



PAPREN
PHYSICAL ACTIVITY POLICY RESEARCH
AND EVALUATION NETWORK

Zoning and Land Use Policy as Tools for Creating Active Communities: Rationale and Theory, Policy Approaches, and Impact

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Physical Activity and Public Health Course

Theory & Practice in Planning and Zoning: A Largely Untapped Public
Health and PA Opportunity

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The findings and conclusions in this presentation are those of the author(s) and do not necessarily represent the official position of the NCI, the CDC, or UIC.



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Land Use, Transportation and PA and the Role of Zoning



Zoning is a key policy lever or strategy for codifying the Community Preventive Services Task Force (CPSTF) recommendations (Community Guide, May 2017)

- The CPSTF recommends **built environment strategies combining** one or more intervention approaches to improve **pedestrian or bicycle transportation systems with** one or more **land use and environmental design interventions** based on sufficient evidence of effectiveness in increasing physical activity.

Pedestrian & Bicycle System Transportation Intervention Component

- Street pattern design and connectivity
- Pedestrian infrastructure
- Bicycle infrastructure
- Public transit infrastructure and access

Land Use & Environment Design Intervention Component

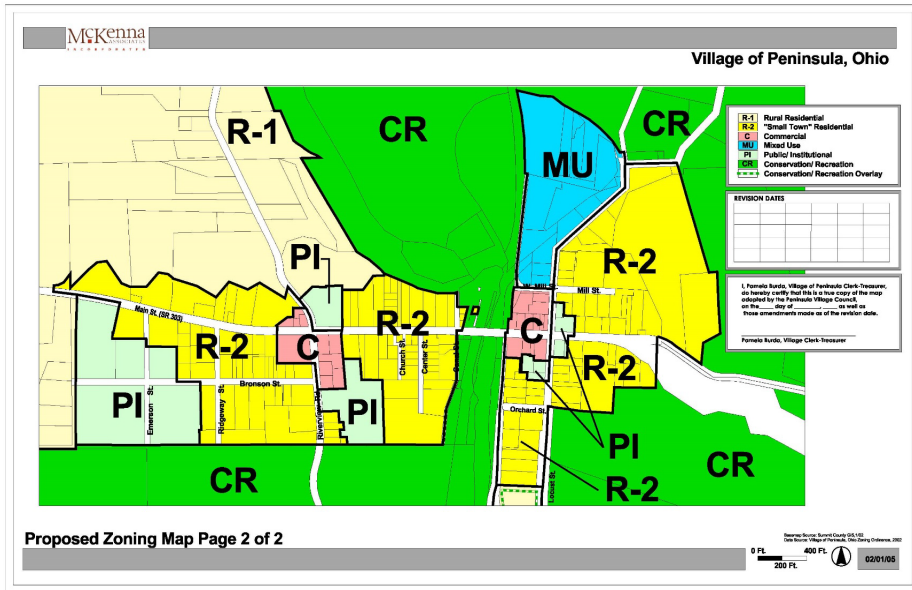
- Mixed land use
- Increasing residential density
- Proximity to neighborhood or community destinations
- Parks and recreational facility access

Zoning is the key policy lever that governs land use and transportation infrastructure within a community

- Exercises of the states' police powers under the 10th Amendment
- Laws that divide city or county areas into districts, or zones, that specify allowable uses or requirements for structural improvements
 - Includes requirements or allowable uses for things like sidewalks, trails, bike lanes, bike parking, etc.

