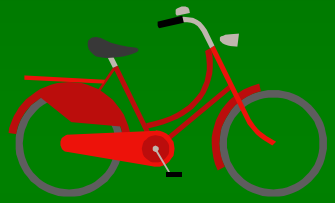
Bicycle Research Targeted to Change Policies and Funding to do the Research

Monday Nutrition Department Seminar Series



Anne Lusk, Ph.D.

Harvard T. H. Chan School of Public Health

October 31, 2016

Harvard Chan web site

"Harvard T.H. Chan School of Public Health **traces its roots to public health activism** at the beginning of the last century, a time of energetic social reform.

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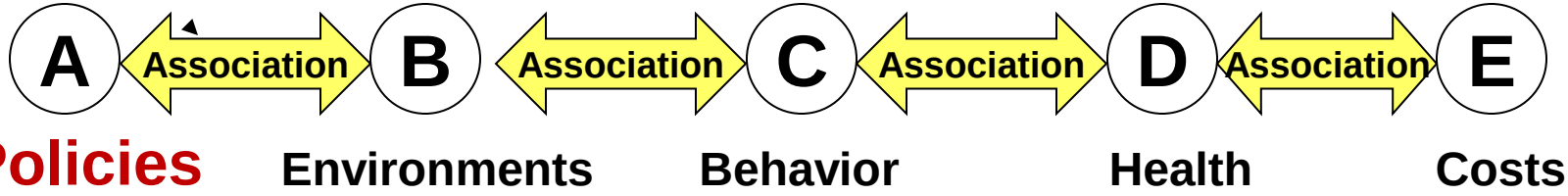
Biking Demands Policies

Bicycle research has multiple associations including:



Evidence-based policies are necessary to ensure that the safest and most preferred bicycle environments are provided.

Evidence to change policies

Instead of conducting research to add to the body of knowledge, research can be targeted to change policies. Therefore, this is the process I follow.

A. Identify a policy that needs to be changed.

B. Determine the research necessary to change the policy.

C. Identify funding to conduct the research.

D. Use press to disseminate the findings.

E. Determine if the policy has changed.

12 Examples of Bicycle Research

What follows are 12 examples of the policy that needed to be changed, the research findings, if the policy was changed, and the funding.

These 12 examples are provided to demonstrate generalizability of evidence-based policy making.

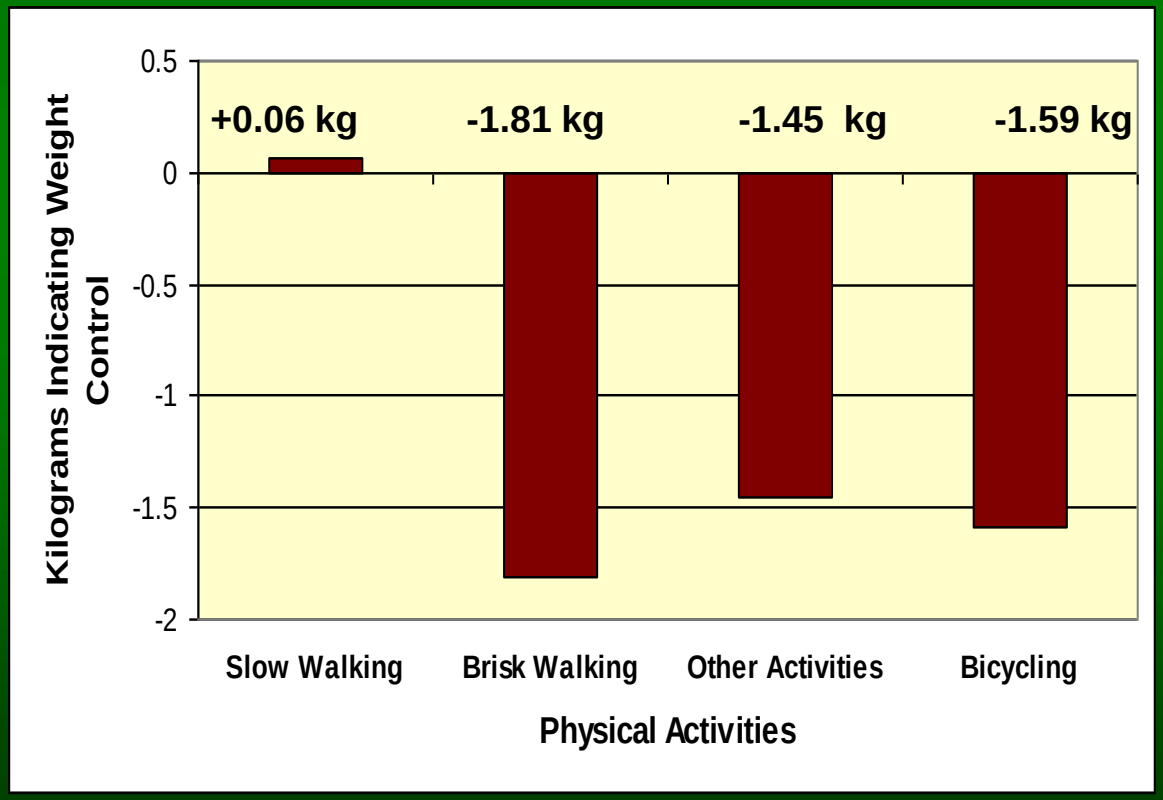
1. Research targeted to change this policy – Individuals are encouraged to walk and wide sidewalks are built.

