Zoning and Complete Streets Policies and Active Travel to Work

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Overview

- Background
- Zoning Policies and Active Travel to Work
- Complete Streets Policies and Taking Public Transit to Work
- Key Findings and Limitations
- Lessons Learned in the Use of ACS Data

Background

- In 2018, only 24% of adults met the 2008 Physical Activity Guidelines, which recommend at least 150 minutes/week of moderate or 75 minutes/week of vigorous aerobic activity and muscle-strengthening activities at least 2 days/week.
- Only 54% of adults met even the aerobic activity guidelines.
- Active commuting to work by walking or biking provides an important opportunity for physical activity (PA), as does taking public transit as public transit users typically spend time walking to and from stops/stations and within stations.

The role of the built environment

- Features of the built environment such as street connectivity and more compact neighborhood design with a mix of land uses, making travel destinations more accessible, have been shown to be associated with more PA.
- As a result, several authoritative bodies, including the Community Preventative Services Task Force and the Institute of Medicine of the National Academies, have recognized the role the design of the built environment can play in facilitating PA.

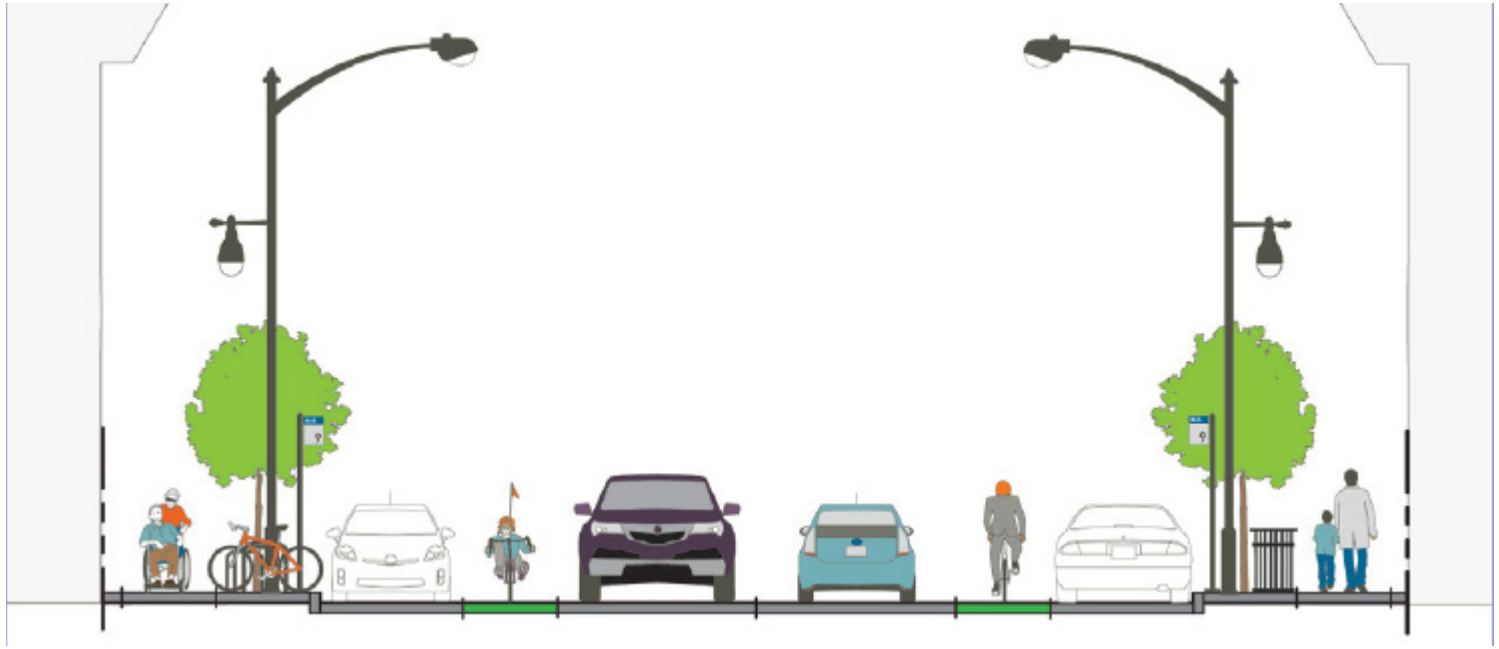
Zoning Policies

- Because zoning policies regulate land use and features of the built environment such as sidewalks and bike lanes, they can play an important role in facilitating a more PA-friendly built environment.
- Traditional Euclidian zoning does not emphasize PA-friendly features and typically divides jurisdictions into single-use zones which inhibit active travel and create more dependence on cars.
- Recently, zoning code reforms have gained popularity in part because of movements such as Smart Growth, including traditional neighborhood developments, pedestrian- and transit-oriented developments, and form-based codes.

Source: www.pedbikeimages.org / NYCDOT

Complete Streets Policies

- Complete Streets are “designed and operated to prioritize safety, comfort, and access to destinations for all people who use the street” (Smart Growth America).
- Specific design elements vary by context but can include sidewalks, bike lanes, bus lanes, and more convenient public transit stops.



Source: Active Transportation Alliance

Zoning Policies and Active Travel to Work

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Zoning Analysis Sample

6,438 municipal jurisdictions in the most populous 496 counties and 4 consolidated cities in the U.S.

4,076 municipal jurisdictions representing ≥0.5% of their county/consolidated city's population

3,921 municipal jurisdictions for which zoning data could be obtained

3,914 municipal jurisdictions with ACS and walkability scale data, covering 45% of the U.S. population in 48 states and DC

Zoning Measures

- Zoning codes as of 2010 were collected and evaluated for whether they addressed 10 items:
  - Code reform zoning
  - Sidewalks
  - Crosswalks
  - Bike-pedestrian connectivity
  - Street connectivity
  - Bike lanes
  - Bike parking
  - Bike-pedestrian trails/paths
  - Other walkability (e.g., traffic calming, pedestrian plaza)
  - Mixed use

ACS Active Travel to Work Measures

- Data on active travel to work were obtained from the ACS 2010-2014 5-year estimates.
- The ACS included a question asking, “How did this person usually get to work LAST WEEK? If this person usually used more than one method of transportation during the trip, mark (X) in the box of the one used for most of the distance.”