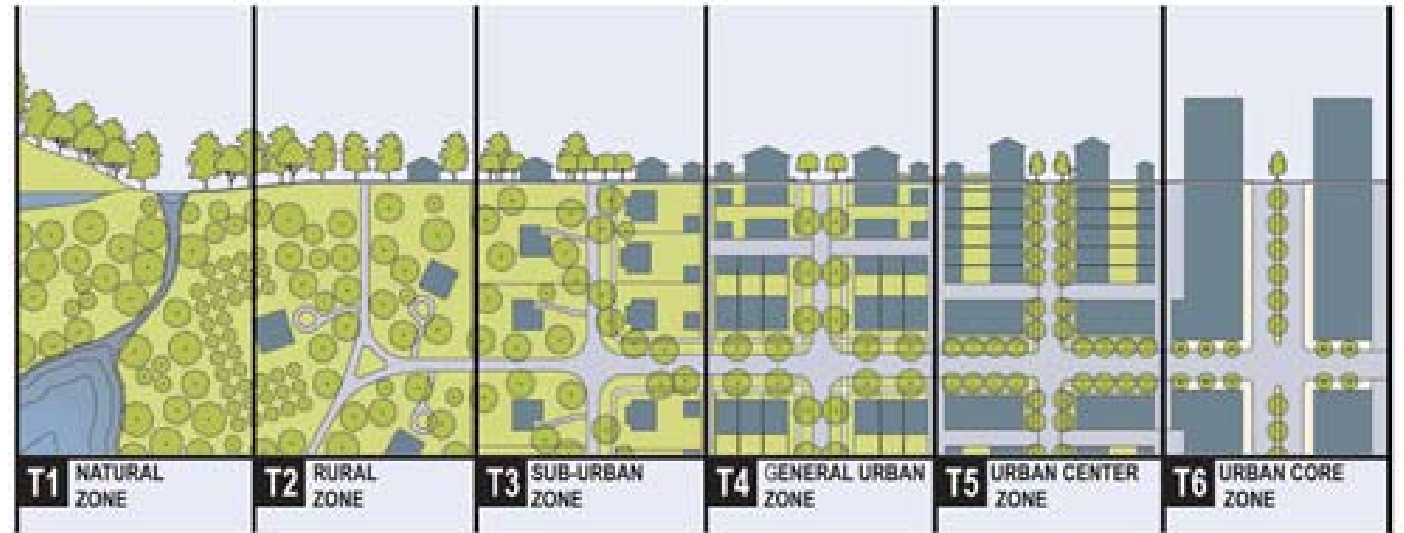


Traditional Zoning vs. Code Reform (Smart Code or Transect-based) Zoning



Traditional Zoning: Use and Density

Code Reform Zoning: Pedestrian-oriented by design



Source: transect.org

Zoning Code Reforms

- Emerged in the U.S. as a potential policy strategy to **reduce sprawl and reliance on cars** and increase physical activity.¹⁻³
- The reforms seek to:
 - Create **compact development**
 - Create **pedestrian-friendly** or traditional neighborhoods
 - Increase **street connectivity**
 - Create **mixed use** and higher density neighborhoods
 - Increase **open space** and **alternative transportation**¹⁻³
- **Examples of code reform zoning**
 - Form-Based Code
 - Transect-Based Districts
 - SmartCode
 - New Urbanist Districts
 - Pedestrian-Oriented Districts or Developments (POD)
 - Transit-Oriented Districts or Developments (TOD)
 - Traditional Neighborhood Districts or Developments (TND)
 - Other (i.e. Smart Growth Districts)

(1) Schilling J, Linton LS. The public health roots of zoning: In search of active living's legal genealogy. *Am J Prev Med.* 2005;28:96-104.

(2) Schilling J, Mishkovsky N. *Creating a Regulatory Blueprint for Healthy Community Design: A Local Government Guide to Reforming Zoning and Land Development Codes.* E-43346. 2005. Washington, D.C., ICMA.

(3) American Planning Association. *Planning and Urban Design Standards.* 1st ed. Hoboken, NJ: John Wiley & Sons, Inc., 2006.

Additional infrastructure improvements addressed in zoning codes that may support PA

- **Reduced/eliminated parking requirements help to:**
 - Preserve open space
 - Reduce congestion
 - Encourage attractive, pedestrian-friendly design
 - Promote transportation choices
 - Provide more room for new homes in dense, walkable communities that are more sustainable and livable than car-dependent communities

Sources: U.S. EPA (<https://www.epa.gov/smartgrowth/parking-spacescommunity-places>) ; Urban Institute's Housing Matters (<https://housingmatters.urban.org/>)

Density Bonuses

- Financial incentive for developers to incorporate certain design features into new developments (e.g., open space, streetscape improvements, bicycle infrastructure) in exchange for allowing them to build more units (typically vertically)
- Helps to respond to community needs and interests without requiring complex approval processes



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PA-related Elements in Zoning Codes

Zoning Code Audit Tool – 2020 Version

PAPREN Zoning Policy Coding Instrument (Short Form)

Marker	Code Reform (Except TOD)	TOD	Commercial	Mixed Use	Park/Rec/ Open Space	PUD	Residential: Multi-Family	Residential: Single-Family
	A. Sidewalks (If yes, pop up: Req/encouraged or addressed)	0	0	0	0	0	0	0
B. Crosswalks	0	0	0	0	0	0	0	0
C. Bike-Pedestrian Connectivity	0	0	0	0	0	0	0	0
D. Street Connectivity	0	0	0	0	0	0	0	0
E. Bike Lanes	0	0	0	0	0	0	0	0
F. Bike Parking (If yes, pop up: Req, encouraged, permitted, addressed)	0	0	0	0	0	0	0	0
G. Bike-Pedestrian Trails-Paths	0	0	0	0	0	0	0	0
H. Other Walkability	0	0	0	0	0	0	0	0
I. Mixed Use	0	0	0	0	0	0	0	0
J. Active Recreation	0	0	0	0	0	0	0	0
K. Passive Recreation	0	0	0	0	0	0	0	0
L. Pedestrian Plazas	0	0	0	0	0	0	0	0
M. Code Reform (Mark if the TOD is a subdistrict form-based code/SmartCode district OR if it explicitly mentions that it is form-based; only relevant to TOD district)	NA	0	NA	NA	NA	NA	NA	NA
N. Access to Public Transportation	0	0	0	0	0	0	0	0
3. Density Bonuses (if yes, pop up list below a-e)	0	0	0	0	NA	0	0	0
a. Open/Green Space	0	0	0	0	NA	0	0	0
b. Affordable Housing (not covered by Topic R)	0	0	0	0	NA	0	0	0
c. Pedestrian amenities	0	0	0	0	NA	0	0	0
d. Bike amenities	0	0	0	0	NA	0	0	0
e. Streetscape improvements/street furniture/public art	0	0	0	0	NA	0	0	0
4. Other (specify)	0	0	0	0	NA	0	0	0
T. Reduced/Eliminated Parking Requirements (includes incentives or general reductions/eliminations)	0	0	0	0	NA	0	0	0

A. Community Identification Information

FIPS15: _____

Summary Level Code: _____

Place Name: _____

County Name: _____

State Name: _____

Keep Level: _____

B. Coder and Zoning Code Information

Coder ID Number: 1 0 _____

Coding Date: ____ / ____ / 20 ____

Zoning Code Status

Zoning code exists

No zoning code (verified)