- Every US adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week. JAMA 1995;273:402-407.
- The Robert Wood Johnson Foundation Active Living Research focused on walking and many studies were conducted using accelerometers (which measure walking).
- Walk audits were conducted to learn if sidewalks were provided with the goal of making “walkable neighborhoods.”
- No provisions were available for biking except the road and bike audits were not conducted.

Research conducted - “Bicycle Riding, Walking, and Weight Gain in Premenopausal Women”

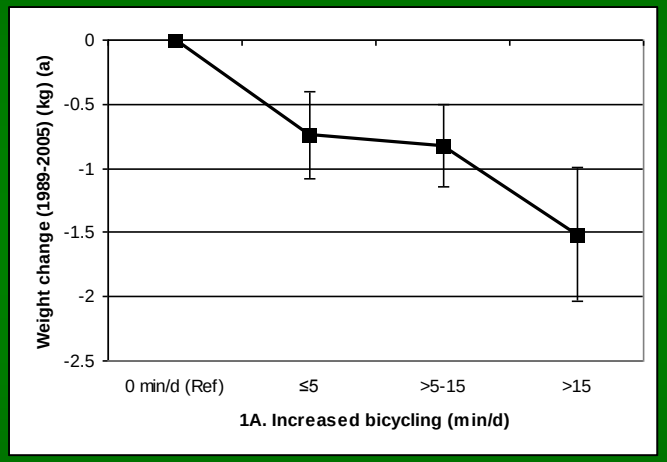
In research conducted on 18,414 nurses in the Nurses’ Health Study II, **50 % of the women walked slowly and slow walking did not control weight.**

Lusk, A, Mekary, R,* Feskanich, D, Willett, W. Bicycle Riding, Walking, and Weight Gain in Premenopausal Women. Archives of Internal Medicine. 2010; Vol 170 (no. 12) June 28: 1050 -1056.*



Research conducted to compare walking and bicycling

If women did not bicycle in 1989 but bicycled in 2005 for a set time, they were more likely to have controlled weight. A dose response also exists, i.e., more bicycling = more weight control and less bicycling = more weight gain.



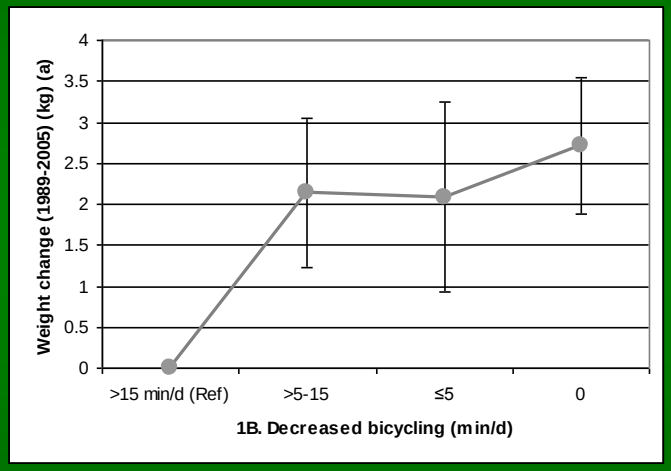


Figure 1A includes only women who did not initially bicycle (0 min/d) at baseline (1989). The figure reflects the slope of weight change if women remained in the non-bicycling category in 2005 or if they increased their bicycling in 2005. Figure 1B includes only women who initially bicycled for >15 min/d at baseline (1989). The figure reflects the slope of weight change if women remained in the high bicycling activity category in 2005 (reference), or if they decreased their bicycling in 2005.