- Response options included:
  - **Walked**
  - **Bicycle**
  - **Bus or trolley bus**
  - **Streetcar or trolley car**
  - **Subway or elevated**
  - **Railroad**
  - **Ferryboat**
  - Car, truck, or van
  - Taxicab
  - Motorcycle
  - Worked at home
  - Other method

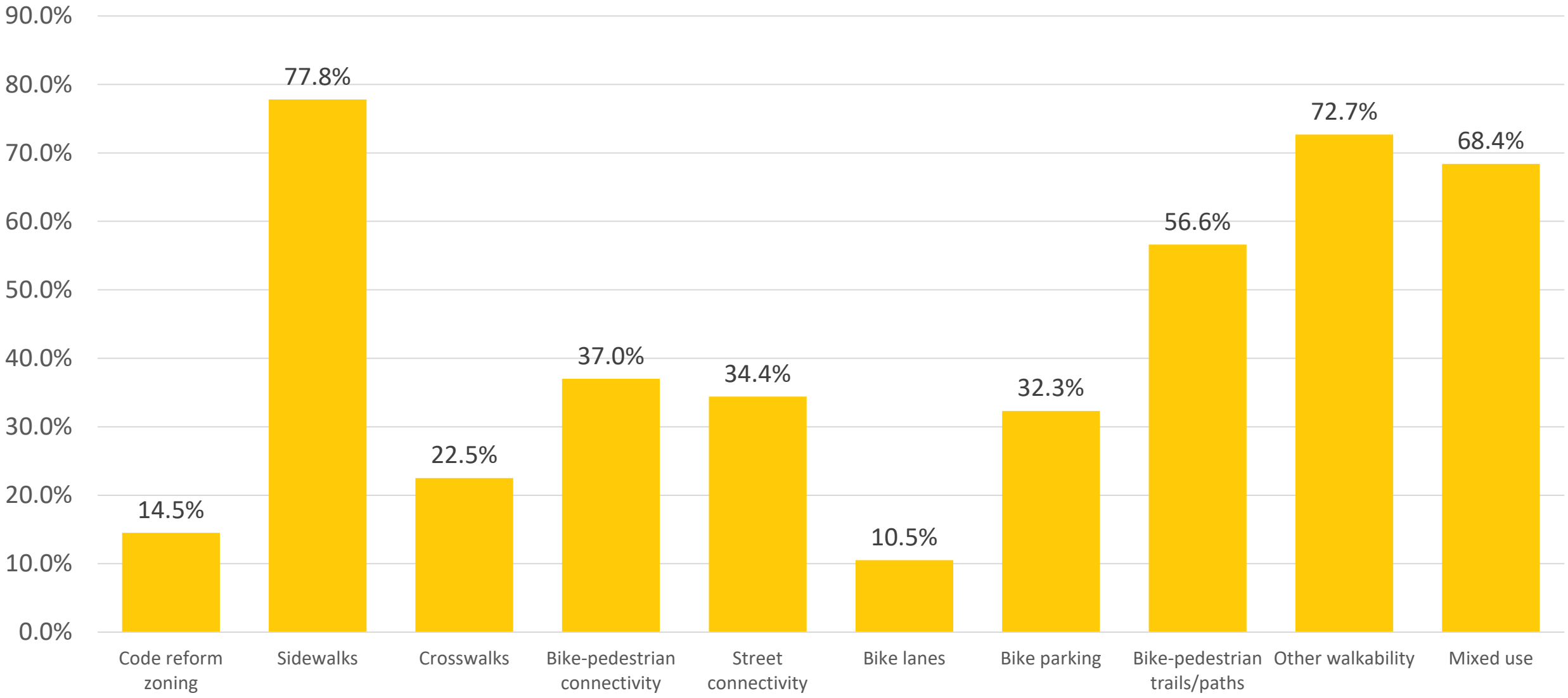
ACS Active Travel to Work Measures

- Measures were computed for the percentage of workers who worked away from home:
  - Walking to work,
  - Biking to work, and
  - Taking public transit to work.
- An overall measure was also computed for the percentage of workers who took any of these forms of active travel to work.

