near-highway exposure.

The project team engaged with residents in community meetings and neighborhood events. Simultaneously, we held discussions with elected officials, municipal staff, and Massachusetts DOT – who control noise barrier installation. The project culminated in a design charrette where participants generated evidence-informed and actionable strategies to mitigate exposure to pollutants and improve neighborhood livability through built environment measures.

Lessons Learned

We adapted our process to fit community context; while not our first approach, we shifted to a HLA so we could explore alternatives in the absence of noise barrier funding and to reflect that several sections of the nearby neighborhoods were not suitable for noise barrier installation. We were able to substantially increase the reach of our engagement by attending capacity-building classes for immigrant-residents and by working with youth interpreters. The community-led noise study enhanced the accessibility of findings.

Conclusions and Implications

The HLA approach, combined with a design charrette, was successful at engaging affected near-highway communities and generating community- and evidence-informed mitigation approaches that can integrate into public decision-making. The HLA elevated evidence that noise barriers along I-93 could effectively reduce residents' exposure to pollutants. It was flexible enough to allow creative solutions in locations where geographic and meteorological conditions would limit installation and efficacy. And, the HLA and charrette provided a space where community could push back and lead, shaping recommendations for esthetics, site planning, and vegetation.

Next Steps

The ultimate goal of this work is to see the community-generated recommendations adopted by decision-makers. The project team continues to work with local activists, community groups,

elected officials, and government employees to raise awareness of this issue and promote evidence-based solutions.

References

- Lane, K. J., J. I. Levy, M. K. Scammell, J. L. Peters, A. P. Patton, E. Reisner, and D. Brugge. Association of Modeled Long-Term Personal Exposure to Ultrafine Particles with Inflammatory and Coagulation Biomarkers. *Environment International*, Vol. 92, 2016, pp. 173–182.
- Münzel, T., M. Sørensen, T. Gori, F. P. Schmidt, X. Rao, J. Brook, and S. Rajagopalan. Environmental Stressors and Cardio-Metabolic Disease: Part I, *Epidemiology*, 2017.
- Evidence Supporting a Role for Noise and Air Pollution and Effects of Mitigation Strategies. *European Heart Journal*, Vol. 38, No. 8, pp. 550–556.
- Baldauf, R. Roadside Vegetation Design to Improve Local, Near-Road Air Quality. *Transportation Research. Part D, Transport and Environment*, Vol. 52, No. 11, 2017, pp. 354–361.
- Health Lens Analysis Projects. Government of South Australia Health Department (SA Health). Federal Highway Administration, U.S. Department of Transportation. <https://www.fhwa.dot.gov/5>. <https://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/about+us/about+sa+health/health+in+all+policies/health+lens+analysis+projects>.

HEALTH IMPACTS OF BUS RAPID TRANSIT SYSTEMS WORLDWIDE

DAVID ROJAS-RUEDA

Colorado State University

Background

The city populations are rapidly expanding all over the world which places increased pressure on transportation systems specifically that of private motor vehicle transport. The private motor vehicle industry has many negative implications on health such as physical activity and environmental factors. Public transport, and specifically BRT systems are an efficient form of public transportation that is also growing in popularity and proven to have a positive impact in public health such as improved physical activity, reduced gas emissions and pollutant exposure and improved traffic safety.

Objective

Quantify the health risks and benefits related to BRT in seven cities worldwide.

Methodology

A quantitative HIA approach was used. We selected seven cities (Bogota, Colombia; Brisbane, Australia; Helsinki, Finland; Istanbul, Turkey; Mexico City, Mexico; Miami, Florida; Paris, France) with >10,000 passenger trips per day and with available data on transport, environment and health. Transport, environment and health data was collected from official data sources and scientific papers. The oPTHIMA tool was used to quantify the risk and benefits related to traffic fatalities, air pollution (particulate matter less than 2.5 micrometers of diameter) and physical

activity, in those that shift from car to BRT. Four scenarios were created to estimate the impacts of different modal shift between car and BRT. An economic evaluation was performed to estimate the economic impacts related to mortality using the Value of Statistical Life.

Results

Overall the benefits outweigh the risks in every scenario and city. Physical activity was the main driver of the results. Mexico City BRT benefit the most with 160 annual deaths avoided and an economic impact of 290 million USD, in the most conservative scenario. In the less conservative scenario we estimated (in the seven cities), BRT implementation could prevent 2401 deaths and save 3802 million USD annually.

Conclusions

The BRT systems may be a contributing factor to the public health of communities and cities worldwide. Physical activity related to public transport was the driver and resulted in the most substantial benefit of all estimate exposures. The cities with the largest daily BRT passenger trips resulted in the largest estimated benefits. This analysis should be used to inform policies and urban planners to consider the impact that transportation systems have on health.

HEALTH IMPACTS OF BIKESHARING SYSTEMS IN EUROPE

DAVID ROJAS-RUEDA

Colorado State University

Background

Bike sharing systems (BSS) have been implemented in several cities around the world as policies to mitigate climate change, reduce traffic congestion, and promote physical activity.

Aim

This study aims to assess the health impacts (risks and benefits) of major BSS in Europe.

Methods

We performed a HIA study to quantify the health risks and benefits of car trips substitution by bikes trips (regular bikes and/or electric bikes) from European BSS with >2000 bikes. Four scenarios were created to estimate the annual expected number of deaths (increasing or reduced) due to physical activity, road traffic fatalities, and air pollution. A quantitative model was built using data from transport and health surveys and environmental and traffic safety records. The study population was BSS users between 18 and 64 years old.

Results

Twelve BSS were included in the analysis. In all scenarios and cities, the health benefits of physical activity outweighed the health risk of traffic fatalities and air pollution. It was estimated that 5.17 (95%CI: 3.11–7.01) annual deaths are avoided in the twelve BSS, with the actual level of car trip substitution, corresponding to an annual saving of 18 million of Euros. If all BSS trips replaced car trips, 73.25 deaths could be avoided each year (225 million Euros saving) in the twelve cities.

Conclusions

The 12 major bike sharing systems in Europe provide health and economic benefits. The promotion of shifting car drivers to use BSS can significantly increase the health benefits. BSS in Europe can be used as a tool for health promotion and prevention.

CORRELATES OF ACTIVE COMMUTING, TRANSPORT PHYSICAL ACTIVITY, AND LIGHT RAIL USE IN A UNIVERSITY SETTING

KATIE CRIST

University of California, San Diego

Background

Physical inactivity is a global health crisis that continues to worsen. The promotion of active modes of travel, like biking, walking and transit, has been recommended as a strategy to increase physical activity (PA) levels as well as reduce air pollution and traffic congestion. Universities are large employment and education centers and provide a feasible intervention setting. A new light rail transit (LRT) line under construction will connect downtown San Diego to the University of California, San Diego campus and presents a major opportunity to intervene on campus commuting behaviors.

Purpose

The purpose of this study was to identify individual, organizational and environmental factors associated with 1) active commute mode, 2) intention to use the new LRT, and 3) transport PA, in a sample of university staff, students and faculty.

Methods

PA researchers collaborated with planners to develop a survey of commute behaviors and preferences that was distributed to all university staff, faculty and students in 2017. The outcomes of interest included the likelihood of: 1) active versus vehicle commute mode, 2) intention to use LRT versus not, 3) any amount of transport PA versus none, and 4) the duration (min/week) of TPA in the past week. Multivariable logistic and linear regression models assessed associations between potential correlates and our outcomes.

Results

From the full sample of survey respondents (N=10,943), those with no missing data ($n = 6,894$) were included in the analyses. The intention to use LRT analysis was conducted with a subsample ($n = 979$) with data for that outcome. Results showed that those commuting by biking, walking or transit, achieved greater minutes of transport PA per week, compared to vehicle commuters. Staff were less likely to commute via active modes and had fewer minutes of transport PA, compared to students, suggesting a promising intervention group. Compared to males, females had less transport PA and were less comfortable on all cycling facilities, indicating interventions may need to be gender specific. Discounted transit pass and rideshare use were positively associated with all outcomes, highlighting incentives that could encourage AT. A significant increase in comfort when cycling with greater separation from traffic was found, suggesting the need for bicycle infrastructure improvements. Environmental variables, like distance to campus and transit stops were associated with commute mode and intention to use LRT.

Conclusion

Nearly 70% of the study sample were vehicle commuters, underscoring the need for effective programs to achieve both health and sustainability goals. Results demonstrated the link between commute behaviors and PA and provided insight into intervention strategies and campus programs that may encourage a shift from vehicle commuting to active modes. Well-designed interventions in conjunction with transit infrastructure could provide much needed insight into the most successful policies and behavior change strategies to incur mode shift at a scale that is meaningful for the health of individuals and the environment.

USING SYNTHETIC CONTROLS WITH INTERACTIVE FIXED EFFECTS TO EXAMINE CHANGES IN VEHICLE SPEED RELATED TO NEW YORK CITY'S VISION ZERO PROGRAM

DAVID EDERER

Georgia Institute of Technology

Background

New York City passed one of the first *Vision Zero* policies in the United States with the goal of ending traffic deaths within 30 years. The policy is intended to increase safety with a particular focus on walking and cycling. The policy was accompanied by substantial investment in road infrastructure improvements intended to slow speeds and by extension, reduce the number of traffic injuries and deaths in New York City.

Purpose

To date, researchers have only been able to evaluate *Vision Zero* policies using data on injuries and deaths. Crashes are rare events, and immediate decreases in injuries and deaths may not be

detected in traditional medical and transportation data sources, which suffer from under- and misreporting. Vehicle speeds can act as a surrogate measure of safety. Vehicle speed is one of the key risk factors for crashes involving people walking and cycling. Decreased speeds tend to be associated with decreased likelihood of injury and death.

Until recently, large-scale vehicle speed and infrastructure data has not been available or widely accessible. Uber Movement and NYC Open Streets data allow for an evaluation of infrastructural interventions. The sequential rollout of infrastructural improvements, while not random, allows researchers to analyze speed behaviors before and after implementation while comparing to similar roadways.

This research contributes to theory, practice, and policy. To date, Uber Movement speed data has yet to be analyzed and novel methods need to be developed to use the data. Probe vehicle speed data (e.g., from INRIX, HERE, and Streetlight Data) is increasingly available and transportation/health professionals must understand how to properly use it. Similarly, few *Vision Zero* programs have been rigorously analyzed, and there is little information about whether infrastructure interventions are effective. While some evaluations have analyzed citywide injury and fatality trends, understanding whether and how vehicle speeds change in relation to specific infrastructure designs provides a more robust evaluation of this policy and the engineering treatments.

Methodology

This research compares vehicle speeds on roads improved under New York City's *Vision Zero* program to synthetic controls to estimate the effect of infrastructure improvements on vehicle speeds and safety. Roadway corridors that were received infrastructure improvements as part of the *Vision Zero* program in 2018 were selected as the exposed units. Synthetic controls were created from a weighted combination of roadway links with similar speeds, traffic volumes, crash histories, and road design using an interactive fixed effects model. The synthetic control approach is appropriate as infrastructural improvements are typically phased over time and cannot be completed simultaneously, and it is difficult to meet the parallel trends assumption needed for difference-in-difference analyses. This approach offers a new method to analyze road safety data.