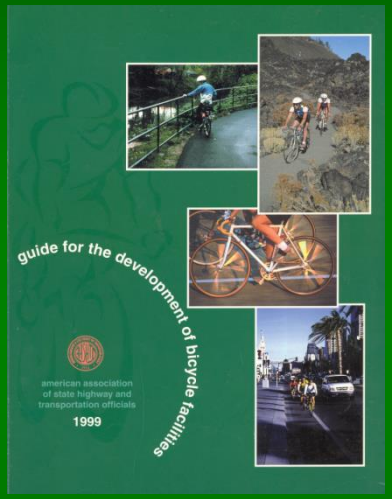
Lusk, A,* Mekary, R,* Feskanich, D, Willett, W. Bicycle Riding, Walking, and Weight Gain in Premenopausal Women. *Archives of Internal Medicine.* 2010; Vol 170 (no. 12) June 28: 1050-1056.

Policy change

The research was able to demonstrate the benefits of bicycling related to weight control. Because of the association with weight control, in the Department of Nutrition this research was the foundation for advocating for changes to the built environment to improve bike safety.

Funding – NIH F 32 grant

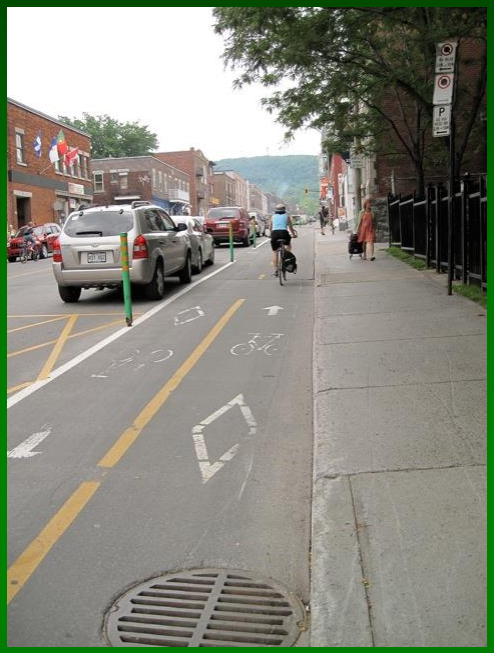
2. Research targeted to change this policy – The American Association of State Highway and Transportation Officials (AASHTO) stated in their guidelines to not build cycle tracks (barrier-protected bicycle-exclusive paths).



- The 1999 guidelines stated, “Bike lanes should never be placed between the parking lane and the curb lane. Bike lanes between the curb and parking lane can create obstacles for bicyclists from opening car doors and poor visibility at intersections and driveways and they prohibit bicyclists from making left turns.”

- The belief was cycle tracks only work in the Netherlands because they have a long standing bike culture.

Research conducted - “Risk of injury for bicycling on cycle tracks versus on the street”



In Montreal, we compared vehicle/bicycle crash injuries on six cycle tracks (three above) with comparable reference streets without bicycle provisions. The cycle tracks had a 28% lower injury rate and 2.5 times as many bicyclists compared to the reference streets without bicycle provisions.

Lusk, A, Furth, P, Morency, P, Miranda-Moreno, L, Willett, W, Dennerlein, J. Risk of injury for bicycling on cycle tracks versus in the street. Injury Prevention. 2011; Feb 9 17: 131-135.

Policy change

On July 31, 2013, the Federal Highway Administration, which had also opposed cycle tracks, requested proposals on cycle tracks. The call for proposals included this language, “There is a growing body of research on cycle tracks in the U.S. and Canada indicating that, when they are designed well, they do not increase bike crash rates. A growing body of research is also suggesting that separated bikeways encourage more people to bicycle.”

Funding – NIH F 32 grant

3. Research targeted to change this policy – Bicycle facilities were to be engineered as highways and not have landscaping.