Analyses

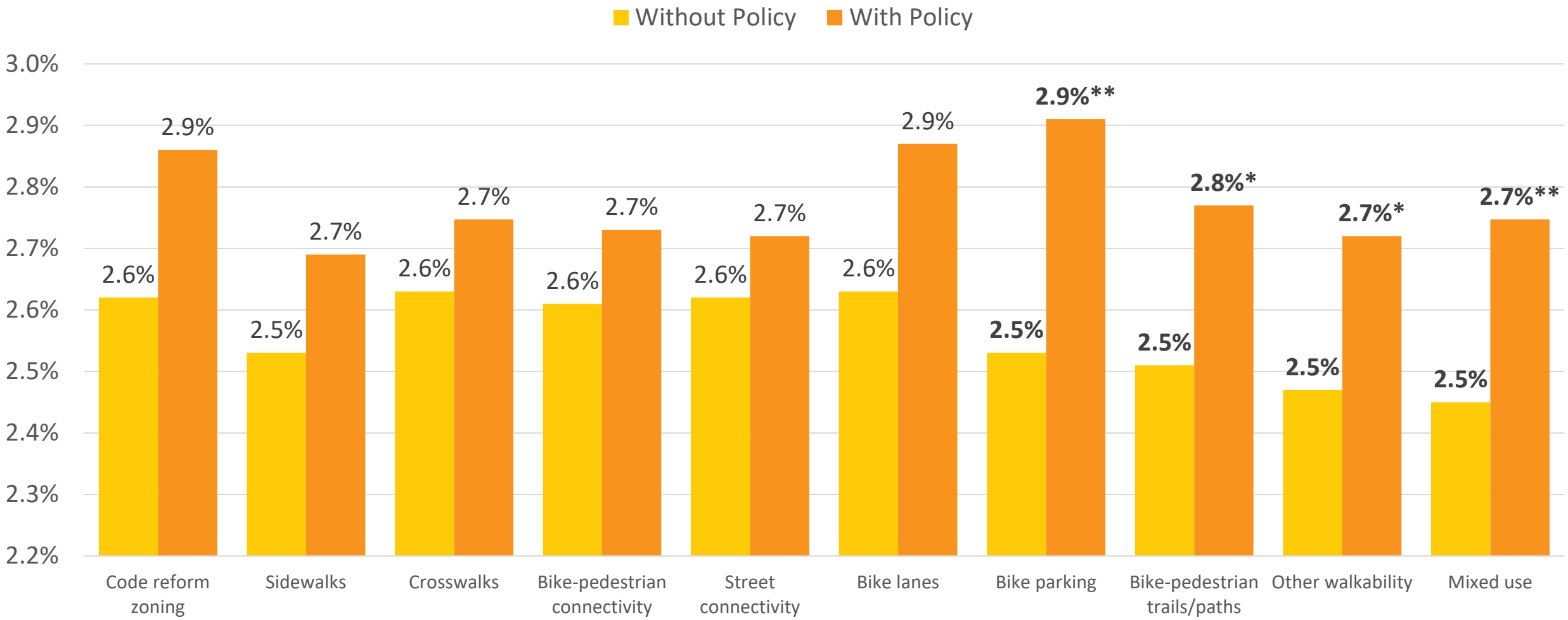
- Linear regression models were computed estimating the association between each zoning measure and active travel to work, with robust standard errors clustered on county, controlling for ACS data on:
  - % households in poverty
  - Median household income tertiles
  - % non-Hispanic White, Black, and Hispanic
  - Median age
  - Walkability scale (based on ACS and NAVTEQ 2013 data)
  - % occupied housing with no vehicle available
  - Population size tertiles
  - Region
- Adjusted prevalence estimates were computed from these models.

Zoning provision prevalence



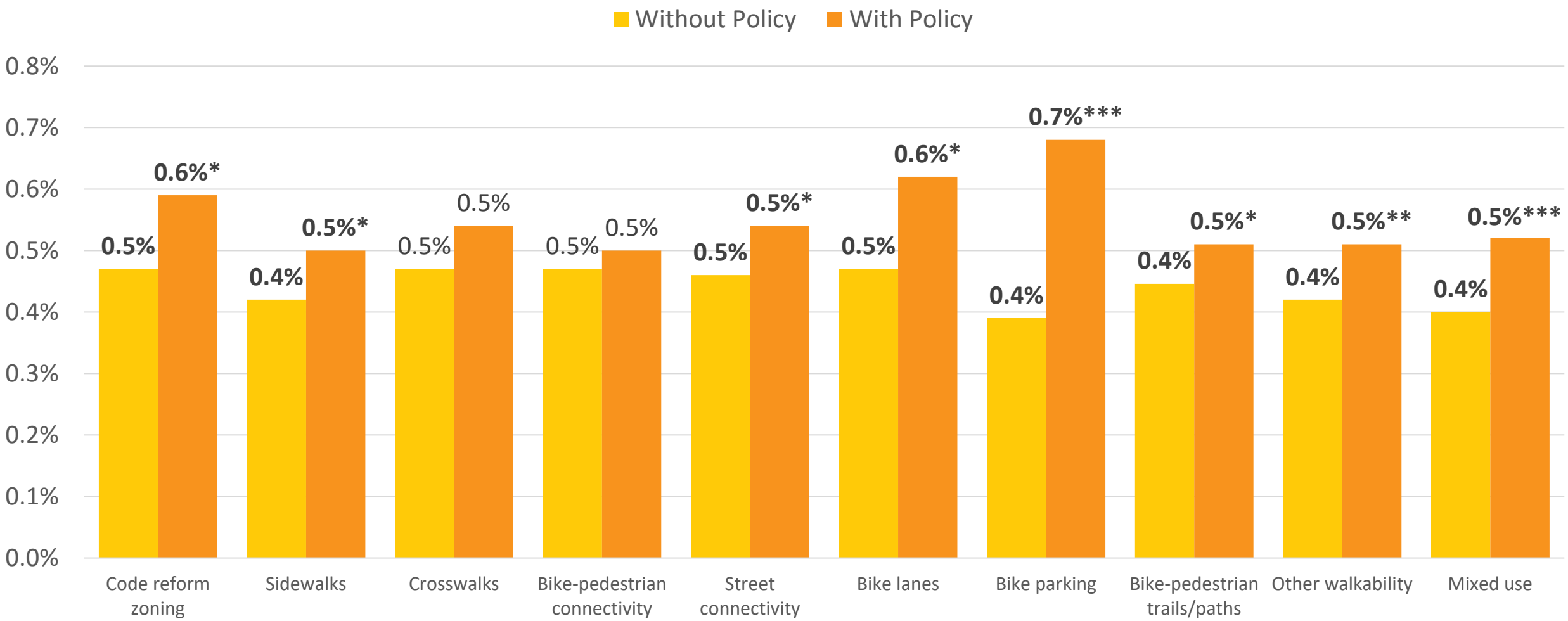
N=3,914 municipalities representing 45.45% of the 2010 U.S. population in 48 states and DC.