Missing zoning code (non-responder)

If "Zoning code exists" is selected, continue to next column

COMPLETE STREETS POLICY	Y/N
Complete Streets Policy Exists?	<input type="radio"/>

Complete Streets Policy Jurisdiction	Citation
County	1
Place	2
Place and County	3

DEFINITIONS

Allow (Allowed)= permitted, conditional, or accessory use

In lieu fees: Allows developer to pay a fee in lieu of providing

None= use not specified

Prohib (Prohibited)= prohibited use

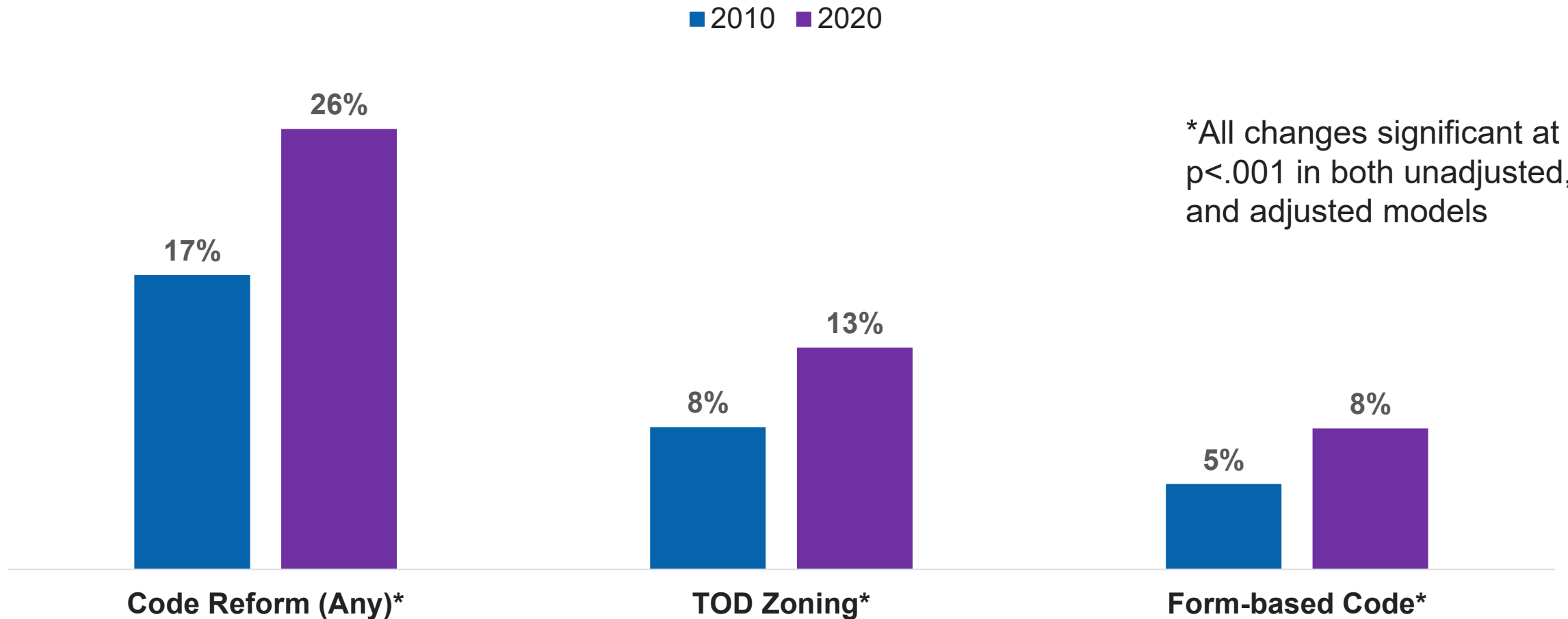


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**Prevalence of Activity-Oriented
Zoning Provisions in the 200 Most
Populous US Counties (2297
jurisdictions)**