Conclusion

Infrastructure improvements can decrease the likelihood of injuries and increase the likelihood of AT. Understanding the extent to which infrastructure improvements decrease speed is important for informing ways to decrease perceived and actual safety risk on roadways. This research will assist policy-makers in determining how to make infrastructure improvements to improve road safety.

NETWORK SCREENING APPROACH FOR CYCLIST SAFETY IN QUÉBEC CITY

DAVID BEITEL

Eco-Counter

Background

The objective of this study is to demonstrate a simple approach for estimating bicycle activity across an entire network, to perform network screening by merging bicycle activity estimates with bicycle collision data, and to apply the methodology in a case study of the city of Québec. Only a few studies have combined GPS bicycle trip data with screenline bicycle counts to generate network-wide cycling activity estimates (1–2) and only one known study has used network-wide bicycle exposure data to estimate risk in a network screening process (1). The results from the study in Québec revealed high-risk intersections in need of prioritization for safety treatments and cycling desire lines.

Purpose

This research demonstrates a relatively simple, practice-ready approach for estimating bicycle activity across all network elements (roads, bike paths, and intersections) by combining screenline bicycle counts from automated bicycle counters with GPS bicycle trip traces. The resulting estimates can be merged with bicycle–vehicle crash data to perform network screening at intersections, and with existing bicycle infrastructure maps to reveal desire lines.

Methodology

Long-term, automatic, bicycle counters have been used as references to estimate daily averages using short-duration counts (3–5). However, few studies have demonstrated that long-term screenline counting sites can be used as references to estimate daily averages from GPS trace cyclist data (1). The merging of bicycle screenline counts and network-wide GPS trace data allows for bicycle activity to be estimated throughout the entire road network. The bicycle counts at each segment of the network are expanded to average daily bicyclists using a factor, which is determined through linear regression. The dependent variable being the average daily bicyclists derived from the cleaned and validated (6) long-term and short-term screenline counting data. The network-wide bicycle activity, used as an exposure measure, is combined with reported collision data to estimate risk at intersections (defined as collisions per million cyclists) for the purpose of network screening.

The methodology was applied in a case study of Québec City. The study uses data from three long-term bicycle counters, 20 short-term counting sites and GPS traces from 6,100 bike trips generated by 650 citizens in 2015 as part of a campaign to identify desired travel routes through the city using a mobile application called Mon Trajet Vélo.

Results

All intersections with bicycle traffic exceeding 1,000 trips per day are located along bicycle facilities, confirming that Québec City cyclists prefer traveling on cycling facilities. Figure 1

illustrates the raw data from the Mon Trajet Vélo smartphone application (red traces) and average daily bike counts at point locations from automatic bicycle counters (white circles with average daily bike counts given).

Intersections with the most collisions involving cyclists occur along the most used cycling facilities near the city center. The number of reported collisions involving a cyclist, by intersection, are plotted in Figure 2.

The cyclist collision rates at intersections throughout the city are illustrated in Figure 3. Most of the high-risk intersections are not located along cycling facilities. A total of nine intersections had an estimated collision rate of more than ten collisions per million cyclist trips, eight of which are not located on cycling facilities. The highest risk intersections appear along several corridors that form a connection between the suburban areas and the city center.

Conclusion

The estimated network-wide cycling activity has several applications. Firstly, it provides a cycling heat map that can help identify where road treatments and maintenance should be prioritized and where bicycle parking is needed. Secondly, cycling activity is required as a level of exposure to estimate cycling risk. Maps are generated that identify the most high-risk intersections (defined as collisions per million cyclists) in the city. Lastly, desire lines are determined by identifying the streets and corridors with heavy cyclist activity, despite having no cycling infrastructure.

This research demonstrates a practice-ready approach for estimating bicycle activity across a network. When paired with collision data and the existing bicycle network, the results can help inform transportation departments in planning for and designing safe infrastructure.

References

- Strauss, J., L. F. Miranda-Moreno, and P. Morency. Cyclist Activity and Injury Risk Analysis at Signalized Intersections: A Bayesian Modelling Approach. *Accident Analysis and Prevention*, Vol. 59, 2013, pp. 9–17.
- Strauss, J., and L. F. Miranda-Moreno. Speed, Travel Time and Delay for Intersections and Road Segments in the Montreal Network Using Cyclist Smartphone GPS Data. *Transportation Research Part D: Transport and Environment*, Vol. 57, 2017, pp. 155–171.
- Nordback, K., et al. Estimating Annual Average Daily Bicyclists. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2339, 2013, pp. 90–97.
- Miranda-Moreno, L. F., et al. Classification of Bicycle Traffic Patterns in Five North American Cities. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2339, 2013, pp. 68–79.
- Hankey, S., G. Lindsey, and J. Marshall. Day-of-Year Scaling Factors and Design Considerations for Non-Motorized Traffic Monitoring Programs. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2468, 2014, pp. 64–73.
- Beitel, D., S. McNee, F. McLaughlin, and L. F. Miranda-Moreno. Automated Validation and Interpolation of Long-Duration Bicycle Counting Data. *Transportation Research Record*, No. 2672, 2018, pp. 75–86.

COLORADO DOWNTOWN STREETS

CATE TOWNLEY

Colorado Department of Public Health and Environment

Background

In 2015, the Colorado Department of Public Health and Environment instituted a collaboration with the Colorado Department of Transportation (DOT) and the Department of Local Affairs to facilitate policy and environmental change to promote safe, equitable access to walking in local communities. The collaborative team participated in the 2015 National Association of Chronic Disease Directors' Walkability Institute with the goal to improve the way state agencies work together to advance multimodal transportation in urban and rural areas of Colorado. As a result, the team developed the Colorado Downtown Streets suite of resources for local communities to design, build and improve state highways that also serve as multimodal main streets to increase walkability.

Purpose

Attending the Walkability Institute helped Colorado build and advance strategic institutional relationships at the intersection of health and AT. Through the development of the Colorado Downtown Streets resources and corresponding workshops, Colorado has increased the capacity of local communities to understand the connection between infrastructure improvements for AT and non-health factors such as social cohesion, safety, economic vitality, and climate by illustrating how street design, physical health and economic development are connected.

Description

Savvy local leaders understand that a vibrant downtown is essential to a strong local economy and that great streets are essential to a walkable, successful downtown. In this session participants will learn how Colorado is helping local communities to better understand and communicate the connections between street design, physical health and economic development; how to diagnose barriers and identify appropriate design solutions for creating safe multimodal main streets as well as best practices for collaborating with the Colorado Department of Transportation. Colorado will share lessons learned from a series of ten workshops designed activate the concepts in the Colorado Downtown Streets guides. Colorado will also share lessons learned from four communities who implemented low-cost enhancements to the main street walking environments including wayfinding signs, benches and shade trees.

Conclusions

Colorado encourages communities to pass policies and prioritize infrastructure improvements to promote active living and accessible street design with features conducive for safe PA. The Colorado Downtown Streets resources have helped the state take bold steps towards revolutionizing Colorado's approach to designing state highways that also serve as multimodal main streets.

Next Steps

Colorado will continue to build on state agency collaboration and work to include health metrics in the Statewide Transportation Plan and include transportation in the State Health Improvement Plan.

Reference

Colorado State Department of Local Affairs. *Colorado Downtown Streets*.
<https://cdola.colorado.gov/colorado-downtown-streets>. Accessed April 21, 2020.

WALKING TO PUBLIC TRANSIT HELPS ACHIEVE PHYSICAL ACTIVITY RECOMMENDATIONS

VI LE

University of Washington

Background

Guidelines for PA recommend that adults achieve at least 150 minutes of aerobic PA per week. However, only half of U.S. adults report obtaining sufficient levels of PA. Public transportation systems may encourage and support PA as users commonly begin and end transit trips with walking. Previous research showed that transit-associated walking increased from 2001 to 2009, but it is unknown whether this increase has been sustained.

Objective

The objective is to assess sociodemographic correlations and temporal trends in transit-associated walking in the United States from 2001 to 2017 using data from the NHTS, which is a nationally representative survey of travel behaviors.

Methods

Using the 2017 NHTS, we compared the weighted proportion of transit walkers to the total NHTS population by household income, age, education level, race/ethnicity, gender, urban size, car ownership, worker status, online delivery use, and use of a rideshare app (e.g., Uber). Multivariable logistic regression was used to determine predictors of achieving at least 30 minutes of walk time per day solely by walking to and from transit. We evaluated trends in the weighted median total walking time to and from transit using the 2001, 2009, and 2017 NHTS. Survey analysis procedures were used to account for unequal probability of selection and nonresponse.

Results

In the 2017 NHTS, transit walkers (unweighted $n = 4596$) tended to be younger, from households earning less than \$25,000/year, without a car, located in an Metropolitan Statistical

Area (MSA) of at least 3 million persons, and served by a rail system compared to the general population (unweighted $n = 230,592$). A greater proportion of transit walkers was non-Hispanic black, Asian/Pacific Islander, and Hispanic. After adjusting for income, age, education, race/ethnicity, and gender, the odds of obtaining at least 30 min of daily walk time was 61% higher among transit users with access to a rail system compared to those without (OR: 1.61; 95% CI: 1.30, 1.99; p -value <0.001) and 34% lower among transit users who made online purchases in the past 30 days (OR: 0.66; 95% CI: 0.52, 0.85; p -value = 0.002). From 2001 through 2017, median daily transit-associated walk time remained consistent [2001: 19 min (95% CI: 17.5, 20.5); 2017: 20 min (95% CI: 18.5, 21.5)]. The proportion of transit walkers obtaining at least 30 minutes of daily walk time did not change substantially over time [2001: 28.9% (95% CI: 26.4, 31.4); 2017: 30.3% (95% CI: 28.2, 32.4)]. Discretionary travel (shopping, family–personal business, social–recreational, or medical–dental trips) comprised roughly half of total travel trips among transit walkers over the study period. Between 2001 and 2017, the proportion of discretionary travel due to shopping declined from 35.0% to 31.0%.

Conclusion

Using public transit contributes to PA, and literature supporting this finding, as well as other health benefits (e.g., reduced air pollution, traffic crashes) is growing. Continued monitoring of transit-associated walking using NHTS is important, given that technological advancements (e.g., shared mobility, autonomous vehicles) and the growth of online retail may impact transit use and associated PA in the future.

ADOPTION OF A COMPLETE STREETS POLICY IN NORTH LAS VEGAS: USING EVIDENCE-BASED PRACTICES TO IMPROVE HEALTH AND SAFETY

NICOLE BUNGUM

Southern Nevada Health District

Background

The Southern Nevada Health District and North Las Vegas (NLV) launched a *Complete Streets* Policy Initiative in 2015. In 2017, NLV became the first city in Southern Nevada to adopt a stand-alone *Complete Streets* Policy. At the same time, several *Complete Streets* projects were completed and evaluated.