Adjusted prevalence of workers walking to work



N=3,914 municipalities representing 45.45% of the 2010 U.S. population in 48 states and DC. Adjusted prevalence estimates are shown from linear regression models controlling for region, % households in poverty, % non-Hispanic White, % non-Hispanic Black, % Hispanic, median household income tertiles, median age, walkability scale, % occupied housing with no vehicle available, and population size tertiles, with robust standard errors clustered on county. Estimates are bolded where differences by presence of policy are statistically significant. * p<.05 ** p<.01

Adjusted prevalence of workers biking to work



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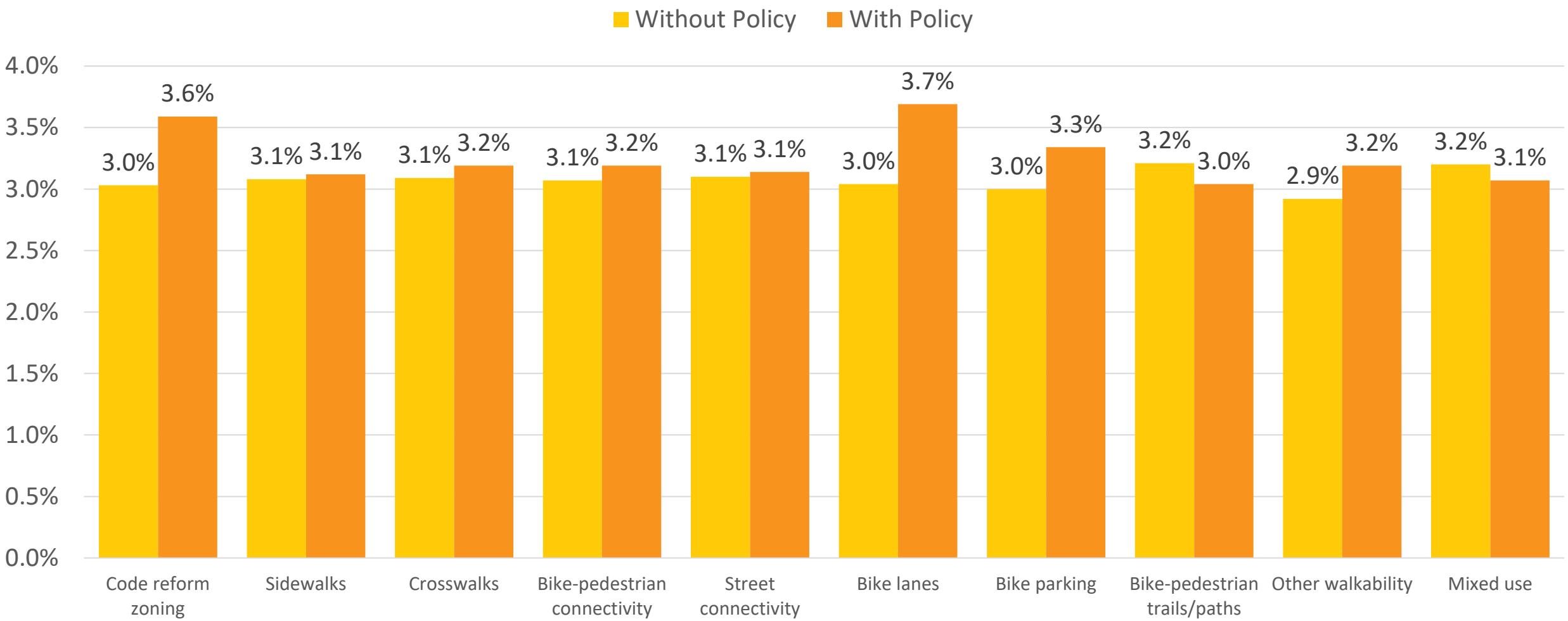
Adjusted prevalence of workers taking public transit to work



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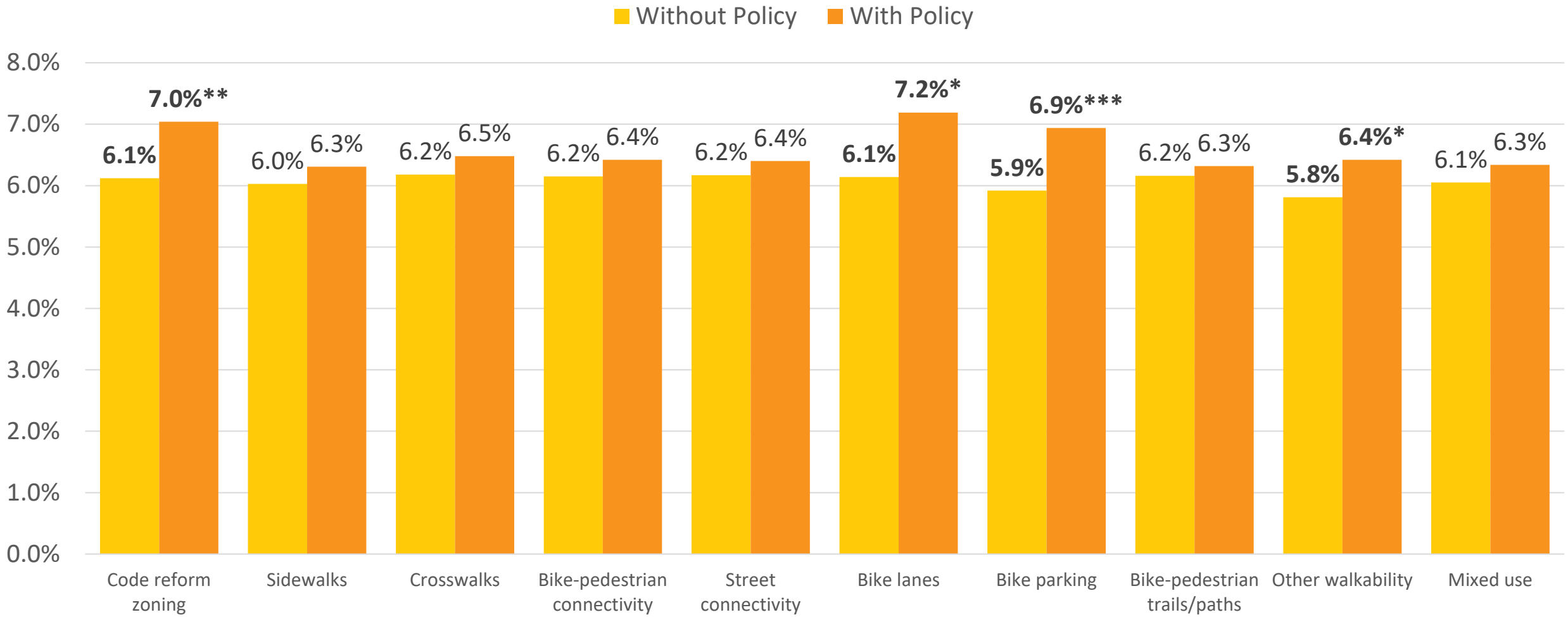
Adjusted prevalence of workers taking any active transportation