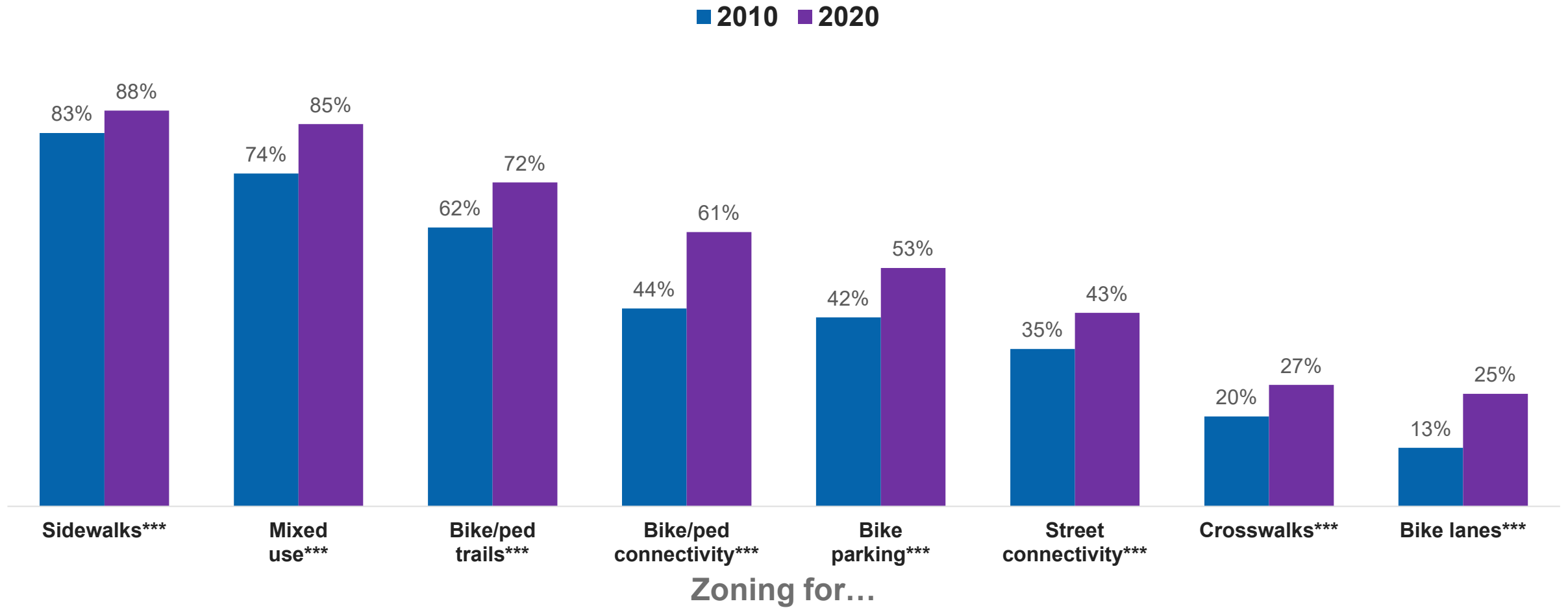
Code reform zoning has significantly* increased over time

(Longitudinal Panel; 2297 jurisdictions in 200 counties and 41 states + DC)



Activity-supporting built environment features addressed in zoning codes have increased* over time

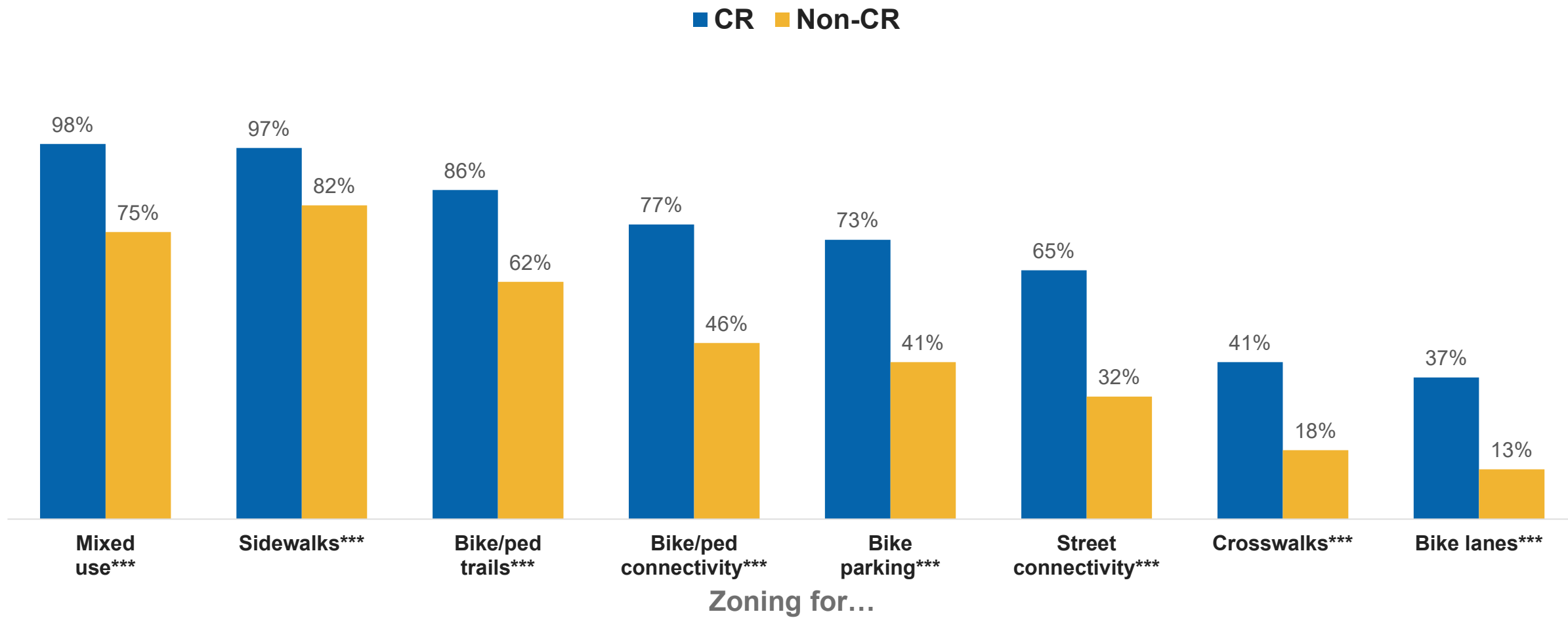
(Longitudinal Panel; 2297 jurisdictions in 200 counties and 41 states + DC)



*** $p < .001$ in unadj. and adj. models

Activity-supporting built environment features addressed in zoning codes are more prevalent in code reform jurisdictions