Purpose

This poster highlights the partnerships between public health and city government that led to the adoption of a *Complete Streets* Policy and summarizes quantifiable data on the impact of *Complete Streets* projects completed in NLV.

Description

For two years, SNHD staff worked with NLV, project consultants, National *Complete Streets* Coalition (NCSC), and other stakeholders on the development of a *Complete Streets* Policy and the addition of 4 miles of bike lanes in NLV. Major steps included:

- Comprehensive review of existing NLV policies, codes and procedures.
- Development of policy drafts which were reviewed by NCSC and other stakeholders.
- Amendments to the NLV Comprehensive Master Plan to include the *Complete Streets* Policy.
- A public hearing at the NLV Planning Commission.
- City Council approval of the policy and Comprehensive Master Plan amendments.
- Implementation and evaluation of *Complete Streets* projects.

Four miles of bike lanes were added to priority corridors in downtown NLV. An evaluation of the impact the bike lanes included collection of pre- and post-installation user counts and a post-installation intercept study. Bike lanes were installed between 2016 and 2017. Pre-installation user counts were collected in July 2015, and post-installation counts were collected in 2017. Pre- and post-user counts were collected manually using electronic count equipment at seven locations within the priority corridor. Observation periods were established and data were collected at various times during the day. To assess mode choice, frequency of active transit, and safety concerns, an intercept survey was developed and administered by a trained research assistant.

Lessons Learned

Overall pedestrian use of the priority corridors increased dramatically from 25.7 walkers per hour to 49.2 walkers per hour. Overall bicyclist use of the priority corridors increased slightly from 7.86 cyclists per hour to 8.46 cyclists per hour. Results from the Intercept Survey will also be shared.

Conclusion and Implications

Complete Streets Policy Implementation: The ‘Keys to Success: Implementation Plan’ developed by NLV outlines the key activities, workflow process, timelines and responsible parties to ensure implementation of the *Complete Streets* Policy. At 1-year post adoption, the Implementation Plan was working as intended and had been used to approve/process several *Complete Streets* projects under design or construction.

Complete Streets Projects: Data collected indicate that at most sites the infrastructure improvements were associated with increased rates of walking and biking. Data from the observations and survey suggest that *Complete Streets* projects such as the addition of bike lanes can improve overall walking and biking rates. Future *Complete Streets* improvements that align with the NLV *Complete Streets* Policy would likely also serve to increase bicycle and pedestrian traffic by addressing safety concerns and increasing ease of use, which could eventually lead to increases in overall PA levels.

VOICES FOR HEALTHY KIDS FRAMEWORK FOR EQUITY-FOCUSED COMPLETE STREETS POLICIES

CLAUDIA GOYTIA

American Heart Association

Description

Public policies that specifically address the needs of underserved communities or communities of concern are gaining momentum. In 2018, Voices for Healthy Kids supported numerous *Complete Streets* policies that adopted strong language to address health equity in unique ways. Tucson, Arizona; Baltimore, Maryland; and Des Moines, Iowa stand out as examples of locations passed transportation policies that are strong in their approach, language, and commitment to addressing health disparities. These campaigns utilized the Voices for Healthy Kids framework to include health equity in transportation policy by recognizing that each community is unique and will have different needs.

Lessons Learned

For successful and most-impactful implementation, local communities must identify how they want to lead on addressing equity in their transportation policy. In these three cities, policy language that included community engagement, prioritization of investment in low income communities, and a demonstrated plan of implementation and measurement have been critical in addressing the consequences of past transportation policy decisions. With committed community engagement, continued dialogue, and strong policy language, we have seen communities make a commitment to intentionally invest first in areas with the most need. Community involvement has been invaluable and has pressured decision-makers to include strong language that would result in equitable investment. Not every community will address equity in the same way, but with the model we have established, there are many ways that a community can achieve equity investments. Moving forward, the Voices for Healthy Kids framework will focus on investment in implementation and supporting those policies as they are implemented.

Conclusion

Policies that attempt to address equity are more effective when they include performance metrics, community members, transparency, and specific language that identifies those populations impacted by poor infrastructure investments. Since 2017, we have seen more communities move towards adopting policies that will help achieve equity in transportation policy and expect this trend to grow as communities see improved results.

Reference

Thrun, M., and J. Chiqui. *November 2016 Research Report: Prioritizing Transportation Equity through Complete Streets*. The University of Illinois at Chicago, 2016. Available at <https://www.ihrp.uic.edu/content/equity-complete-streets-policies-fact-sheets-research-briefs>. Accessed April 21, 2020.

CREATING A SEAT FOR PUBLIC HEALTH AT THE TRANSPORTATION PLANNING TABLE

PHYLLIS DAVIS

Kittelson & Associates

Background and Purpose

As the fourth largest county in the U.S., Maricopa County, Arizona, faces numerous public health issues, including:

- One in 4 adults are obese.
- Heart disease is the second leading cause of death.
- 50% of residents do not meet PA recommendations.

The Maricopa County Public Health Department (MCPHD) has teamed with local agencies to pioneer innovative approaches to integrate public health elements in AT planning process.

Description

AT investments can help reduce social, economic, education, and health gaps. Local initiatives to integrate health into AT include:

- **Agency Involvement and Collaboration**—MCPHD staff have been instrumental in developing region wide, collaborative partnerships where public health has a “seat at the table” to guide and support AT plans and infrastructure improvements.
- **Countywide Socioeconomic and Health Equity Propensity Models**—countywide socioeconomic and health equity models were developed with data provided by the MCPHD to identify concentration of persons with socioeconomic and/or health issues. The models allow planners to quickly visualize areas where vulnerable populations have high disparities in access to AT.
- **Project Prioritization Scoring Tool**—a flexible, data-driven tool was created to rank AT needs against safety, access, demand, and social and health inequity conditions. With a weight of 20 percent of the overall scoring, areas within high social and health inequity are given a priority for improvement.
- **Nontraditional Outreach**—MCPHD supplements outreach efforts by conducting one-on-one surveys (in Spanish and in English) at community centers; Women, Infant, and Children clinics; parks; and bus stops. This approach gathers feedback from users that don’t usually participate in the planning process.

Lessons Learned

- Use your local public health agency as a resource. Public health staff represent underserved community members and should have a seat at the table.

- Include public health and agency partners early and often. Including partners only to review a draft report is too late to build a strong collaboration.
- Diverse participation allows you to view issues from different angles, helping to create plans that serve people of all ages and abilities.
- Public health data is becoming more available and refined. Mapping health data allows decision-makers to prioritize projects in areas with the greatest need.

Conclusions and Implications

Actions and projects that have stemmed from MCPHD's efforts include:

- The Maricopa County Department of Transportation (MCDOT) and the city of Glendale have utilized the Scoring Tool in their AT Plans.
- MCDOT used the Equity Models to determine areas with the greatest need for ADA and non-motorized transportation facilities.
- MCPHD has a permanent appointment to the Maricopa County Association of Governments (MAG) AT Committee.
- MAG requires agencies to consider public health outcomes in all planning and design applications.

Next Steps

MCPDH continues to collaborate with agencies to integrate and understand the impact of investments on public health concerns. Models will be enhanced to include new datasets, heat factors that might limit activity, and the impacts of micro mobility. We recommend you reach out to your public health department and offer them a seat at your table.

MEASURING TEMPORAL AND SPATIAL EXPOSURE OF URBAN CYCLISTS TO AIR POLLUTANTS USING AN INSTRUMENTED BICYCLE

KAITLYN SCHAFFER

Georgia Institute of Technology

Commuting by bicycle is an environmentally-friendly alternative to commuting by vehicle. Increased use of AT provides other societal benefits [1]. Developing more dense urban environments increases the utilization of AT. However, dense urban environments also centralize harmful vehicle emissions [2]. Close proximity to high traffic corridors can negatively impact the health of cyclists and pedestrians. Cyclists risk greater exposure to particulate matter, because cycling facilities are frequently integrated with vehicle infrastructure [3] [4].

Planners and engineers are responsible for making informed decisions about the types of infrastructure to implement. There has been limited research conducted to understand how particulate matter exposure differs between different types of cycling infrastructure. It is possible that separated cycling facilities could have better air quality due to further distances from vehicular traffic. Air quality is also impacted by the time of day and meteorological factors. This study seeks to better understand local cyclist exposure to PM_{2.5}.

An instrumented bicycle was used to monitor the PM_{2.5} exposure of cyclists. The instrumented bike components were designed to be attached to participants' bicycles. The research team developed four different routes that represent the different bicycle infrastructure available in Atlanta, Georgia. The routes were designed to have variation in facility and road type. Each route has a segment of low-stress (i.e., parks, shared use trail), medium-stress, and high stress (i.e., mixed traffic with high car volumes). The routes have a variety of conditions in each and are located where people frequently ride.

Study participants rode the instrumented bicycle on four routes that represent the wide range of bicycle infrastructure available in Atlanta, Georgia. Additional trials were conducted to understand a cyclist's PM_{2.5} exposure during different times of the day and along different routes. This study resulted in PM_{2.5} exposure maps that show how exposure differs from the urban background concentration. Hot spot maps were developed to show locations where PM_{2.5} exposure averaged over multiple runs was higher or lower than background PM_{2.5} concentration. All segments where exposure was higher were locations where bikes share the road with high vehicle volumes. Segments where PM_{2.5} exposure was lower than background concentrations were all along multi-use trails. Cyclist exposure to PM_{2.5} is impacted more by environmental variables that lead the background concentration to be higher along the entire route than the proximity to vehicles at specific points along any route. Further exploration should include quantification of the specific differences in exposure of different types of cycling infrastructure. Future work includes efforts to collect more data for routes to common origin–destination pairs and further analysis of how time of day and time of year impact exposure.

This research provides planners and engineers with information about the variation of pollutant exposure between different types of cycling infrastructure. This knowledge can be used to make more informed decisions about what types of treatments should be implemented to provide the healthiest cycling experience. The dissemination of information about healthier cycling routes has the potential to encourage more people to complete trips by bicycle.

References

- World Health Organization. The World Health Report 2002: Reducing Risks, Promoting Healthy Life. World Health Organization, 2002.
- Frank, L. D., and P. Engelke. Multiple Impacts of the Built Environment on Public Health: Walkable Places and the Exposure to Air Pollution. *International Regional Science Review*, Vol. 28, No. 2, 2005, pp. 193–216.
- van Wijnen, J. H., A. P. Verhoeff, H. W. Jans, and M. van Bruggen. The Exposure of Cyclists, Car Drivers and Pedestrians to Traffic-Related Air Pollutants. *International Archives of Occupational and Environmental Health*, Vol. 67, No. 3, 1995, pp. 187–193.
- Zuurbier, M., G. Hoek, M. Oldenwening, V. Lenters, K. Meliefste, P. van den Hazel, and B. Brunekreef. Commuters' Exposure to Particulate Matter Air Pollution Is Affected by Mode of Transport, Fuel Type, and Route. *Environmental Health Perspectives*, Vol. 118, No. 6, 2010, pp. 783–789.