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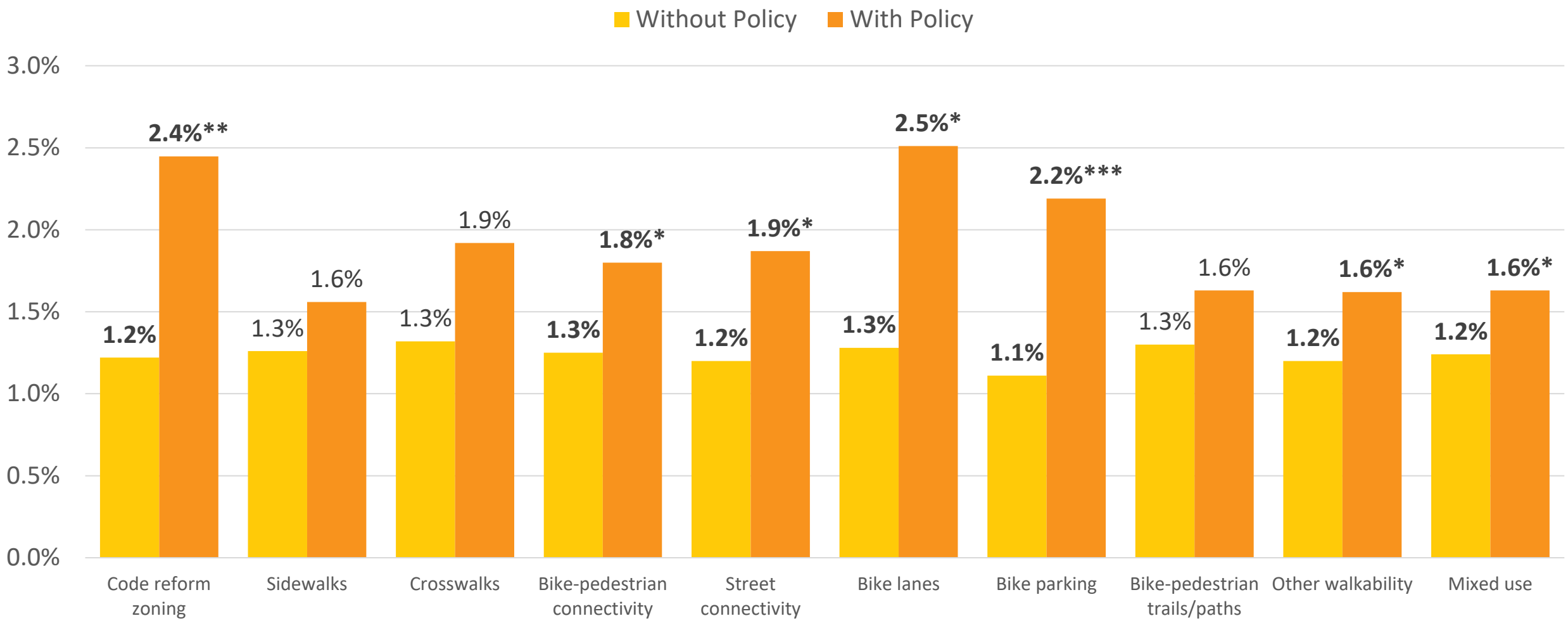
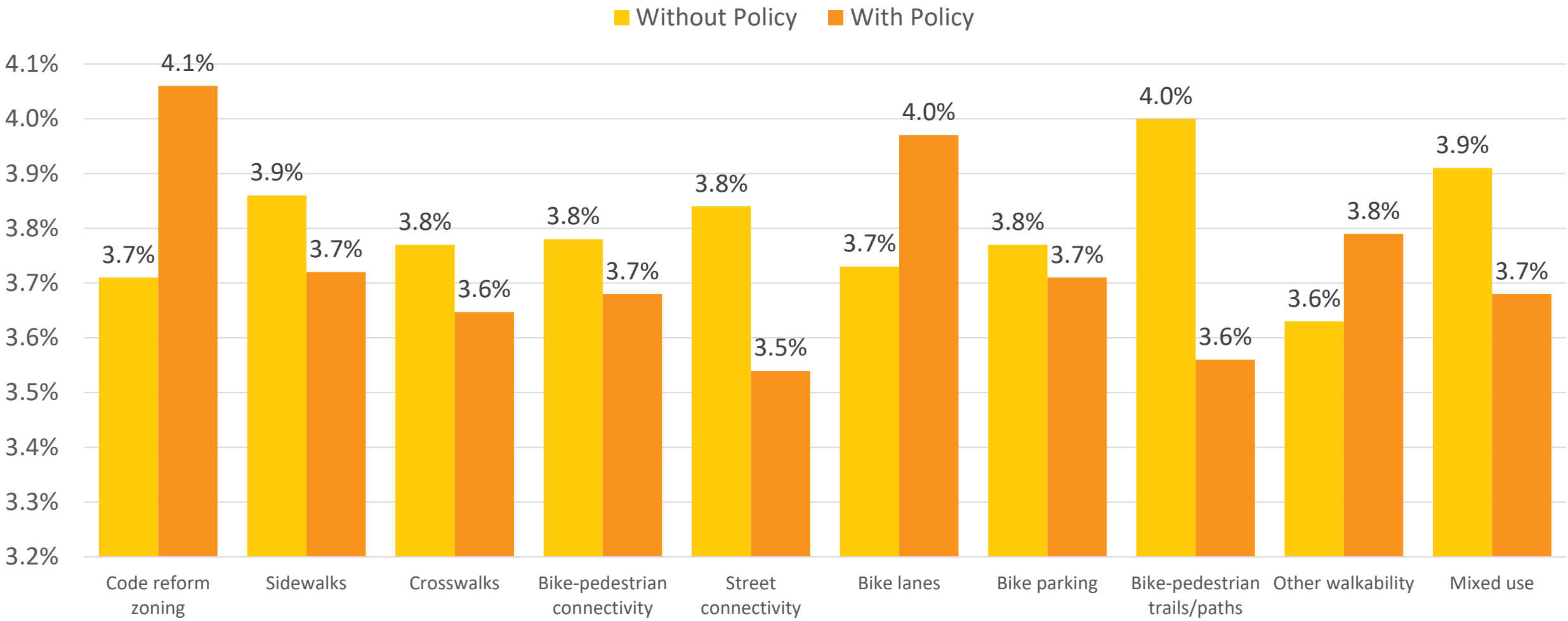
Adjusted prevalence of workers taking public transit to work: Southern jurisdictions