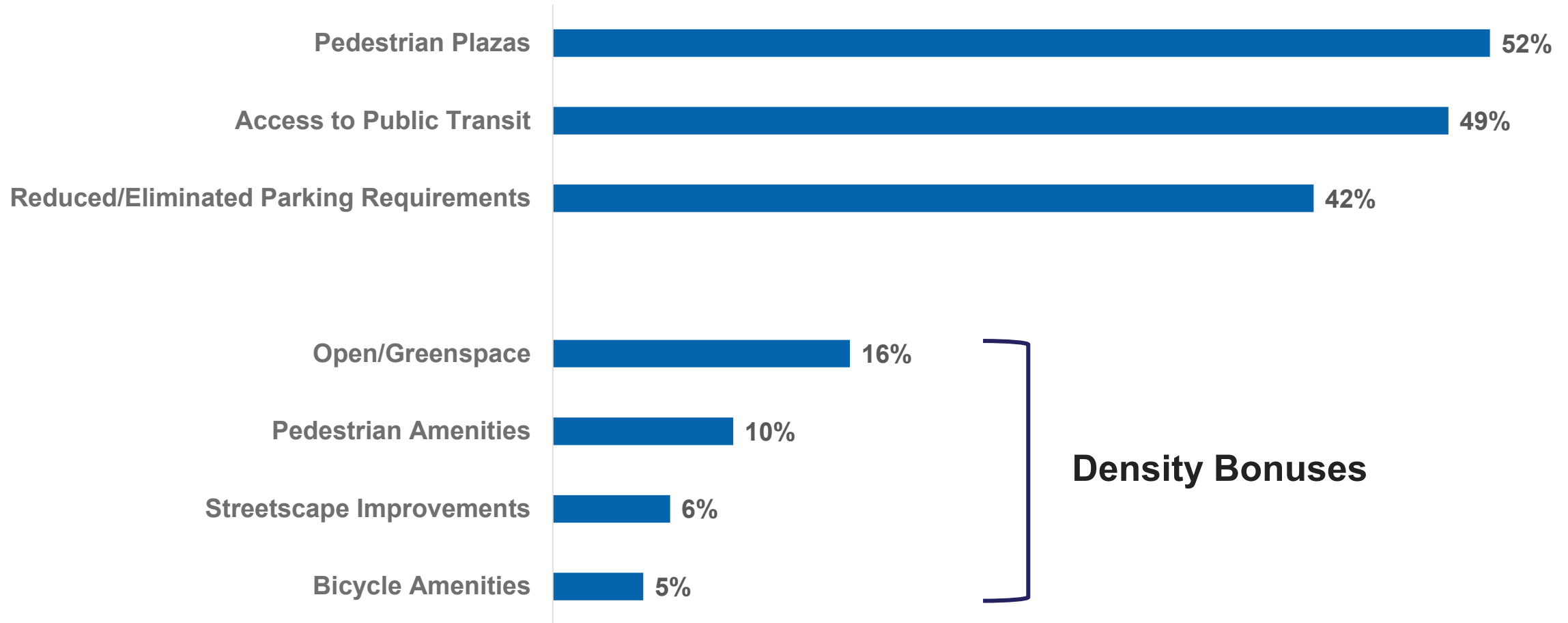
(Longitudinal Panel; 2297 jurisdictions in 200 counties and 41 states + DC; 2020 data)



*** $p < .001$ in adjusted models

Additional PA-supportive Infrastructure Improvements are more Prevalent than PA-related Density Bonuses in Zoning Codes (2020 data only)

(2297 jurisdictions in 200 counties and 41 states + DC)





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What About the Relationship between Zoning and PA-related Outcomes?

Certain Zoning Provisions are Particularly Associated with Increased Rates of Adult Walking to Work

Zoning Predictor	Municipal-level ONLY		Municipal & Unincorporated Areas	
	Coef.	95% CI	Coef.	95% CI
Code Reform Zoning	0.24	-0.00,0.48	0.26*	0.04,0.48
Sidewalks	0.17	-0.07,0.40	0.15	-0.05,0.35
Crosswalks	0.12	-0.10,0.35	0.11	-0.10,0.32
Bike-Ped Connectivity	0.12	-0.08,0.33	0.13	-0.06,0.31
Street Connectivity	0.10	-0.08,0.29	0.10	-0.07,0.27
Bike Lanes	0.25	-0.04,0.53	0.23	-0.03,0.49
Bike Parking (street furniture)	0.38**	0.14,0.62	0.37***	0.15,0.58
Trails	0.26*	0.05,0.47	0.24**	0.06,0.43
Pedestrian Plazas	0.25*	0.02,0.47	0.23*	0.05,0.42
Mixed Use	0.30**	0.10,0.50	0.27**	0.10,0.45

Certain Zoning Provisions are Particularly Associated with Increased Rates of Adult Walking OR Biking to Work