Before (from FHWA)

After (from FHWA)

- Bike lanes in the door zones were the engineered design solution. This best served the cars (double parking allowed, swerving in the bike lane possible, etc.).

Research conducted - “A History of Bicycle Environments in China: Comparisons with the US and the Netherlands”

China had cycle tracks with landscaped islands up to 22 feet wide that separated moving vehicles from the bicyclists.

As early as 1894, the U.S. had cycle tracks that were landscaped corridors.

In 1940, Robert Moses, the later-highway baron, designed 31 miles of bicycle-exclusive-paths in park settings.

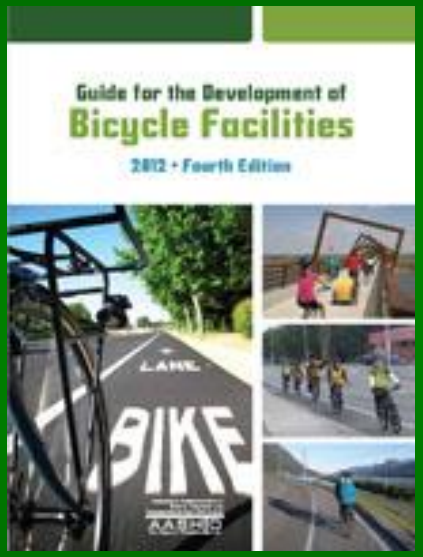
Lusk, A. A History of Bicycle Environments in China: Comparisons with the US and the Netherlands. Harvard Asia Quarterly Winter, Second Chapter, 2012; Vol. XIV, No. 4, 16-27.

Policy change

The history about wide landscaped islands by cycle tracks in China and that the U.S. had bicycle-exclusive paths in 1940 provided necessary information from countries other than the Netherlands. This background was useful to request funding to study trees and cycle tracks in subsequent research to change policies about facility design.

Funding – John King Fairbank Center for Chinese Studies

4. <u>Research targeted to change this policy</u> – The U.S. AASHTO bicycle facility guidelines were written primarily by males who always wrote not to build cycle tracks. AASHTO had a policy of cutting and pasting the same text from prior documents.



2012 AASHTO guidelines after the cycle track research

- Even though the National Association of City Transportation Officials (NACTO) had published their document that included cycle tracks and the earlier research on cycle tracks in Montreal had been published, the 2012 AASHTO guidelines repeated the same text that cycle tracks should not be built.

Research conducted - “Bicycle Guidelines and Crash Rates on Cycle Tracks in the United States”

In the 1991 AASHTO bike guidelines, the authors were 91% male and in 1999 guidelines the authors were 97% male.

Unlike in public health when a finding (heart attack symptoms and gender) is re-tested, the practice at AASHTO is to cut and paste the same text from the prior guideline.

Though it was difficult to get cycle tracks built in the U.S., 19 cycle tracks were identified in the US.

The crash rate for the US cycle tracks was 2.3 per million bicycle kilometers compared with the crash rate for biking on road of 3.75 to 67 for the U.S. and Canada.

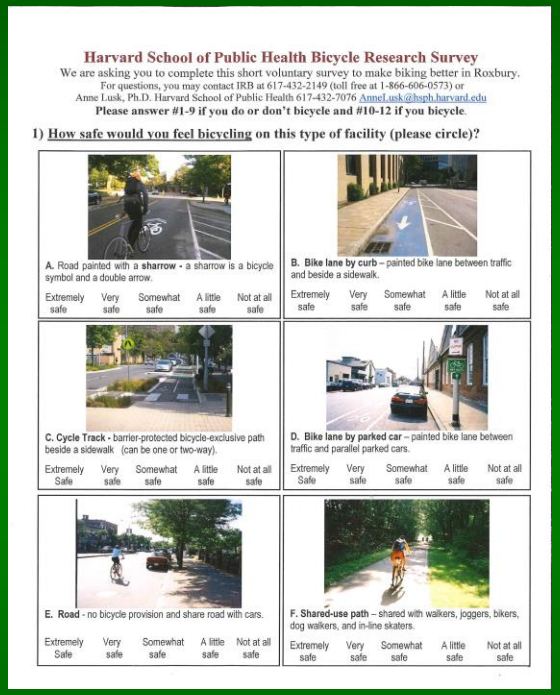
Lusk, A, Morency, P, Miranda-Moreno, L, Willett, W, Dennerlein, J. Bicycle Guidelines and Crash Rates on Cycle Tracks in the United States. American Journal of Public Health. 2013; July, 103(7): 1240-1248.