N=1,108 municipalities. Adjusted prevalence estimates are shown from linear regression models controlling for % households in poverty, % non-Hispanic White, % non-Hispanic Black, % Hispanic, median household income tertiles, median age, walkability scale, % occupied housing with no vehicle available, and population size tertiles, with robust standard errors clustered on county. Estimates are bolded where differences by presence of policy are statistically significant.
* p<.05 ** p<.01 *** p<.001

Adjusted prevalence of workers taking public transit to work: non-Southern jurisdictions



N=2,806 municipalities. Adjusted prevalence estimates are shown from linear regression models controlling for % households in poverty, % non-Hispanic White, % non-Hispanic Black, % Hispanic, median household income tertiles, median age, walkability scale, % occupied housing with no vehicle available, and population size tertiles, with robust standard errors clustered on county. Estimates are bolded where differences by presence of policy are statistically significant.

Complete Streets Policies and Taking Public Transit to Work

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Complete Streets Analysis Sample

- All Complete Streets policies in existence as of May 2015 were compiled. This analysis examined the association between having a policy and the rate of taking public transit to work.
- The sample frames included all (1) counties/consolidated cities and (2) municipalities with governmental authority in the 50 states and DC.
- This was based on all geographies from the 2010-2014 ACS 5-year estimates under summary levels
  - 50 (counties)
  - 170 (consolidated cities), and
  - 155 (place within county, used to capture municipalities)
- We excluded jurisdictions without governmental authority, as well as duplicates across the summary levels, referring to classifications in the 2012 Census of Governments Individual State Descriptions.

Complete Streets Analysis Sample

3,142 counties (summary level 50) and 8 consolidated cities (summary level 170) in 50 states and DC

Excluded 76 counties which duplicate a place or consolidated city

Excluded 31 counties which lacked governing authority:

- 11 county-equivalents in AK
- All counties in CT and RI, and most in MA

30,642 places within counties (summary level 155) in 50 states and DC

Excluded places which lacked governing authority:

- 9,902 Census Designated Places
- 8 balances of county
- 1 place (Houma, LA, in Terrebonne Parish)

Treated 2 counties as municipalities (Honolulu County, HI, and Terrebonne Parish, LA)

611 municipal governments excluded from analyses because of missing ACS data on median household income, median age, or taking public transit to work

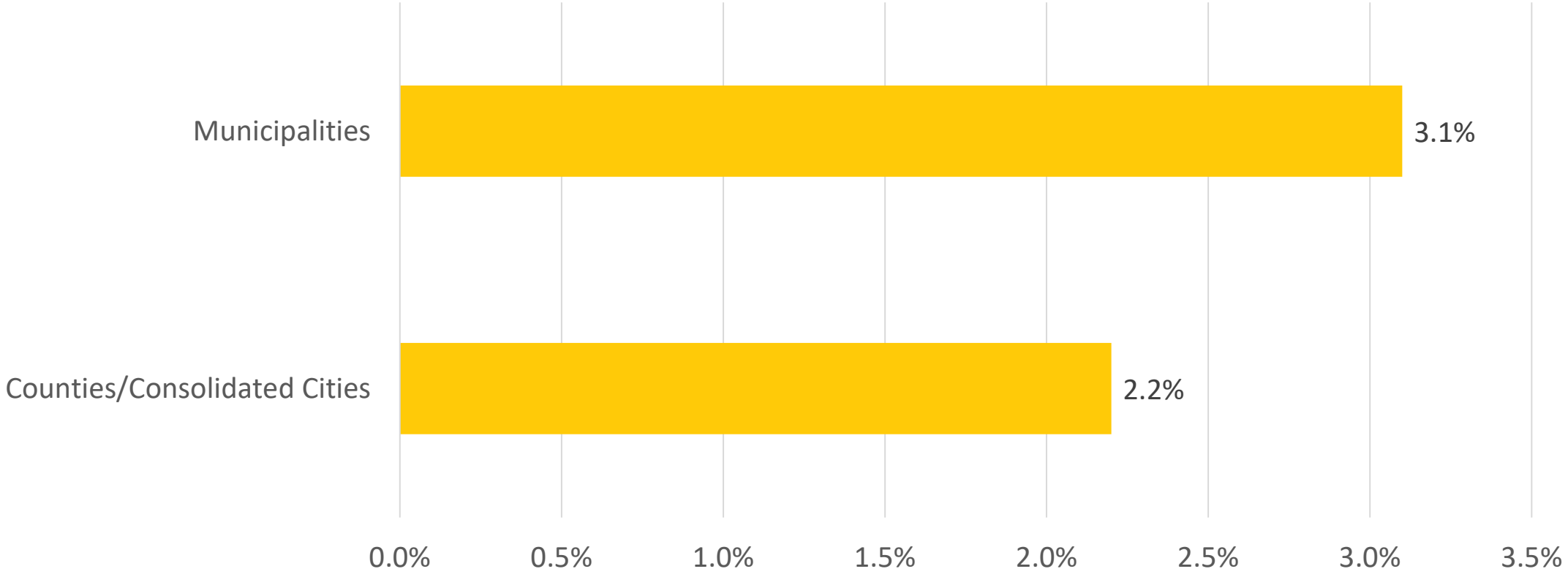
Total of 3,041 county and consolidated city governments