EVALUATING THE PHYSICAL ACTIVITY IMPACTS OF RIDING ELECTRIC KICK SCOOTERS

YI WEN

University of Tennessee, Knoxville

Background

As a representative of micro mobility, electric kick scooters (e-scooters) have flooded cities around the world recently. In 2018 alone, about 38.5 million e-scooters trips have been reported in the United States. Some posit that e-scooters are an AT mode. Yet, the PA of riding an e-scooter relative to other competing modes has not been measured. More importantly, without a concrete understanding of these health impacts, it becomes a growing challenge for planners to deliver public health benefits through transportation planning and policies.

Purpose

Primarily, this study attempts to answer the question if riding an e-scooter can provide PA health benefits to riders. In San Francisco, about 40% of scooter trips replace car trips, and 30% replace walking trips. This study also compares the PA level of e-scooter riding to driving and walking. In addition, it discusses the implications for policy-making and transportation planning.

Methods

The study relies on a field experiment with 20 subjects and includes two parts: measuring metabolic PA level and muscle activity of e-scooter riding. For the first part, we applied a similar approach as in our previous e-bike PA study with necessary modifications (Langford et al. 2017). The recruited participants are asked to walk, drive, and ride an e-scooter on a 4.4 km fixed course that encompasses a level, an uphill and a downhill segment. We used the Cosmed Fitmate Pro to measure their oxygen consumption rate (VO_2) and energy expenditure. For the second part, we used 16-channel wireless electromyography (EMG) to monitor muscle activities of 16 trunk, upper, and lower limb muscles during walking, driving and e-scooter riding for a series of typical maneuvers.

Results

The data collection process study is currently in progress with full result ($N = 20$) expected in August 2019. Our preliminary trials ($n = 3$) suggest that riding an e-scooter only provides light PA level ($\text{MET} = 1.78$), similar to driving ($\text{MET} = 1.48$); energy expenditure and oxygen consumption rate are 20% higher than driving. In addition, both energy expenditure and oxygen consumption rate of riding an e-scooter are lower than walking ($\text{MET} = 4.17$), which offers moderate PA ($\text{MET} > 3$). Our EMG trials to date ($n = 5$) have not been evaluated yet.

Conclusion

Understanding PA of e-scooter riders is crucial as e-scooter riders may substitute other modes such as walking, biking, and driving. Our study measures the metabolic and isometric PA levels of riding an e-scooter and compares it to walking and driving. Our preliminary metabolic data shows that riding an e-scooter may only provide limited metabolic benefits compared to driving. Therefore, if e-scooters are growingly replacing AT modes such as walking and biking but not driving, e-scooter riders, planners and policy-makers should be alert to the ultimate health impacts. This study only explores the act of riding an e-scooter and does not consider the entire tour, in which most riders access an e-scooter by walking. Still, this important finding reveals important results about scooter use.

Reference

Langford, B. C., et al., Comparing Physical Activity of Pedal-Assist Electric Bikes with Walking and Conventional Bicycles. *Journal of Transport & Health*, Vol. 6, 2017, pp. 463–473.

ADAPTING PUBLIC HEALTH STRATEGIES AND INTERVENTIONS TO INCLUDE PEOPLE WITH DISABILITIES IN ACTIVE TRANSPORTATION POLICIES AND PROGRAMS

JOANN THIERRY

Centers for Disease Control and Prevention

Background and Purpose

Disabilities affect over 61 million adults in the United States—cutting across the boundaries of age, race, gender, and SES (1). People with disabilities benefit from public health programs for the same reasons anyone does—to help them be healthy, active, and part of the community. Yet, studies have shown that people with disabilities are more likely to have limited access to quality health care services, higher prevalence of chronic disease risk factors (e.g., smoking, obesity, high blood pressure, and physical inactivity) and are at increased risk for preventable health problems such as heart disease, stroke and type 2 diabetes (2). Access to and participation in PA can help mitigate some of these health risks. AT strategies may be used in public health programs to address these preventable conditions by reducing risk factors and increasing participation in PA. While most public health and AT strategies have been developed for general audiences, these programs can be successfully adapted for individuals with disabilities. This presentation will address how CDC and its partners are influencing systems change to improve inclusion and accessibility for people with disabilities in public health programs that employ AT policies, strategies and interventions.

Description

CDC's Disability and Health Branch funds three national organizations and 19 state-based programs to reduce health disparities and improve the health of people with disabilities through the adaptation and implementation of evidence-based strategies and interventions. CDC

conducted a programmatic review of funded projects and identified a collection of innovative strategies and interventions that were being adapted and/or implemented for people with disabilities. Ten of these state programs are currently addressing AT policies and programs (e.g., inclusive walking, wheeling and bicycling programs; active wayfinding systems; and community planning activities) to improve health and social participation of people with disabilities at the state and local levels.

Lessons Learned

Modifications and lessons learned from the funded initiatives will be discussed, including: (1) building critical partnerships, (2) assuring physical accessibility, (3) developing inclusive communication products, (4) implementing disability awareness training, and (5) tailoring AT programs for people with disabilities.

Conclusions and Implications

Adopting modifications to existing initiatives may lead to more inclusive AT programs and provide new opportunities for the initiation and maintenance of healthy behaviors for people with disabilities.

References

1. Okoro, C. A., N. D. Hollis, A. C. Cyrus, and S. Griffin-Blake. Prevalence of Disabilities and Health Care Access by Disability Status and Type among Adults—United States, 2016. *Morbidity and Mortality Weekly Report*, Vol. 67, No. 32, 2018, pp. 882–887.
2. Centers for Disease Control and Prevention, National Center on Birth Defects and Developmental Disabilities, Division of Human Development and Disability. Disability and Health Data System Data. Available at <https://dhds.cdc.gov>. Accessed June 17, 2019.

INCORPORATING PUBLIC HEALTH AND EQUITY INTO COLORADO'S STATEWIDE AND REGIONAL TRANSPORTATION PLANNING

KAREN ROOF

Safe and Healthy Communities

Background

State transportation agencies are in a unique position to potentially create transportation systems that improve public health and equity. Only a few transportation agencies such as Minnesota, California, and Washington have focused on incorporating public health and equity policies and data into their Statewide Transportation Plan (SWP). This effort provides opportunities for all members of society to safely bike, walk, drive, and ride transit to access their destinations and for leisure.

Purpose

For the first time, the Colorado DOT has a goal to incorporate public health and equity into their regional transportation plans and their 2045 SWP that is currently being updated. The SWP will focus on the impacts transportation systems have on public health and reducing health disparities such as access to health care visits and jobs, improving safety outcomes, and increasing PA.

Methods

Toward this effort, Colorado DOT, with assistance from Safe and Healthy Communities (SHC) a nonprofit public health organization, created and co-facilitated an innovative Public Health, Equity and Transportation Taskforce. The mission of the taskforce is to provide guidance and direction on how to best incorporate public health and equity into the SWP. The taskforce is made up of approximately 30 equity, public health, and transportation professionals statewide and met six times in 2018–2019.

Results

Presenters from SHC and Colorado DOT will provide details on this unique process and the outcomes developed by the taskforce members such as: best practices; education and public outreach; policies; integrating public health and transportation data; health-related performance measures such as AT; and health language that supports public health and equity in regional and statewide transportation planning. Colorado DOT is explicitly focusing the plans on the needs of the aging population, people with disabilities, rural health issues, low-income residents, and communities of color. The taskforce decided appropriate phrasing such as using, historically disenfranchised versus minorities, and that health and equity will be considered throughout the SWP and RTPs along with a separate public health technical report. The taskforce created an educational factsheet about the connections between public health and transportation and adopted a vision statement that also will be shared.

Conclusion

Significant work was accomplished by the taskforce that will be discussed. Colorado DOT is shifting and collaboratively working with new partners in deliberate ways to better ensure public health and equity are important additions to the 2045 SWP. Questions to and feedback from the audience about the process and outcomes will be encouraged so the presentation format will be interactive.

WHERE DO HEALTHY BICYCLISTS GROW? TRAFFIC GARDENS AS SAFE SPACES FOR COGNITIVE AND SOCIO-EMOTIONAL DEVELOPMENT

RICHARD HOLT

George Mason University

Background

AT is beneficial for the environment, individual health and community well-being. Bicycling provides enhanced mobility, independence, and enjoyment, and bridges generations. Early life influences profoundly impact patterns of behavior: children who engage in PA are more likely to engage as adults. It is imperative that children engage in transportation activities that will enhance their well-being across the lifespan. As a function of age and ability, children are less independent and physically and cognitively more vulnerable. They behave impulsively with difficulty self-regulating, are distracted from tasks, and challenged with spatial discrimination. Many lack reading ability, English proficiency, or warning directives—symbol recognition. Yet, they have greater capacity for curiosity and learning through experience. To insure the health of the broader community, it is essential that the most vulnerable remain safe. The Washington, D.C., Public Schools (DCPS) have developed several physical education programs to promote healthy engagement. All children in DCPS pre-kindergarten are introduced to balance bikes. All DCPS second graders (over 15,000 to date), participate in a comprehensive bike education program, Biking in the Park.

Purpose

Schools are safe places for learning and experience. The purpose of this project was to design (with student–community input) and install two traffic gardens (miniature streetscapes) as safe spaces for learning lifelong skills; to create and deliver curriculum related to bicycle safety and rules of the road (i.e., mini-lessons with stories and song); and to assess the impact of play on PA, social, emotional and cognitive growth. In efforts to attain the highest level of health for all people. Traffic gardens were installed and curriculum implemented at two elementary schools in an urban, under-resourced, majority black jurisdiction.

Methods

Mini-lessons were conducted during class by classroom–physical education teachers. Research entailed collecting complementary data: (1) field notes, (2) semi-structured interviews with school personnel, (3) focus groups with community members, and (4) digital recording (audio–video) of students during their traffic garden experiences (planned activity time and recess). All data are in the process of thematic analysis. Additionally, survey data was collected from the community by the Washington, D.C., DOT to determine children’s and parent’s transportation mode choices.

Results

It is anticipated that students will experience increased enjoyment, safety awareness, and knowledge of biking within the built environment. Additionally, students may experience social-emotional growth (e.g., conflict resolution, resilience, problem solving, self-confidence, independence). Anecdotally, engaging students and the community in design of the traffic gardens has empowered them as agents of change and has immediately impacted their collective well-being.

Conclusion

This project has the potential to change community perceptions of safety and the built environment. This is critical to whether children spend more time playing, interacting in the environment, and walking or biking to school. Creative and challenging play contributes to children's cognitive and social-emotional development. There is little research however on bicycling specifically and the efficacy of traffic gardens for youth development. Helping students better utilize their built environment will insure patterns of healthy behavior and overall well-being for all residents.