Policy change

Angie Schmitt wrote a Streetsblog piece titled, “Does the Gender Disparity in Engineering Harm Cycling in the U.S.?” The field is still primarily male but cycle tracks are slowly being built and cycle tracks will be in the next AASHTO Guidelines.

Funding – NIH F32 and the Helen and William Mazer Foundation

5. Research targeted to change this policy – Cycle tracks still are not built and they are not built based on evidence that they are preferred by females.



Harvard School of Public Health Bicycle Research Survey

We are asking you to complete this short voluntary survey to make biking better in Roxbury.
For questions, you may contact IRB at 617-432-2149 (toll free at 1-866-606-0573) or
Anne Lusk, Ph.D. Harvard School of Public Health 617-432-7076 AnneLusk@hsph.harvard.edu

Please answer #1-9 if you do or don't bicycle and #10-12 if you bicycle.

1) How safe would you feel bicycling on this type of facility (please circle)?

A. Road painted with a **sharrow** - a sharrow is a bicycle symbol and a double arrow.
Extremely safe | Very safe | Somewhat safe | A little safe | Not at all safe

B. **Bike lane by curb** – painted bike lane between traffic and beside a sidewalk.
Extremely safe | Very safe | Somewhat safe | A little safe | Not at all safe

C. **Cycle Track** - barrier-protected bicycle-exclusive path beside a sidewalk (can be one or two-way).
Extremely Safe | Very safe | Somewhat safe | A little safe | Not at all safe

D. **Bike lane by parked car** – painted bike lane between traffic and parallel parked cars.
Extremely Safe | Very safe | Somewhat safe | A little safe | Not at all safe

E. **Road** - no bicycle provision and share road with cars.
Extremely Safe | Very safe | Somewhat safe | A little safe | Not at all safe

F. **Shared-use path** – shared with walkers, joggers, bikers, dog walkers, and in-line skaters.
Extremely safe | Very safe | Somewhat safe | A little safe | Not at all safe

Stated preference study
Based on what a person likes

Revealed Preference Survey
Based on preference about what exists

- A more informed choice is made if the person can actually bicycle on the different environments.

Research conducted - “Gender and used/preferred differences of bicycle routes, parking, intersection signals, and bicycle type: Professional middle class preferences in Hangzhou, China”

Hangzhou, China has an extensive network of cycle tracks and 53.9% of the men and 60.2% of the women preferred cycle tracks to the other bike environments.

Hangzhou also has bicycle signals and 63.7% of the men and 69.1% of the women preferred having the bicycle signal.

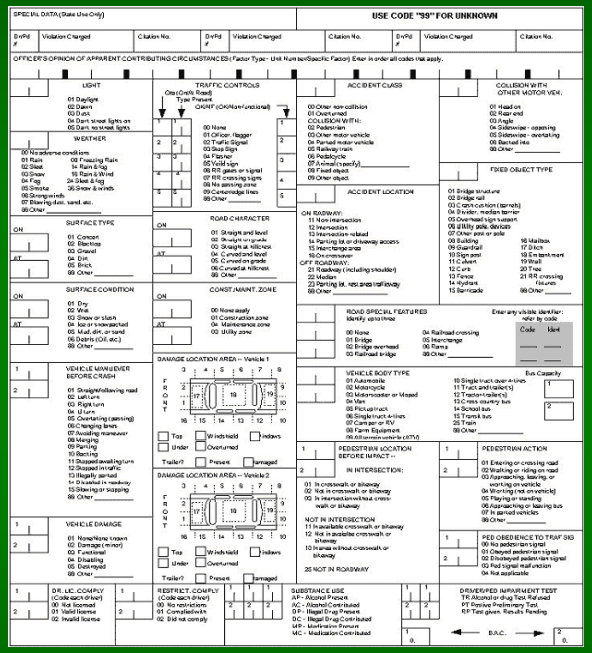
Lusk, A, Wen, X, Zhou, L. Gender and Used/Preferred Differences on Bicycle Routes, Parking, Intersection Signals, and Bicycle Type: Professional Middle Class Preferences in Hangzhou, China. Journal of Transport and Health. 2014; 1: 124-133.