Total of 20,122 municipal governments

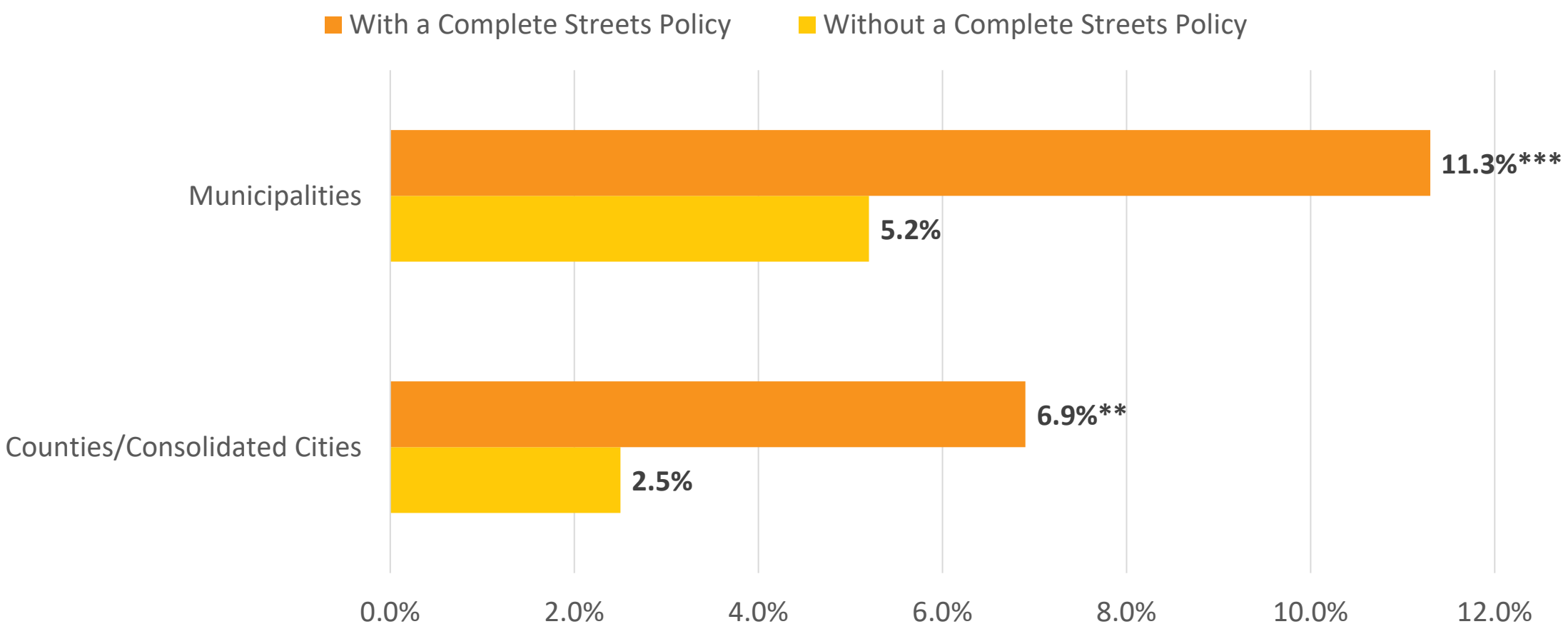
Analyses

- Linear regression models were computed estimating the association between having a Complete Streets policy and taking public transit to work, with robust standard errors clustered on state (county/consolidated city model) or county (municipal model), controlling for:
  - Population size tertiles (ACS)
  - Median household income tertiles (ACS)
  - Median age (ACS)
  - Presence of a higher-level (state/county) Complete Streets policy
  - Region (municipal models only)
- Models were weighted by population size.
- Adjusted prevalence estimates were computed from these models.

Prevalence of Complete Streets policies



Adjusted prevalence of workers taking public transit to work



** p<.01 *** p<.001

Key Findings and Limitations

Key Findings

- With the exception of zoning for crosswalks and bike-pedestrian connectivity, each zoning measure was positively associated with at least one active travel to work outcome in the full sample.
- In the South but not other regions, several zoning measures were associated with taking public transit to work, including code reform zoning and specific zoning provisions such as addressing mixed use, street connectivity, and bike-pedestrian connectivity.
  - This is notable as public transit use was lower on average in Southern jurisdictions (1.5% vs. 3.7% for non-Southern jurisdictions).
- Both municipal and county/consolidated city Complete Streets policies were associated with taking public transit to work.
- The results show the potential importance of zoning and Complete Streets policies in encouraging active travel to work.

Limitations

- Because the policy data are cross-sectional we cannot establish causality.
- We lack data on the presence of built environment features corresponding to the elements addressed in zoning and Complete Streets policies, so we cannot assess on-the-ground implementation of these provisions.

Lessons Learned in the Use of ACS Data

Choice of Dataset

- These analyses show how ACS data on commute modes can be used to facilitate analyses at a nationwide scale.
- When using ACS data, it is important to consider which ACS dataset is most appropriate.
- The 5-year estimates are the most precise and are the only estimates available for jurisdictions of all population sizes.
- The other estimates are only available for jurisdictions meeting specific population size cutoffs: ≥20k (1-year supplemental and discontinued 3-year estimates) or ≥65k (1-year estimates).
- They are also less precise.

Choice of Dataset

- Both the zoning and Complete Streets analyses presented here included jurisdictions with a wide range of population sizes, from 509->2M for the zoning analysis and 4->9M for the Complete Streets analyses.
- Jurisdictions with population <20k represented >40% of all analytic samples.
- This required the use of the 5-year estimates.