References

- Bandura, A. Social Cognitive Theory. *Annals of Child Development—Vol. 6: Six Theories of Child Development* (R. Vasta, ed.), JAI Press, Greenwich, Conn., 1989, pp. 1–60.
- Brussoni, M., L. L. Olsen, I. Pike, and D. A. Sleet. Risky Play and Children's Safety: Balancing Priorities for Optimal Child Development. *International Journal of Environmental Research and Public Health*, Vol. 9, No. 9, 2012, pp. 3134–3148. <http://doi.org/10.3390/ijerph90931343>.
- Davison, K. K., and C. T. Lawson. Do Attributes in the physical Environment Influence Children's Physical Activity? A Review of the Literature. *International Journal of Behavioral Nutrition and Physical Activity*, Vol. 27, No. 3, 2006. doi: 10.1186/1479-5868-3-194.
- Franzini, L., M. N. Elliott, P. Cuccaro, M. Schuster, M. J. Gilliland, J. A. Grunbaum, and S. R. Tortolero. Influences of Physical and Social Neighborhood Environments on Children's Physical Activity and Obesity. *American Journal of Public Health*, Vol. 99, No. 2, 2009, pp. 271–278. doi: [10.2105/AJPH.2007.1287025](http://doi.org/10.2105/AJPH.2007.1287025).
- Gordon-Larsen, P., M. C. Nelson, P. Page, and B. M. Popkin. Inequality in the Built Environment Underlies Key Health Disparities in Physical Activity and Obesity. *Pediatrics*, Vol. 117, No. 2, 2006, pp. 417–424. doi: 10.1542/peds.2005-0058.
- Gray, C., R. Gibbons, R. Larouche, E. B. H. Sandseter, A. Bienenstock, M. Brussoni, G. Chabot, S. Herrington, I. Janssen, W. Pickett, M. Power, N. Stanger, M. Sampson, and M. Tremblay. What Is the Relationship Between Outdoor Time and Physical Activity, Sedentary Behaviour, and Physical Fitness in Children? A Systematic Review. *International Journal of Environmental Research and Public Health*, Vol. 12, No. 6, 2015, pp. 6455–6647.
- Green, C. G., and E. G. Klein. Promoting Active Transportation as a Partnership Between Urban Planning and Public Health: The Columbus Healthy Places Program. *Public Health Reports (Washington, D.C.: 1974)*, Vol. 126, Supplement 1, 2011, pp. 41–49. doi: 10.1177/00333549111260S107.
- Nikiforidou, Z. Risk Literacy: Concepts and Pedagogical Implications for Early Childhood Education. *Contemporary Issues in Early Childhood*, Vol. 18, No. 3, 2017, pp. 322–332. doi: 10.1177/146394911773102.
- Rosenthal, T. L., and B. J. Zimmerman. *Social Learning and Cognition*. Academic Press, 1978.

Tappe, K. A., K. Glanz, J. F. Sallis, C. Zhou, and B. E. Saelens. Children's Physical Activity and Parents' Perception of the Neighborhood Environment: Neighborhood Impact on Kids Study. *International Journal of Behavioral Nutrition and Physical Activity*, Vol. 10, No. 39, 2013, pp. 1–10. doi.org/10.1186/1479-5868-10-39.

SYSTEMS APPROACHES TO INTEGRATED HEALTH AND INJURY CONTROL: GUIDING PRINCIPLES AND PRACTICAL APPLICATIONS FOR COMMUNITY ENGAGEMENT

LAURA SANDT

University of North Carolina Highway Safety Research Center

Since 2009, pedestrian fatalities, both in number and in rate, have been increasing after years of declining numbers. Across disciplines, many explanations that cite many causal factors have been named as the reason for this recent increase. We sought to explore these multiple explanations, recognizing the complexity of the system that has led to the rise in pedestrian fatalities while also using a systems approach to identify other factors that need further exploration to understand better this issue.

Through a series of systems mapping workshops, we gathered stakeholders across multiple disciplines to collaborate on identifying the variables and their relationships at the root of the rise in pedestrian fatalities. In each workshop, participants learned the basics of systems mapping and storytelling through an example. They then created individual and group maps or models explaining the interrelationships between health, PA, injury, roadway design, and other issues. Through these models we identified key variables to inform hypotheses for further research. These included theories related to the feedback loops (or virtuous or vicious cycles) in place in transportation systems that are accelerating or balancing the forces that influence pedestrian safety, comfort, equity, and other outcomes.

The participants in each workshop represented a range of disciplines and professional experience. As a result, the components of the system map represented influences from planning and engineering, public health, law enforcement, and emergency response. A key theme in the system maps and storytelling around them related to elements that encouraged or discouraged walking, and the impact of increasing or decreasing walking. The findings from this study supported evidence from prior systems work, including the work of McClure et al. (1) that focuses on policy levers to improve population health, including a reduction in crashes and mode shift to more active travel. They employed a systems model to explore outcomes related to policies that drew the relationship between modal shift and the overall health of the population. Though the ultimate goal of the systems mapping performed for our project focused on the relation to pedestrian fatalities, many of the explanatory loops also related to overall physical health in a similar way by increasing walking. One feedback loop or system structure, the “fear of walking” loop, tells the story of pedestrian safety as it relates to the desire to walk, where a lack of pedestrians leads to less yielding behavior, which increases crashes and fatalities and the perception of risk. In reverse, as numbers increase, driver awareness and yielding increases, and pedestrians feel safer and are more likely to walk. Similarly the “walking culture” loop linked an increase of pedestrians on the road to a culture of walking that perpetuates an increase in pedestrian activity. Finally, the “infrastructure support” loop expands upon the “walking culture” loop to include an increase in support for pedestrian infrastructure which creates a safer

environment that encourages more walking. These three loops reveal the interconnectedness between improving safety, by making pedestrian-friendly environments, and health through the increase in PA.

Reference

1. McClure, R. J., et al. Simulating the Dynamic Effect of Land Use and Transport Policies on the Health of Populations. *American Journal of Public Health*, Vol. 105, No. S2, 2015, pp. S223–S229.

DOES HIGHER NEIGHBORHOOD WALKABILITY REDUCE THE IMPACT OF MOBILITY LIMITATION ON BMI?

YOCHAI EISENBERG

University of Illinois at Chicago

Background

Obesity is more prevalent among people with disabilities than those without, especially among people with mobility limitations (1, 2). An estimated 31.5 million or 13% of U.S. adults have a mobility limitation (3). Although research has suggested that neighborhood walkability may play an important role in helping to curb the obesity epidemic in the U.S. population (4, 5), there is no existing research on how neighborhood walkability impacts body weight for people with mobility limitations. Conceptual models of disability suggest that the neighborhood environment could be an important moderator of the effect of mobility limitation on BMI (6).

Purpose

The purpose of this study was to examine whether living in more walkable neighborhoods reduces the impact of mobility limitation on BMI. Further, we examine whether these relationships hold in neighborhoods with different levels of poverty.

Methods

We used data from the Weight and Veteran's Environment Study from 2009–2014. The analytic sample was 842,861 veterans from large, metro counties. Time-varying data on walkability and other measures of the food and PA environment within one mile of veterans' homes came from public and private sources and were developed for the continental United States (7). Information on veterans' health and healthcare, including BMI, and demographics came from the U.S. Department of Veterans Affairs healthcare system. A predictive algorithm, developed in prior work, was used to identify veterans with a mobility limitation (binary variable). We ran individual fixed effects regression models, which strengthen the causal interpretation of findings because they control for all unmeasured–unobserved factors that do not change over time. An interaction between walkability and mobility limitation (lagged 1-year) was used to examine moderation. We conducted stratified analysis by census-tract poverty tertiles, as well as based on having never moved during the study period.

Results

We found that neighborhood walkability moderated the effect of mobility limitation on BMI. For veterans in low-walkability neighborhoods, having a mobility limitation increased BMI [males 0.056 BMI units ($p < 0.001$), females 0.151 BMI units ($p < 0.001$)]. The effect of mobility limitation on BMI decreased as walkability increased and became insignificant in the highest walkability quartile [males: 0.014-units ($p = 0.166$), females 0.010-units ($p = 0.815$)]. In higher poverty neighborhoods, the effect of mobility limitation on BMI was larger than in low-poverty neighborhoods. However, across neighborhood poverty levels the effect of mobility limitation on BMI decreased as walkability increased. The pattern of moderation also held for those who never moved during the study period.

Conclusion

Findings from this study suggest that living in neighborhoods with higher walkability reduces the impact of mobility limitation on BMI. Low-walkability neighborhoods that are also high in poverty present additional risk for increased BMI among people with mobility limitations. This study overcame several threats to causal interpretation but there were limitations related to time-varying omitted variable bias, use of a binary mobility limitation variable, and generalizability of findings beyond the veteran population. Policy and built environment strategies that improve neighborhood walkability may be an impactful component of strategies to reduce obesity and improve health in populations with mobility limitation.

References

1. An, R., F. Andrade, and C.-Y. Chiu. Overweight and Obesity Among U.S. Adults with and without Disability, 1999–2012. *Preventive Medicine Reports*, Vol. 2, 2015, pp. 419–422. doi:10.1016/j.pmedr.2015.05.001.
2. Reichard, A., H. Stolze, and M. H. Fox. Health Disparities Among Adults with Physical Disabilities or Cognitive Limitations Compared to Individuals with No Disabilities in the United States. *Disability and Health Journal*, Vol. 4, No. 2, 2011, pp. 59–67. <https://doi.org/10.1016/j.dhjo.2010.05.003>
3. Courtney-Long, E. A., D. D. Carroll, Q. C. Zhang, A. C. Stevens, S. Griffin-Blake, B. S. Armour, and V. A. Campbell, V. A. Prevalence of Disability and Disability Type Among Adults—United States, 2013. *Morbidity and Mortality Weekly Report*, Vol. 64, No. 29, 2015, pp. 777–783.
4. Chandrabose, M., J. N. Rachele, L. Gunn, A. Kavanagh, N. Owen, G. Turrell, and T. Sugiyama. Built Environment and Cardio-Metabolic Health: Systematic Review and Meta-Analysis of Longitudinal Studies. *Obesity Reviews*, Vol. 20, No. 1, 2019, pp. 41–54. doi:10.1111/obr.12759.
5. Sallis, J. F., M. F. Floyd, D. A. Rodríguez, and B. E. Saelens. Role of Built Environments in Physical Activity, Obesity, and Cardiovascular Disease. *Circulation*, Vol. 125, No. 5, 2012, pp. 729–737.
6. World Health Organization. WHO | International Classification of Functioning, Disability and Health. 2001.
7. Zenk, S. N., E. Tarlov, C. Wing, S. A. Matthews, K. Jones, H. Tong, and L. M. Powell. Geographic Accessibility of Food Outlets Not Associated with Body Mass Index Change Among Veterans, 2009–14. *Health Affairs*, Vol. 36, No. 8, 2017, pp. 1433–1442.

WHY DO HISPANIC AMERICANS USE THE BRT SERVICES MORE THAN OTHERS? UNDERLYING FACTORS BEHIND ETHNICITY

JIAHE (JANE) BIAN

Texas A&M University

Background

BRT has emerged as a promising form of transit with its benefits combining the efficiency and reliability of a rail transit with the flexibility and feasibility of a conventional bus system. El Paso, Texas started its BRT service since 2014. El Paso has over 80% of its residents of Hispanic origin offering unique opportunities to better understand BRT use within the context of ethnicity. This study analyzes the survey data captured from a larger research project, Active El Paso (AEP).