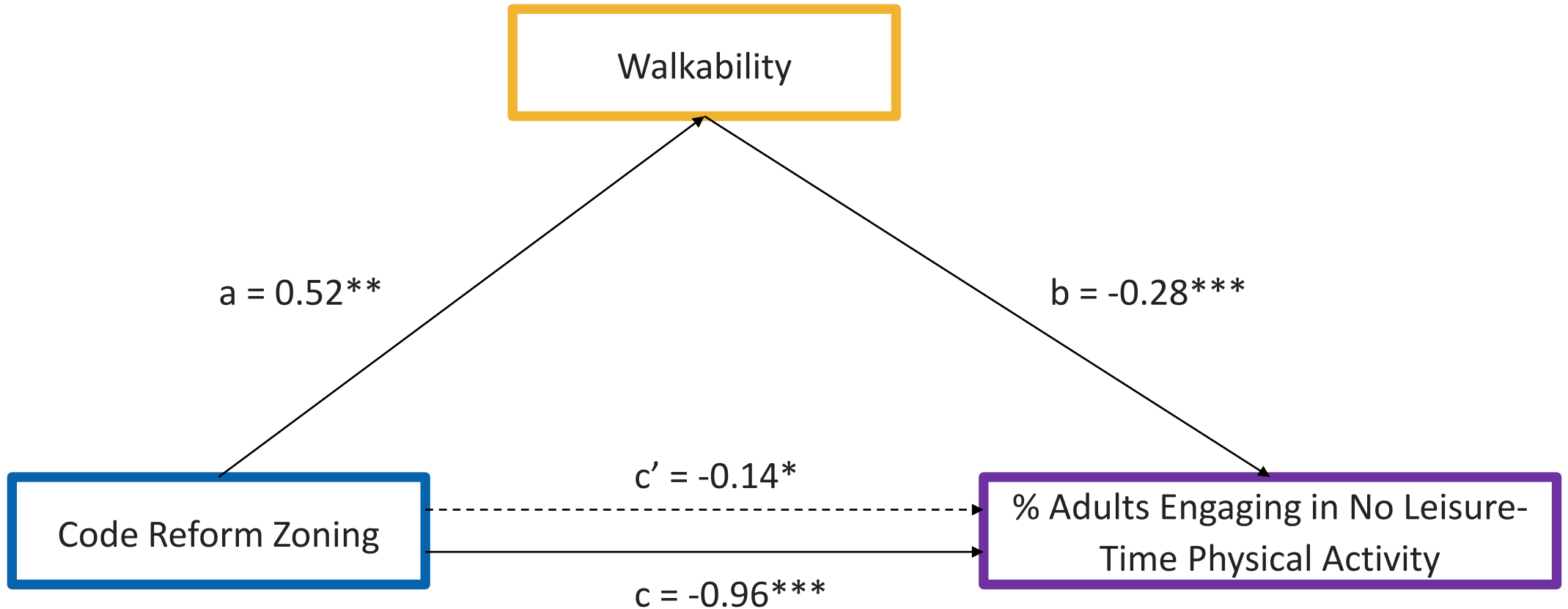
Zoning Predictor	Municipal-level ONLY		Municipal & Unincorporated Areas	
	Coef.	95% CI	Coef.	95% CI
Code Reform Zoning	0.36*	0.07,0.66	0.40**	0.12,0.67
Sidewalks	0.25	-0.01,0.51	0.24*	0.02,0.46
Crosswalks	0.19	-0.09,0.47	0.18	-0.08,0.44
Bike-Ped Connectivity	0.15	-0.10,0.40	0.16	-0.07,0.39
Street Connectivity	0.18	-0.04,0.41	0.19	-0.02,0.39
Bike Lanes	0.40*	0.05,0.75	0.37*	0.05,0.70
Bike Parking (street furniture)	0.68***	0.39,0.97	0.65***	0.39,0.91
Trails	0.32**	0.09,0.56	0.33**	0.12,0.53
Pedestrian Plazas	0.34**	0.09,0.59	0.34**	0.13,0.55
Mixed Use	0.42***	0.19,0.64	0.39***	0.19,0.59

Code reform zoning is associated with more people engaging in any active travel to work

Zoning Predictor	Municipal-level ONLY		Municipal & Unincorporated Areas	
	Coef.	95% CI	Coef.	95% CI
Code Reform Zoning	0.93**	0.24,1.62	1.02**	0.38,1.65
Sidewalks	0.29	-0.19,0.77	0.38	-0.07,0.82
Crosswalks				-0.16,0.91
Bike-Ped Connectivity				-0.13,0.78
Street Connectivity	0.23	-0.21,0.66	0.25	-0.16,0.65
Bike Lanes	1.05*	0.14,1.96	1.00*	0.16,1.83
Bike Parking (Street furniture)	1.02***	0.49,1.55	1.03***	0.57,1.50
Trails	0.16	-0.29,0.61	0.25	-0.13,0.63
Pedestrian Plazas	0.61*	0.12,1.09	0.65**	0.19,1.10
Mixed Use	0.29	-0.08,0.66	0.32	-0.01,0.66