Geographic summary levels

- The ACS offers data at a wide variety of geographic summary levels, ranging from the block group level up to state-level or nationwide estimates.
- It is important to consider the geographic level that is most appropriate for analyses.
- For example, in the Complete Streets analyses, we examined places within counties because those analyses controlled for county-level policies.

Geographic summary levels

- It is important to note that the same jurisdiction may fall under multiple summary levels.
- We found this with the Complete Streets analysis. Examples include independent cities such as Fairfax, VA, and consolidated city-county jurisdictions such as San Francisco, CA, both of which are listed as both counties and places.
- For the Complete Streets analysis we consulted the Census of Governments to address these cases. For other analyses we have found TIGERweb (https://tigerweb.geo.census.gov/tigerweb/) to be helpful in better understanding overlap.

FIPS codes

- In linking datasets, it is important to correctly make use of the relevant FIPS code identifiers for the given geographic summary level.
- For instance, places within counties are identified by a combination of state, place, and county FIPS codes.
- To link the municipal Complete Streets policy data to the ACS data, we used state and place FIPS codes with a one-to-many merge, as a single place may span multiple counties.

FIPS codes

- It is also important to ensure FIPS codes are recorded consistently; e.g., if stored as strings, then consistently either with or without leading zeros.
- FIPS codes do change over time, and it is also important to be on the lookout for that. For instance, for our zoning analyses, two jurisdictions' FIPS codes changed between the time we constructed the frame and the time we linked to ACS data.
- For the Complete Streets analysis, we had to look up FIPS codes for some jurisdictions as we conducted a census of all policies. This highlighted the ambiguity of place names; for instance, in NY, there is both a town and a village named Fishkill, and these are two entirely separate entities.

For more information

NOVEMBER 2016 RESEARCH BRIEF

Exploring the Association Between Complete Streets Policies And Taking Public Transit to Work

THE UNIVERSITY OF ILLINOIS AT CHICAGO

Emily Thrun, MUPP, Julien Leider, MA, Jamie Chriqui, PhD, MHS

This brief summarizes the results of a study to examine the association between Complete Streets policies at the county and municipal levels in the United States and taking public transit to work. This review found that having a Complete Streets policy was associated with significantly higher rates of taking public transit at both the county and municipal levels.

Historically, most streets have been designed to emphasize capacity, safety, and efficiency, focused primarily on cars and referred to as "car-centric" design (Figure 1). Complete Streets, on the other hand, are designed for all users and modes.[1] Complete Streets is a transportation and design concept in which streets are "designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities"[2] (Figure 2). Other terms that are commonly used to describe Complete Streets are "Livable Streets" or "Green Streets." Depending on the jurisdiction, a Complete Streets policy directs staff in local departments of planning, transportation (including transportation planners and engineers), and/or public works to design, operate, construct, and maintain streets that are safe for every user.

In addition to the roadway itself, Complete Streets designs may include infrastructure such as sidewalks, bicycle lanes or signed routes, bicycle parking, public transit facilities and bus stops, road diets (reducing travel lanes on a road to reclaim space for pedestrians and/or bicyclists), traffic calming measures (curb extensions, roundabouts, medians, traffic islands), crosswalks, curb ramps, and street furniture (benches).

Besides creating safe access, Complete Streets also support economic growth by increasing accessibility to destinations and improving the environment by increasing air quality. They foster independence by creating opportunities for people to travel who may not be able to drive (elderly, children, disabled, economically disadvantaged), and are considered fiscally responsible by reducing the potential of costly street retrofits in the future.[3]

Car-centric Designed Roadway (Figure 1)

Example of Urban Complete Streets Design (Figure 2)

https://go.uic.edu/WorkTransit

frontiers in Public Health

ORIGINAL RESEARCH
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Communities on the Move: Pedestrian-Oriented Zoning as a Facilitator of Adult Active Travel to Work in the United States

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Background: Communities across the United States have been reforming their zoning codes to create pedestrian-friendly neighborhoods with increased street connectivity, mixed use and higher density, open space, transportation infrastructure, and a traditional neighborhood structure. Zoning code reforms include new urbanist zoning such as the SmartCode, form-based codes, transects, transportation and pedestrian-oriented developments, and traditional neighborhood developments.

Purpose: To examine the relationship of zoning code reforms and more active living-oriented zoning provisions with adult active travel to work via walking, biking, or by using public transit.

Methods: Zoning codes effective as of 2010 were compiled for 3,914 municipal-level jurisdictions located in 471 counties and 2 consolidated cities in 48 states and the District of Columbia, and that collectively covered 72.9% of the U.S. population. Zoning codes were evaluated for the presence of code reform zoning and nine pedestrian-oriented zoning provisions (1 = yes): sidewalks, crosswalks, bike-pedestrian connectivity, street connectivity, bike lanes, bike parking, bike-pedestrian trails/paths, mixed-use development, and other walkability/pedestrian orientation. A zoning scale reflected the number of provisions addressed (out of 10). Five continuous outcome measures were constructed using 2010–2014 American Community Survey municipal-level 5-year estimates to assess the percentage of workers: walking, biking, walking or biking, or taking public transit to work OR engaged in any active travel to work. Regression models controlled for municipal-level socioeconomic characteristics and a GIS-constructed walkability scale and were clustered on county with robust standard errors.

Results: Adjusted models indicated that several pedestrian-oriented zoning provisions were statistically associated ($p < 0.05$ or lower) with increased rates of walking, biking, or engaging in any active travel (walking, biking, or any active travel) to work: code reform zoning, bike parking (street furniture), bike lanes, bike-pedestrian trails/paths, other walkability, mixed-use zoning, and a higher score on the zoning scale. Public transit use was associated with code reform zoning and a number of zoning measures in Southern jurisdictions but not in non-Southern jurisdictions.

Conclusion: As jurisdictions revisit their zoning and land use policies, they may want to evaluate the pedestrian-orientation of their zoning codes so that they can plan for pedestrian improvements that will help to encourage active travel to work.

Keywords: zoning, land use, active travel, physical activity, built environment, policy

OPEN ACCESS

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