Purpose

To examine the characteristics of the current BRT users and explore ways to further promote BRT use, the AEP project conducted two rounds of surveys ($n = 320$, in 2016; and $n = 2,240$, in 2019). This study focuses on the impact of Hispanic ethnicity and other underlying factors influencing BRT use in El Paso.

Methodology

Logistic regression models were used to predict the odds of using BRT at least once a week. Controlling for other significant personal variables, we tested the significance of Hispanic ethnicity variable first (Model 1), and then added three variable blocks (Models 2-4), one block at a time, cumulatively to the previous model. Those variable blocks were selected to test the potential underlying factors behind ethnicity that may influence BRT use: (a) walkability to BRT, (b) residential self-selection, and (c) attitudes toward transit.

Results

Among the 2,560 respondents, 14.6% of Hispanic respondents reported using BRT at least one day in a typical week (considered BRT users in this study), while only 9.4% of non-Hispanic respondents were BRT users. Model 1 showed that controlling for other personal factors, Hispanic ethnicity was still positively correlated with BRT use ($OR = 1.70$, $p = 0.010$). After further controlling for the distance to the closest BRT station and neighborhood walkability conditions (Model 2), Hispanic ethnicity maintained similar significance ($OR = 1.75$, $p = 0.011$). The network distance from home to the closest BRT stations was also a significant predictor in this model ($OR = 0.88$, $p < 0.001$). Next, we added the residential self-selection variables (i.e. factors considered when choosing the current residence) (Model 3), and found slightly decreased role of ethnicity ($OR = 1.63$, $p = 0.035$) confirming the presence of self-selection effect. In the final step (Model 4), we used factor analysis to generate three latent factors (attitudes, positive perception, and negative perception) reflecting people's attitudes and perceptions towards public transit. When those factors were added, ethnicity became statistically insignificant ($OR = 1.67$, $p = 0.058$).

Conclusion

The results imply that rather than or in addition to ethnicity, self-selection factors, and attitudes and perceptions towards transit are critical to consider when making policy decisions to support BRT use. These findings are in line with previous studies reporting the significant roles of attitudinal factors. Future work may consider interactions between ethnicity and other variables, more detailed and objectively measured environmental and transit use variables, and better isolation of self-selection factors. This study and its future work will help better understand the important variability in factors influencing BRT use across different population groups to guide the development of tailored BRT promotion strategies.

References

- Ewing, R., and R. Cervero. Travel and the Built Environment. *Journal of the American Planning Association*, Vol. 76, No. 3, 2010, pp. 265–294. doi: 10.1080/01944361003766766.
- Beimborn, E. A., M. J. Greenwald, and X. Jin. Accessibility, Connectivity, and Captivity: Impacts on Transit Choice. *Transportation Research Record: Journal of the Transportation Research Board*, No. 1835, 2003, pp. 1–9. doi: 10.3141/1835-01.
- Beirão, G., and J. A. Sarsfield Cabral. Understanding Attitudes Towards Public Transport and Private Car: A Qualitative Study. *Transport Policy*, Vol. 14, No. 6, 2007, pp. 478–489. <https://doi.org/10.1016/j.tranpol.2007.04.009>.

QUANTIFYING THE HEALTH, TRANSPORTATION, AND ECONOMIC EQUITY IMPACTS OF COMPLETING THE EAST COAST GREENWAY IN THE DELAWARE RIVER WATERSHED

DANIEL PASCHALL

East Coast Greenway Alliance

Background

The East Coast Greenway (ECG) is developing into one of the nation's longest continuous biking and walking paths, connecting 15 states and 450 communities from Key West, Florida, to Calais, Maine. This report looks at the impact of the ECG within the Delaware River Watershed specifically, not the entire regional trail network. The figures, analysis, and mapping in this report examined the ultimate, fully built ECG route across Delaware, Pennsylvania, and South New Jersey, which is in various stages of planning, design, and construction. The ECG travels through the core of several major cities while also connecting to some of the most ecologically diverse sites in the Delaware Watershed. From Wilmington to the city center of Philadelphia and north to Trenton, New Jersey, the ECG connects smaller neighborhoods and towns to the region's major employment centers. The ECG also connects residents and visitors to numerous state and local parks, waterways, and open spaces. The Greenway's connections to other major trail and passenger rail systems make it an important part of the area's transportation system. This research examined transportation and safety benefits, economic benefits and planning for equitable development, along with health and environmental benefits of a built-out greenway. It also includes three case studies.

Methodology

Economic Benefits

Within an interconnected economy, each dollar of direct expenditures generates multiple waves of spillover impacts through spending on goods and services purchased within a given region (indirect impacts) as well as spending resulting from the labor income generated by the initial activity that ripples through the region (induced impacts). IMPLAN modeling software was used to estimate indirect and induced impacts, and added to the direct activity to produce total economic impacts. Using a combination of data from planned trail construction and industry estimates, an average per mile cost of construction was calculated for the remaining ECG (the direct expenditure). This estimate is conservative, as elements such as signage, place making, and fixtures are not included in the costs. Construction costs were divided into hard and soft costs before using IMPLAN to calculate the economic impact of construction at the Philadelphia MSA level.

Healthcare Cost Savings

Healthcare cost savings are calculated using 2018 average annual daily bike and pedestrian counts from Delaware Valley Regional Planning Council (in the example of the Jack Markell Trail, those counts are based on the time the trail has been open and extrapolated to the users over a full year based on average users), adjusted for out and back trips, and accounted for frequency of trail users. Then using the Pennsylvania Department of Conservation and Natural Resources Residents' Survey on Outdoor Recreation, we determined the number of people who use the trails and are also considered active (active is defined as engaging in three sessions per week of 30 min of PA). Finally, using average reported expenditure differences in healthcare spending between physically active people and inactive people, we calculated the healthcare savings accrued from people spending less on healthcare expenses due to their PA. Data also came from a study from the National Center for Chronic Disease Prevention (<https://www.ncbi.nlm.nih.gov/pubmed/25559060>).

Environmental Benefits

The acreage of ecosystems within a quarter mile of the ECG was determined using land cover imagery from the Multi-Resolution Land Cover Characteristic's 2011 National Land Use Land Cover in ArcGIS. Using this acreage by ecosystem, the environmental services benefits were calculated using values from previous externality valuation studies, which estimate the average per-acre value of 10 different ecosystem services. These values were used to calculate the total annual ecosystem service benefit for open space along the ECG. In order to estimate carbon sequestration benefits, the i-Tree Vue model developed by the U.S. Forest Service was used to estimate the air pollution removal and carbon sequestration and storage benefits of the preserved open space along the trail.

Conclusion


This report quantifies how completing the ECG would benefit the lower Delaware River Watershed region. While the infrastructure investment is significant, these findings project the Greenway would generate a more than ten-fold return of over \$3 billion in public health, environmental, and economic benefits. Partners in the region have set a goal of completing their part of the ECG by 2025. They will need a new influx in resources to make that aggressive timeline possible. Visionary elected leaders, agencies, private sector partners, and philanthropists have the opportunity to increase the quality of life for millions of people throughout the region. Completing the ECG will provide safe access to nature and active recreation. By synergistically aligning the biking and walking route with regional transit, we can improve access to low-cost transportation while decreasing congestion and carbon emissions. As with many growing cities in today's strong economy, planners and advocates need to focus on equity and inclusion throughout the greenway development process to ensure the benefits are shared across the diverse population who live, work, and play in the corridor.

Resources

- 2000–2015 Travel Trends in the Delaware Valley Region*. Delaware Valley Regional Planning Commission, March 2017. Figure 4, p.11.
- Tracking Traffic Violence*. Bicycle Coalition of Greater Philadelphia. <https://bicyclecoalition.5org/trackingfatalities/>.
- 2017 Pennsylvania Crash Facts a Statistics*. https://www.penndot.gov/TravelInPA/Safety/Documents/2017_CFB_linked.pdf.
- Vision Zero and Equity*. Bicycle Coalition of Greater Philadelphia. <https://bicyclecoalition.org/our-campaigns/vision-zero-equity/>.
- 2017 Bike PHL Facts*. Bicycle Coalition of Greater Philadelphia. <https://www.arcgis.com/apps/Cascade/index.html?appid=6b42ffc54fb941df90cd0be7bd41aac3>.
- Philly Bucks the Trend: Biking Up 20.5 Percent*. Bicycle Coalition of Greater Philadelphia. <https://bicyclecoalition.org/philly-bucks-the-trend-biking-up-20-5-percent/>.
- Pedestrian Death Statistics for Counties, Census Tracts. *Governing Magazine*. <http://www.governing.com/gov-data/pedestrian-death-counties-census-tracts-per-capita-rates.html>.
- Household Size by Vehicles Available*. United States Census American Fact Finder. <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>.
- Evaluating the Economic Contribution of Shared Use Paths in NC*. Institute for Transportation Research and Education, North Carolina State University. <https://itre.ncsu.edu/focus/bikeped/sup-economic-impacts/>.
- Economic Impact*. Adventure Cycling Association. <https://www.adventurecycling.org/advocacy/building-bike-tourism/economic-impact/>.
- Schuylkill River Trail 2009 UserSurvey and Economic Impact Analysis. Rails to Trails Conservancy. https://www.railstotrails.org/resourcehandler.ashx?name=schuylkill-river-trail2009-user-survey-and-economic-impact-analysis&id=3520&fileName=Schuylkill%20River%20Trail%20Users%20Survey_Final_low%20res.pdf.
- Asabere, P. K., and F. E. Huffman. The Relative Impacts of Trails and Greenbelts on Home Price. *Journal of Real Estate Finance Economics*, Vol. 38, 2009, p. 408. <https://doi.org/10.1007/s11146-007-9089-8>.
- Costanza, R., M. Wilson, A. Troy, A. Voinov, S. Liu, and J. D'Agostino. The Value of New Jersey's Ecosystem Services and Natural Capital, 2006. https://www.researchgate.net/publication/266214139_The_Value_of_New_Jersey's_Ecosystem_Services_and_Natural_Capital.