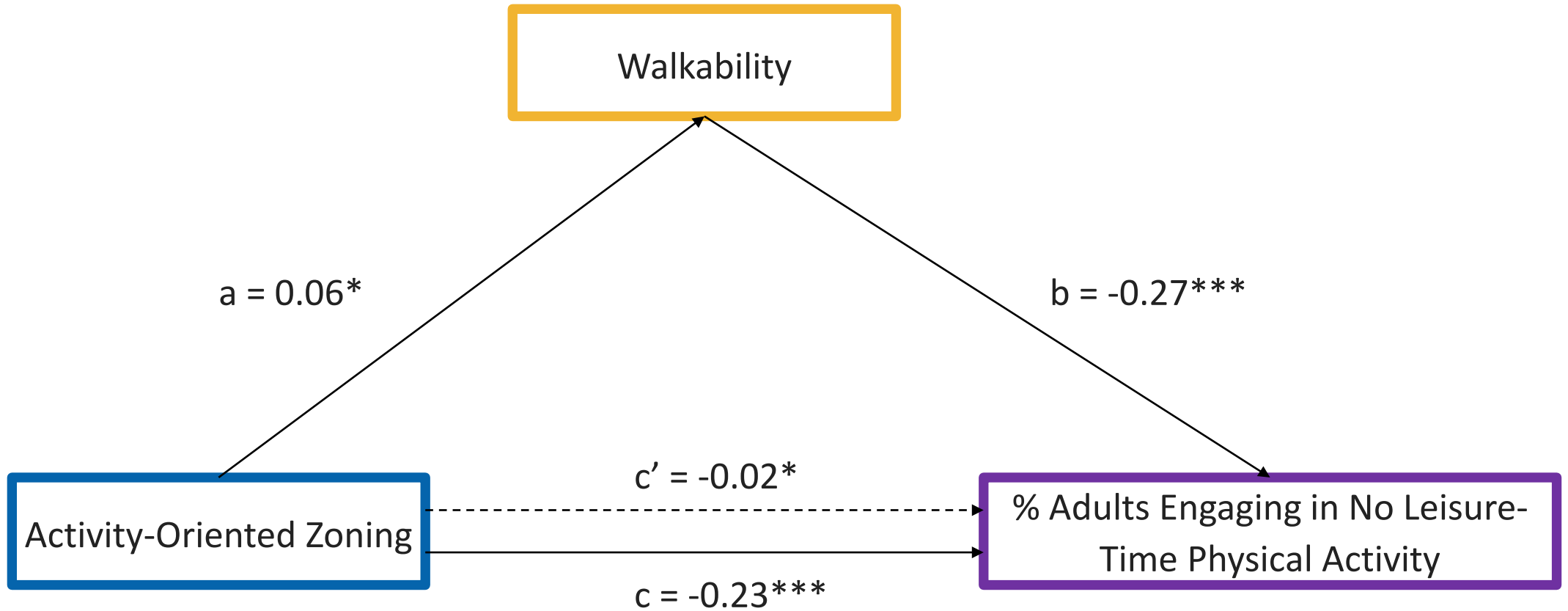
Having code reform zoning is associated with approximately 1% more people engaging in any active travel to work (via walking, biking, or taking public transit).

Code reform zoning is associated with lower rates of no activity, and this association is partially mediated by walkability



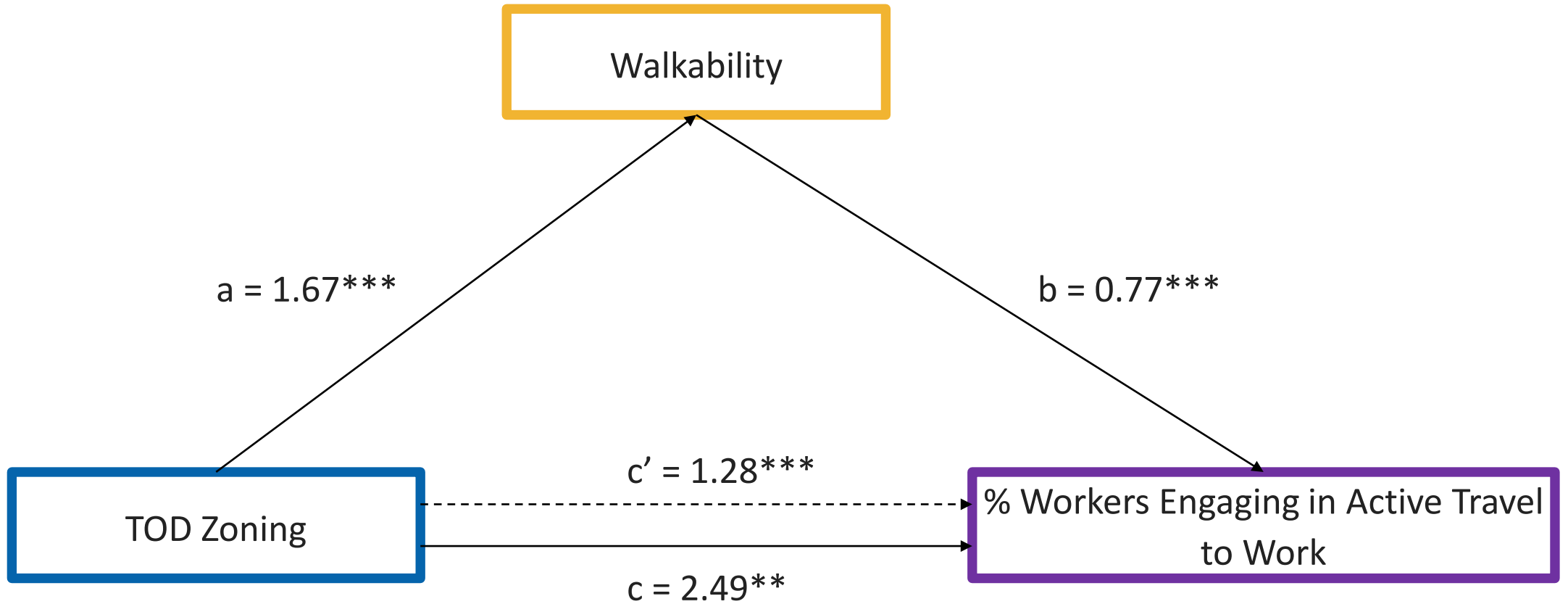
* $p < .05$ ** $p < .01$ *** $p < .001$

Activity-oriented zoning index is associated with lower rates of no activity, and this association is partially mediated by walkability