Policy change

Bikes Belong wrote a document titled “Protected Bike Lanes for Equity” and included the research from Hangzhou about gender preferences of cycle tracks. The author of the document stressed that too often studies about cycle tracks are from the Netherlands but lessons could be learned other countries, including China. The evidence about the bicycle light has been used to push for testing of the Chinese bicycle signal in the U.S.

Funding – John King Fairbank Center for Chinese Studies and the Helen and William Mazer Foundation

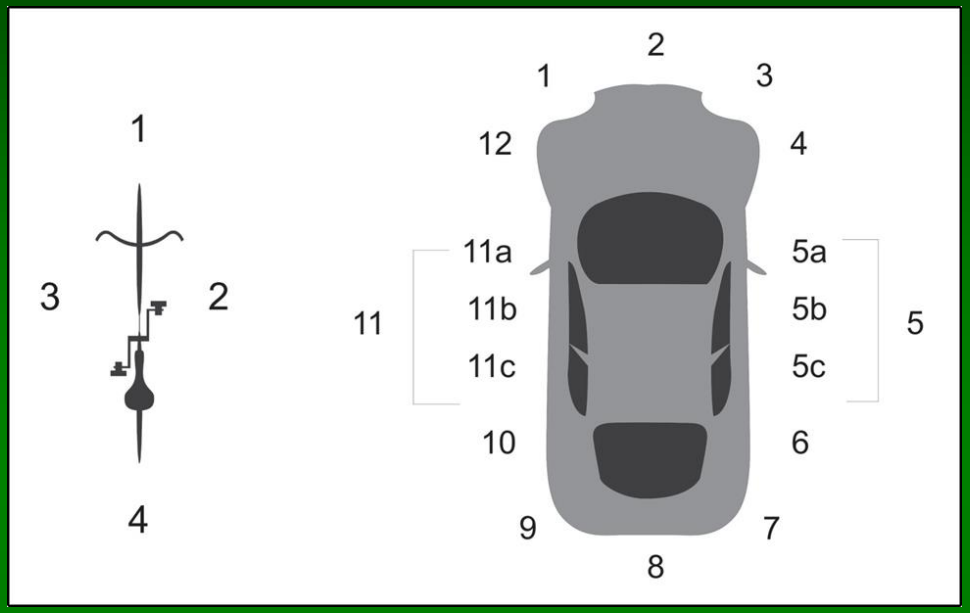
6. Research targeted to change this policy – When police report a vehicle/bicycle crash, they use a template for a crash between two vehicles. The reports are often hand written. Mention is only for pedal-cyclist and helmet.



- With the number of bicyclists on the rise, the crash template should be redesigned to reflect a crash between a vehicle and a bicyclist.

- Crash data should be entered into an electronic tablet and the information automatically uploaded for ease in later analysis of vehicle bicycle crashes.

Research conducted - “Database improvements for motor vehicle/bicycle crash analysis”



Police templates could include the 4 bicycle impact points, 18 vehicle impact points (including mirror and door), 4 bicycle environments (including cycle tracks), in/out of the bicycle environment, crash patterns, and motor vehicle characteristics related to the bike (truck, windowless van).

Lusk, A, Asgarzdeh, A,* Farvid, M. Database improvements for motor vehicle/bicycle crash analysis. Injury Prevention. 2015; 21: 221-230.*