APPENDIX B

Conference Program



Conference on
Health and Active Transportation

DECEMBER 11–12, 2019
NAS Keck Center, Washington, DC

Convened by
Transportation Research Board

Co-sponsored by
Joint Subcommittee on Health and Transportation (ADD50-1)
Standing Committee on Pedestrians (ANF10)
Standing Committee on Bicycle Transportation (ANF20)

Supported by
Centers for Disease Control and Prevention (CDC)
National Institutes of Health (NIH) Office of Disease Prevention and
the National Cancer Institute (NCI)
Volpe National Transportation Systems Center

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

TRB
TRANSPORTATION RESEARCH BOARD

2019 PLANNING COMMITTEE

Ed Christopher, Transportation Planning Consultant (*Co-Chair*)

Janet Wojcik, Winthrop University (*Co-Chair*)

David Berrigan, National Cancer Institute

Shaunna Burbidge, Avenue Consultants

Cynthia Chen, University of Washington

Chris Kochtitzky, Centers for Disease Control and Prevention (CDC)

Melissa Kraemer Badtke, East Central Wisconsin Regional Planning Commission

Leslie Meehan, Tennessee Department of Health

Mehri Mohebbi, Planning Communities, LLC

Amy Plovnick, Volpe National Transportation Systems Center

Daniel Rodriguez, University of California, Berkeley

Staff List

Bernardo Kleiner, Transportation Research Board

Tom Palmerlee, Transportation Research Board

Gary Jenkins, Transportation Research Board

Kate Debelack, Transportation Research Board

Rapporteur

Kelly Rodgers, Streetsmart

The Transportation Research Board The Transportation Research Board is one of seven major programs of the National Academies of Sciences, Engineering, and Medicine. The mission of the Transportation Research Board is to provide leadership in transportation improvements and innovation through trusted, timely, impartial, and evidence-based information exchange, research, and advice regarding all modes of transportation. The Board's varied activities annually engage about 8,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation.

www.TRB.org

WELCOME LETTER

Welcome to Washington, D.C., and the Conference on Health and Active Transportation (CHAT). This conference was organized to build from and extend the work begun at the 2015 Conference on Moving Active Transportation to Higher Ground. So much has happened in both health and transportation sectors since that first meeting as active transportation plays an increasingly important role in health, smart growth, and development requiring an interdisciplinary focus. We would like to thank the Transportation Research Board (TRB), The Centers for Disease Control and Prevention, The National Cancer Institute, the Volpe Institute, and the TRB Subcommittee on Health and Transportation for partnering to bring about this meeting.

The purpose of the conference is to convene leaders from the transportation and health disciplines. Using active transportation as the canvas, together they will chart a course for the future around three theme areas: ***Reflecting on Innovative Practices, Building Strategic Institutional Relationships, and Identifying Research Needs and Opportunities***. Plenary sessions will capture the essence of each theme while individual breakout sessions are designed to give participants an opportunity to engage and drill down into the details. Supporting the development of each theme and helping advance the discussion will be a poster session with over 35 presenters. Our goal is to make this an interactive conference where attendees, whether researchers, practitioners, or policymakers, can actively participate in discussions around each of the conference themes.

Following this two-day conference, an E-Circular will be produced summarizing all presentations and discussions. The report will not only document the activities of the conference but provide the basis for a framework and steps to move forward as we navigate our journey into the intersection of health and active transportation.

We thank you for being here and look forward to your participation in this important event.

Ed Christopher
Transportation Planning Consultant
CHAT Co-Chair



Janet R. Wojcik
Winthrop University and
American College of Sports Medicine
CHAT Co-Chair

TRR

JOURNAL OF THE TRANSPORTATION RESEARCH BOARD

TRANSPORTATION RESEARCH RECORD

Enjoy free access to
the TRR for 30 days: sagepub.com/freetrial

SCHEDULE AT A GLANCE

WEDNESDAY, DECEMBER 11		
TIME	EVENT	ROOM
7:00 AM	Registration Opens	Keck 100 Foyer
7:00 AM	Coffee and Continental Breakfast	Keck 100 Foyer
8:30 AM	Opening Plenary —Welcome Remarks The Prelude: An Active Transportation Health Journey	Keck 100
10:00 AM	30-minute Break	Keck 100 Foyer
10:30 AM	Concurrent Breakout Sessions: Exploring the Landscape Reflecting on Innovative Practices Building Strategic Institutional Relationships Active Travel Behavior Research <i>Part 1—Lightning Talks and Discussion</i> <i>Part 2—Open Mic Panel Discussion</i>	Keck 105 Keck 101 Keck 100
12:00 PM	Lunch	Keck 100 Foyer
1:00 PM	Plenary Session: Reflecting on Innovative Practice	Keck 100
2:30 PM	30-minute Break	Keck 100 Foyer
3:00 PM	Plenary Session: Building Strategic Institutional Relationships	Keck 100
4:30 PM	Session: Posters Roadmap and Gazetteer <i>Navigating the Poster Session</i>	Keck 100
5:00 PM	Poster Session and Networking Reception	Keck Atrium
6:30 pm	Adjourn for the day	

THURSDAY, DECEMBER 12		
TIME	EVENT	ROOM
7:00 AM	Registration Opens	Keck 100 Foyer
7:00 AM	Coffee and Continental Breakfast	Keck 100 Foyer
8:30 AM	Plenary Session: Research to Support Health Integration and Institutionalization in Transportation Agency Processes and Decisions	Keck 100
10:00 AM	30-minute Break	Keck 100 Foyer
10:30 AM	Concurrent Breakout Sessions: Addressing the Future Moving Innovative Practices Forward Moving Institutional Relationships Forward Active Travel Infrastructure Research <i>Part 1—Lightning Talks and Discussion</i> <i>Part 2—Open Mic Panel Discussion</i>	Keck 105 Keck 101 Keck 100
12:00 PM	Lunch	Keck 100 Foyer
1:30 PM	Closing Session: Making it Work in a Transportation Environment	Keck 100
3:00 PM	Session: Next Steps—Future Direction	Keck 100
3:30 pm	Conference adjourns	

CONFERENCE PROGRAM

WEDNESDAY, DECEMBER 11, 2019

7:00 AM, Keck 100 Foyer

Registration Open

7:30 AM–8:30 AM, Keck 100 Foyer

Coffee and Continental Breakfast

8:30 AM–10:00 AM, Keck 100

OPENING PLENARY

Welcome Remarks

Moderator: Janet Wojcik, Winthrop University

Conference Committee Co-chairs

Ed Christopher, Transportation Planning Consultant

Janet Wojcik, Winthrop University

The Prelude: An Active Transportation Health Journey

Our journey into the future will begin with an assessment of where we are today, the issues facing us and some things to consider moving forward. This session is designed to set the stage and provide context for each of the theme areas. Although a lot of work and progress has been made in each area, there is more to be done. The speaker's perspectives will be central to framing the theme areas for the rest of the conference.

Speakers

Jim Sallis, University of California, San Diego—**Opening Keynote**

Janet Fulton, Centers for Disease Control and Prevention—**Innovation Practices**

Andy Dannenberg, University of Washington, Seattle—**Institutional Relationships**

Norman W. Garrick, University of Connecticut—**Research Needs and Opportunities**

10:00 AM–10:30 AM, Keck 100 Foyer

30-minute Break

10:30 AM–12:00 PM

CONCURRENT BREAKOUT SESSIONS

Exploring the Landscape

Armed with some context for the three conference themes, participants will now have an opportunity to bring their perspectives to the table while brainstorming ideas, discussing their questions and sharing experiences in one of three breakouts. The breakouts are structured to allow for maximum participation, discussion, and the interchange of ideas.

Reflecting on Innovative Practices, Keck 105

Moderator: Mehri Mohebbi, Planning Communities, LLC

Facilitator: Phil Bors, Healthy Places by Design

Building Strategic Institutional Relationships, Keck 101

Moderator: Melissa Kraemer Badtke, East Central Wisconsin Regional Planning Commission

Facilitator: Mark Fenton, Transportation, Planning, and Public Health Consultant

Active Travel Behavior Research, Keck 100**Part 1—Lightning Talks and Discussion**

Facilitator: David Berrigan, National Cancer Institute

Speakers:

Madeleine Steinmetz-Wood, McGill University

Jennifer Roberts, University of Maryland

Ralph Buehler, Virginia Polytechnic Institute

Calvin Tribby, National Cancer Institute, NIH

Part 2—Open Mic Panel Discussion

Facilitator: Daniel Rodriguez, University of California-Berkeley

Panelists:

Jim Sallis, University of California, San Diego

Ralph Buehler, Virginia Polytechnic Institute

12:00 PM–1:00 PM, Keck 100 Foyer

Lunch

1:00 PM–2:30 PM, Keck 100

PLENARY SESSION**Reflecting on Innovative Practices**

A variety of innovative practices are developing “in the field” every day. This session will feature “Lighting Talk” presentations from 10 regions nationwide. Presenters comprise a range of disciplines across health and transportation, government and non-government, and academic and non-academic experiences. Each presentation will offer broad perspectives on the subtopics the conference. Going beyond a “show and tell of what was done”, presenters will focus on how to “tweak” their innovation given what they have learned from its implementation.

Moderator: Amy Plovnick, Volpe National Transportation Systems Center

Speakers:

Gretchen Armijo, Norris Design

Aaron Hipp, North Carolina State University

Sagar Shah, American Planning Association

Nicole Payne, National Association of City Transportation Officials

Brian Kiel, WSP Inc.

John Clymer, National Forum for Heart Disease and Stroke Prevention

Megan Wier, San Francisco Department of Public Health

Jana Lynott, AARP Public Policy Institute

Kate Glantz, Lyft

Jordana Maisel, IDeA Center/University at Buffalo

2:30 PM–3:00 PM, Keck 100 Foyer

30-minute Break

3:00 PM–4:30 PM, Keck 100

PLENARY SESSION

Building Strategic Institutional Relationships

Over the years, a variety of discussions have focused on different types of organizational relationships that have been formed around the intersection of health and transportation. Agencies have formed pacts, institutions established memoranda of understanding (MOUs), and more conversations are taking place across these disciplines. It is also essential to explore how these relationships have worked-out over time, what impacts they have had, and why they are not the norm—or are they? In this session we will hear the perspectives of transportation and health officials who have been at the forefront of these defining relationships. This session will begin with a paired presentation consisting of two collaborators from different sectors to address what they did and how they did it.

Moderator: Melissa Kraemer Badtke, East Central Wisconsin Regional Planning Commission

Speakers:

University

Keshia Pollack, Johns Hopkins Bloomberg School of Public Health

Jennifer Dill, Portland State University

Association

Jeff Lindley, Institute of Transportation Engineers

State Department of Transportation

Amber Dallman, Minnesota Department of Transportation

Foundation

Craig Martinez, California Endowment

County Health Department

Anna Ricklin, Fairfax County Health Department

4:30 PM–4:45 PM, Keck 100

SESSION: Posters Roadmap and Gazetteer

Navigating the Poster Session

Before embarking on a journey through the conference posters and providing a brief diversion for the poster presenters to get set-up, a roadmap and gazetteer describing the posters will be presented. This will help attendees efficiently navigate their way based on their own interests.

Moderator: Janet Wojcik, Winthrop University

5:00 PM–6:30 PM, Keck Atrium

Poster Session and Networking Reception

The reception will feature refreshments along with the posters.