Policy change

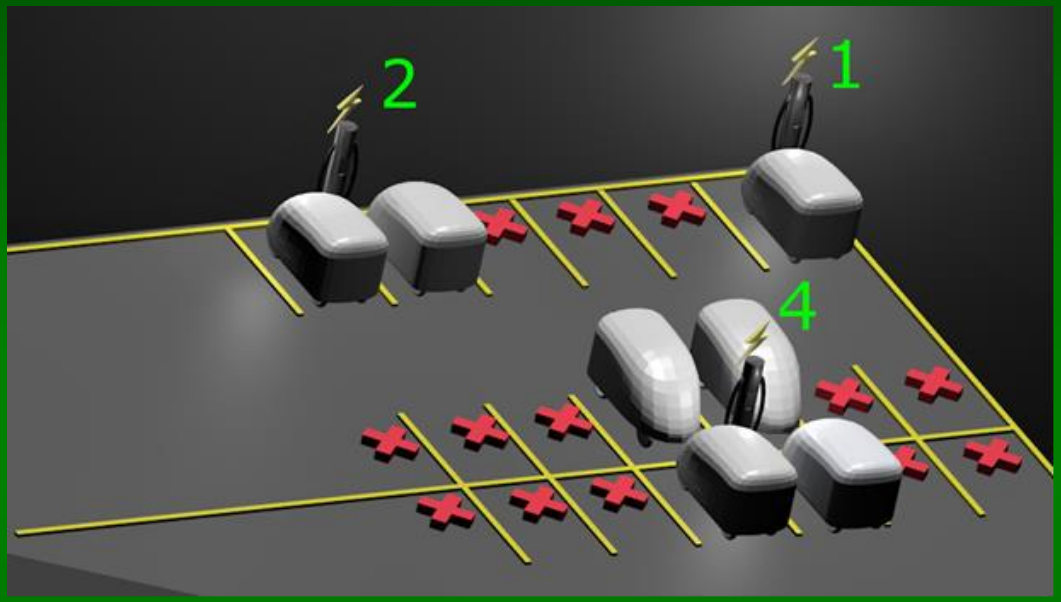
A request was made to use the bicycle and vehicle drawing on a police template. There were multiple press articles that covered the research.

Funding – Nissan Motor, Co., Ltd.

7. <u>Research targeted to change this policy</u> – Current electric vehicle recharging station designs and policies cause range anxiety, lowering the sales of electric vehicles.

- If more electric vehicles were driven, bicyclists would be less exposed to mobile source air pollution.

Research conducted - “Addressing electric vehicle (EV) sales and range anxiety through parking layout, policy and regulation”



We proposed placing charging stations in the middle of the parking lot with an octopus charger, a modest parking fee to encourage turnover, legislation to allow another to unplug an electric vehicle, and a parking kiosk that prints the paid meter fee but also information that the car could be unplugged if charged.

Bonges, H, Lusk, A. “Addressing electric vehicle (EV) sales and range anxiety through parking layout, policy and regulation.” Transportation Research Part A: Policy and Practice, 2016; 83: 63-73.

Policy change

The article has been cited by other authors and the research was well covered in the press. This article was a first step in changing the policies.

Funding – This research was conducted with a Masters student from Harvard Extension who wrote the topic as a class paper.

8. Research targeted to change this policy – Bicycle facility designs have not changed while other technologies have advanced significantly.

Typical bike path beside a road in Ohio

Solar panels over a cycle track in Korea

- By showcasing bike innovations the exist or might exist, perhaps the needle could be moved faster.

Research conducted - “Promoting Bicycling through Creative Design: Innovations for Bicycles and Cycling Facilities”

Towers that vacuum pollution

Cycle tracks built into residential buildings

The document showcased 70 innovations for the bicycle related to the bike, bicycle environments, bicycle parking, and climate change.

Lusk, A. in partnership with the League of American Bicyclists and the U.S. Environmental Protection (EPA) and with support from the Helen and William Mazer Foundation. (2016) “Promoting Bicycling through Creative Design: Innovations for Bicycles and Cycling Facilities.”

Policy change

The document received much press and others have sent in innovations for the follow up document. With 70 innovations showcased, it will be hard to know if policies were changed.

Funding – Helen and William Mazer Foundation

9. <u>Research targeted to change this policy</u> – Bicycle facilities are built in white wealthy communities where advocacy and social capital are available but not built in lower income minority communities.

Malcolm X Boulevard is in the Boston Bike Plan for a cycle track but there are no plans to build it.

Research conducted/article under review - “Biking Practices and Preferences in a Lower Income, Primarily Minority Neighborhood: Learning what residents want.”

- Residents in Roxbury were sent a mailed survey. Bicyclists on Malcolm X Boulevard were asked to complete a survey and bicyclists were observed (gender, helmet, type of bike, clothing, if carrying a child on the bike, etc.)

- The research findings reveal that Blacks and Hispanics are biking, residents want cycle tracks, and residents want bike parking inside their housing unit so their bicycle is not stolen.

Lusk, A, Anastasio, A, Shaffer, N, Wu, J, Li, Y. “Biking Practices and Preferences in a Lower Income, Primarily Minority Neighborhood: Learning what residents want.”

Policy change

Other articles have been written about minority populations and biking but this one asked the residents in Roxbury what they wanted. The hope is the findings in this article will help get the cycle track built on Malcolm X Boulevard and in other lower income primarily minority neighborhoods.

Funding – Coverys with earlier funding from the Helen and William Mazer Foundation

10. Research targeted to change this policy – Bicycle facilities are not being built in developing nations and if they exist they are not used properly.

Drivers in Mexico drive over rubber “armadillos” placed there to demarcate the cycle track so they can park.

Drivers in the Netherlands know that a tilted cobblestone indicates the location of a cycle track and they do not drive or park in the cycle track.

Research conducted/article under review - “Bicycle facilities that address safety, crime, and economic development: Perceptions from Morelia, Mexico.”

- Residents in developing nations did not understand the visual cues for bicycle facilities that exist in developed nations or how to bicycle on the facilities if they existed.
- Cycle tracks were the most preferred facility for safety, crime, and economic development.
- Bicycle facilities introduced into developing nations should accommodate for the differences in knowledge and awareness.

Alveano Aguerrebere, I, Ayvar Campos, F, Farvid, M, Lusk, A. Bicycle facilities that address safety, crime, and economic development: Perceptions from Morelia, Mexico

Policy change

Bicycle facilities have not been incorporated into transportation plans in Mexico and the hope is this article will make the case for inclusion and appropriately designed bicycle facilities.

Funding – This article was a collaboration with a Ph.D. student from Mexico who asked to be involved in research on bicycle facilities.

11. Research targeted to change this policy – Plans for bicycle facilities have not incorporated trees even though trees are necessary to cool a city and could enhance the bicycle environment.

- If trees are beside cycle tracks, it is because the trees were planted in the sidewalk for the pedestrians, as in this street in Montreal.

Research conducted/article to be submitted - “Tree location preferences on cycle tracks relative to sidewalks and the thermal advantages of finding a place for the trees.”

- Pictures of 5 cycle tracks in the Boston area were photo shopped with: 1) No trees; 2) Trees between the sidewalk and the cycle track; 3) Trees between the cycle track and the street; 4) Trees and bushes between the cycle track and street; 5) Trees between the parallel parked cars. These pictures were put on large foam boards and flipped through for pedestrians and bicyclists on the cycle tracks.

- The most preferred image by pedestrians and cyclists was of trees or trees and bushes between the cycle track and the street.

Lusk, A. Dobbert, L. Tree location preferences on cycle tracks relative to sidewalks and the thermal advantages of finding a place for the trees.

Policy change

When this article is published, the hope is bicycle design guidelines will include text for planting trees including tree pit placement and dimensions so trees reach maturity.

Funding – Helen and William Mazer Foundation

12. Research targeted to change this policy – Retirement communities are designed like car-centric industrial parks.

Industrial Park

Senior housing complex

- If bicycling is incorporated in senior housing, residents, staff, and visiting family members could be healthier.
- Risk of Alzheimer's is lowered if individuals engage in vigorous physical activity.

Research underway – “Senior Living, Alzheimer’s and Bicycling”

3 Wheel Quadracycle

Tricycle

Rickshaw

Regular bicycle

- In Phase I, residents in senior housing complexes in New England are being asked for their preferences about bicycling and using 4 different types of bicycles.
- In Phase II, the 4 bicycles will be taken to the senior housing complexes so the residents can try riding the bikes.
- In Phase III, an NIH grant will be submitted to test the benefits from residents, staff, and adult children riding the bikes.

Policy change

When this research is completed, the hope is senior housing complexes will have the variety of bicycles and a place for residents, staff, and adult visiting children to bicycle to address health and, in particular, Alzheimer's disease.

Funding – Helen and William Mazer Foundation

Back to the Harvard Chan web site

"Harvard T.H. Chan School of Public Health **traces its roots to public health activism** at the beginning of the last century, a time of energetic social reform.

We work together as a community of leading scientists, educators, and students to take innovative ideas from the laboratory to people's lives, not only making scientific breakthroughs, but also working to **change** individual behaviors, **public policies**, and health care practices."

Action items for you to consider

1) To change policies, you need to study the policies.

2) To conduct the research, you need to find funding so always have an elevator pitch ready with 6 ideas.

3) To effect change, always work to get publicity about your research.

Thank you

Anne Lusk, Ph.D.
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