Quantifying the Health, Transportation, & Economic Equity Impacts of Completing the East Coast Greenway in the Delaware River Watershed

Daniel Paschall, East Coast Greenway Alliance

Network Screening Approach for Cyclist Safety in Quebec City

David Beitel, McGill University

Build It, But They Might Not Come. Breaking Down Barriers to Active Transportation

Torsha Bhattacharya, Rails-to-Trails Conservancy

Why do Hispanic American Use the BRT Services More Than Others?—Underlying Factors Behind Ethnicity

Jiahe Bian, Texas A&M University

Health, Safety, and Economic Benefits of Implementing Road Diets

Kara Peach, VHB

Adoption of a Complete Streets Policy in North Las Vegas: Using Evidence-Based Practices to Improve Health and Safety

Nicole Bungum, Southern Nevada Health District

Walkable Neighborhoods and Obesity Over Time: Findings from the National REGARDS Study

Natalie Colabianchi, University of Michigan

Promoting Partnerships to Support Community-Informed Active Transportation Safety and Mobility

Tony Dang, California Walks

Evidence to Inform a Cycling and Walking Investment Strategy

Angie Cradock, Harvard TH Chan School of Public Health

Correlates of Active Commuting, Transport Physical Activity, and Light Rail Use in a University Setting

Katie Crist, UC San Diego

Classification and Regression Tree (CART) Analysis to Determine Best Performing Walkability Metrics for Studies Of Physical Activity and Public Health

Ronit Dalmat, University of Washington—Urban Form Lab

Creating a Seat for Public Health at the Transportation Planning Table

Phyllis Davis, Kittelson & Associates

Using Synthetic Controls with Interactive Fixed Effects to Examine Changes in Vehicle Speed Related to New York City's Vision Zero Program

David Ederer, Georgia Institute of Technology

Does Higher Neighborhood Walkability Reduce the Impact of Mobility Limitation on BMI?

Yochai Eisenberg, University of Illinois at Chicago

A Tale of Two Regions: Linking the Transit Build Environment to Health Outcomes

Nicole Geitebruegge, TransLink (South Coast British Columbia Transportation Authority)

Voices for Healthy Kids Framework for Equity-Focused Complete Streets Policies

Claudia Goytia, American Heart Association

Where do healthy bicyclists grow? Traffic Gardens as safe spaces for cognitive and socio-emotional development

Richard Holt, George Mason University

Opportunities to Improve Community Mobility through Community Health Needs Assessments

Alex King, Community Transportation Association of America

Walking to public transit helps achieve physical activity recommendations

Vi Le, University of Washington

Evaluating Modal Shift in Response to Electric Scooter Sharing Services in Oakland, California

Melody Lin, Genentech

A Decade of Benchmarking Biking and Walking

Ken McLeod, The League of American Bicyclists

Cycling Without Age: An Innovative Program to Improve the Quality of Life for Older Adults

Paula McNiel, University of WI Oshkosh

Healthy Mobility Model for Healthy Communities

Curtis Ostrodka, VHB

Beyond KABC0: Improving Our Understanding of Pedestrian and Bicyclist Injuries with Hospital Data

Katherine Peticolas, Carolina Center for Health Informatics

Health impacts of Bus Rapid Transit systems worldwide

David Rojas-Rueda, Colorado State University

Health impacts of bike sharing systems in Europe

David Rojas-Rueda, Colorado State University

Impact and Mitigation of Traffic Noise and Air Pollution in Somerville: A Health Lens Analysis (HLA)

Sharon Ron, Metropolitan Area Planning Council

Incorporating Public Health and Equity into Colorado's Statewide and Regional Transportation Planning

Karen Roof, Safe and Healthy Communities

Systems Approaches to Integrated Health and Injury Control: Guiding Principles and Practical Applications for Community Engagement

Laura Sandt, UNC Highway Safety Research Center

Measuring Temporal and Spatial Exposure of Urban Cyclists to Air Pollutants Using an Instrumented Bicycle

Kaitlyn Schaffer, Georgia Institute of Technology

Adapting Public Health Strategies and Interventions to Include People with Disabilities in Active Transportation Policies and Programs

JoAnn Thierry, Centers for Disease Control and Prevention

Colorado Downtown Streets

Cate Townley, CDPHE CO Dept of Public Health and Environment

Evaluating the Physical Activity Impacts of Riding Electric Kick Scooters

Yi Wen, University of Tennessee

Progress in public health and transportation: Changes in state- and regional-level prevalence of active commuting to work from 2005–2017

Geoffrey Whitfield, Centers for Disease Control and Prevention

6:30 PM

Adjourn for the day

THURSDAY, DECEMBER 12

7:00 AM, Keck 100 Foyer

Registration Open

7:00 AM, Keck 100 Foyer

Coffee and Continental Breakfast

8:30 AM–10:00 AM, Keck 100

PLENARY SESSION**Research to Support Health Integration and Institutionalization in Transportation Agency Processes and Decisions***Moderator:* Daniel Rodriguez, University of California–Berkeley*Speakers*

Laura Sandt, University of North Carolina Highway Safety Research Center

Andy Dannenberg, Department of Urban Design and Planning, University of Washington–Seattle

Megan Wier, San Francisco Department of Public Health

Panelists:

Brian Saelens, Seattle Children's Research Institute, University of Washington

Susan Handy, University of California, Davis

Andrew Rundle, Columbia University, Mailman School of Public

10:00 AM–10:30 AM, Keck 100 Foyer

30-minute Break

10:30 AM–12:00 PM

CONCURRENT BREAKOUT SESSIONS**Addressing the Future**

After reflecting on everything that has come before, the attendees will again have the opportunity to reconvene in discussion groups and articulate how they would move forward. What are their priorities? The ultimate goals or end game? The intervening opportunities? These are just a few of the questions that each breakout should come to closure on and advance to the Conference Proceedings. Building from yesterday's discussion, attendees will use this time to develop and prioritize the ideas and questions stemming from their focus area(s).

Moving Innovative Practices Forward, Keck 105*Moderator:* Chris Kochtitzky, U.S. Centers for Disease Control & Prevention*Facilitator:* Nisha Botchwey, Georgia Institute of Technology**Moving Institutional Relationships Forward, Keck 101***Moderator:* Cynthia Chen, University of Washington*Facilitator:* Ann Steedly, Planning Communities LLC**Active Travel Infrastructure Research, Keck 100****Part 1—Lightning Talks and Discussion***Facilitator:* Leslie Meehan, Tennessee Department of Health

Speakers:

Chanam Lee, Texas A&M University

Yochai Eisenberg, Department of Disability and Human Development, University of Illinois at Chicago

Theodore Mansfield, Resource Systems Group, Inc.

Part 2—Open Mic Panel Discussion

Facilitator: Leslie Meehan, Tennessee Department of Health

Panelists:

Victoria Martinez, Federal Highway Administration

Ana Ramirez Huerta, Texas Department of Transportation

Binbin Peng, University of Maryland

12:00 PM–1:30 PM, Keck 100 Foyer

Lunch

1:30 PM–3:00 PM, Keck 100

CLOSING SESSION:

Making it Work in a Transportation Environment

This session will begin with a wrap-up from each of the breakout theme groups. What are the issues? What is important? Were there any thoughts on how to move forward? Following this, and coming full circle, we will hear what wisdom, if any, a leading transportation professional has to offer us as we plot the course for the future. It will also be time for the attendees to get their last and final comments in before we embark on our next journey.

Moderator: Ed Christopher, Transportation Planning Consultant

Speakers: **CONCURRENT SESSIONS WRAP-UPS**

Breakout wrap up—Reflecting on Innovative Practices

Phil Bors, Healthy Places by Design

Nisha Botchwey, Georgia Institute of Technology

Breakout wrap up—Building Strategic Institutional Relationships

Mark Fenton, Transportation, Planning, and Public Health Consultant

Ann Steedly, Planning Communities LLC

Breakout wrap up—Identifying Research Needs and Opportunities

David Berrigan, National Cancer Institute

Daniel Rodriguez, University of California-Berkeley

Leslie Meehan, Tennessee Department of Health

CLOSING KEYNOTE

Jennifer Toole, Toole Designs

3:00 PM–3:30 PM, Keck 100

SESSION

Next Steps—Future Direction

Providing closure to the conference, the logistical planning for the Conference Proceedings and its report will be reviewed.

Moderator: Janet Wojcik, Winthrop University

Speaker: Bernardo Kleiner, Transportation Research Board

3:30 PM

Conference adjourns

NOTES

KECK CENTER FLOOR PLAN



NOTES

SAVE THE DATE: NATIONAL CONFERENCE ON TRANSPORTATION ASSET MANAGEMENT
JULY 11-14, 2020
BOSTON, MA



VISIT OUR WEBSITE: <http://trb.org/abstracts/conferences/2020AssetManagement/>



The 13th National Conference on Transportation Asset Management (TAM) provides an opportunity for all practitioners involved in their agency's asset management initiative to build core competencies and generate new ideas.

- Looking for both practical and innovative presentations.
- Selected abstracts will be featured in either poster or technical podium sessions.
- Presenters will be required to register and attend the conference to be included in the final program.

Presentation tracks and crosscutting issues:

- Track 1: Implementation
- Track 2: Data Governance/Tools
- Track 3: Managing Risk
- Track 4: Partners and Peers
- Track 5: Sustaining Asset Management in your Organization
- Crosscutting Issue 1: Transit
- Crosscutting Issue 2: Resilience

The National Academies of
SCIENCES • ENGINEERING • MEDICINE
TRB
TRANSPORTATION RESEARCH BOARD

CONFERENCE ON HEALTH AND
ACTIVE TRANSPORTATION

Thank You to Our Supporters

**Centers for Disease Control
and Prevention (CDC)**

**National Institutes of Health
(NIH) Office of Disease
Prevention and the
National Cancer Institute
(NCI)**

**Volpe National
Transportation Systems
Center**

The National Academies of
SCIENCES • ENGINEERING • MEDICINE



TRANSPORTATION RESEARCH BOARD

The National Academies of **SCIENCES • ENGINEERING • MEDICINE**

The **National Academy of Sciences** was established in 1863 by an Act of Congress, signed by President Lincoln, as a private, non-governmental institution to advise the nation on issues related to science and technology. Members are elected by their peers for outstanding contributions to research. Dr. Marcia McNutt is president.

The **National Academy of Engineering** was established in 1964 under the charter of the National Academy of Sciences to bring the practices of engineering to advising the nation. Members are elected by their peers for extraordinary contributions to engineering. Dr. John L. Anderson is president.

The **National Academy of Medicine** (formerly the Institute of Medicine) was established in 1970 under the charter of the National Academy of Sciences to advise the nation on medical and health issues. Members are elected by their peers for distinguished contributions to medicine and health. Dr. Victor J. Dzau is president.

The three Academies work together as the **National Academies of Sciences, Engineering, and Medicine** to provide independent, objective analysis and advice to the nation and conduct other activities to solve complex problems and inform public policy decisions. The National Academies also encourage education and research, recognize outstanding contributions to knowledge, and increase public understanding in matters of science, engineering, and medicine.

Learn more about the National Academies of Sciences, Engineering, and Medicine at www.nationalacademies.org.

The **Transportation Research Board** is one of seven major programs of the National Academies of Sciences, Engineering, and Medicine. The mission of the Transportation Research Board is to provide leadership in transportation improvements and innovation through trusted, timely, impartial, and evidence-based information exchange, research, and advice regarding all modes of transportation. The Board's varied activities annually engage about 8,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation.

Learn more about the Transportation Research Board at www.TRB.org.



TRANSPORTATION RESEARCH BOARD
500 Fifth Street, NW
Washington, DC 20001

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

The nation turns to the National Academies of Sciences, Engineering, and Medicine for independent, objective advice on issues that affect people's lives worldwide.

www.national-academies.org