* $p < .05$ *** $p < .001$

TOD zoning is associated with higher rates of active travel to work, and this association is partially mediated by walkability



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

Zoning code reforms moderate the relationship between municipal-level racialized economic segregation, public transit use, and active travel (2010 zoning data only)

	Public Transit Use		Active Travel	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Associations with RES, without zoning code reform (Compared to RES Q5 – most privileged)				
RES Q1 – most deprived	0.52	0.35 – 0.78	0.31	0.24 – 0.40
RES Q2	0.36	0.27 – 0.49	0.37	0.30 – 0.45
RES Q3	0.36	0.28 – 0.47	0.44	0.37 – 0.53
RES Q4	0.48	0.38 – 0.60	0.55	0.47 – 0.65
Associations with zoning code reform by RES				
RES Q1	1.72	1.18 – 2.52	1.42	1.12 – 1.79
RES Q2	2.38	1.69 – 3.37	1.69	1.31 – 2.18
RES Q3	1.53	1.13 – 2.08	1.19	1.00 – 1.41
RES Q4	1.30	0.89 – 1.91	1.26	1.00 – 1.58
RES Q5	0.90	0.66 – 1.22	0.96	0.75 – 1.23

Fractional logit model controlling for municipal-level median age, percent household poverty, region, walkability, percent occupied housing with no vehicle, population size, and interactions between zoning code reform and racialized economic segregation, with robust standard errors clustered on county. Bold indicates a significant association ($p < .05$). N=3,914 municipalities representing 45.45% of the U.S. population in 471 of the most populous counties and 2 consolidated cities located in 48 states and the District of Columbia.

Pedestrian-oriented zoning moderates the relationship between municipal-level racialized economic segregation, public transit use, and active travel

(2010 zoning data only)

	Public Transit Use		Active Travel	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Associations with RES, without pedestrian-oriented zoning provisions (Ref: RES Q5)				
RES Q1 – most deprived	0.32	0.18 – 0.54	0.22	0.16 – 0.31
RES Q2	0.23	0.15 – 0.34	0.25	0.19 – 0.33
RES Q3	0.25	0.17 – 0.36	0.34	0.26 – 0.43
RES Q4	0.35	0.25 – 0.48	0.41	0.32 – 0.52
Associations with pedestrian-oriented zoning provisions (i.e., zoning scale score) by RES				
RES Q1	1.10	1.00 – 1.21	1.07	1.01 – 1.12
RES Q2	1.13	1.05 – 1.21	1.09	1.05 – 1.14
RES Q3	1.05	0.99 – 1.12	1.03	1.00 – 1.06
RES Q4	1.03	0.96 – 1.09	1.04	1.00 – 1.08
RES Q5	0.91	0.87 – 0.96	0.94	0.90 – 0.98

Fractional logit model controlling for municipal-level median age, percent household poverty, region, walkability, percent occupied housing with no vehicle, population size, and interactions between zoning scale score and racialized economic segregation, with robust standard errors clustered on county. Bold indicates a significant association ($p < .05$). $N=3,914$ municipalities representing 45.45% of the U.S. population in 471 of the most populous counties and 2 consolidated cities located in 48 states and the District of Columbia.



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Opportunities and More Information

What opportunities exist? What else do we need to know?

- Reliable data on the ground of zoning implementation in practice
- Studying the process of implementation and understanding what implementation strategies WORK
 - Mixed methods
- Having local level data on PA to examine the true relationship between zoning, the built environment (implementation), and PA-related outcomes
 - A lot of the data we work with nationally is limited to municipal or county level data or, when individual, only has county geocodes

Opportunities for Public Health Community

- Public health government staff
 - Partner with planning, zoning, and transportation agencies when considering revising zoning codes to make a PA-orientation a priority for rezoning/new zoning efforts
- Advocates
 - Work across sectors to advocate for PA-related zoning provisions
 - Work to advocate for funding to support implementation

Zoning and Public Health Tools

Components of Local Land Development and Related Zoning Policies Associated with Increased Walking

A PRIMER FOR PUBLIC HEALTH PRACTITIONERS

December 2017



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FACTSHEET:

Zoning Code Reforms are Associated with Walking Behaviors in a Nationwide Evaluation

This factsheet serves as a companion document to the product *Local Land Development and Related Policy Strategies for Supporting Walkable Communities: A Primer for Public Health Practitioners*. This factsheet summarizes key findings from a recently completed nationwide evaluation of the relationship between zoning code reforms and both leisure time and active travel-related walking and activity and supports recent recommendations from the Community Preventive Services Task Force entitled, *Physical Activity: Built Environment Approaches Combining Transportation System Interventions with Land Use and Environmental Design*.

Zoning code reforms support the development of infrastructure that is supportive of walking and a mix of land uses that are associated with walking, biking, and public transit.^{1,2} Specific types of zoning code reforms are described in detail in the *Primer* and include form-based codes, new urbanist districts or zones, pedestrian-oriented districts or development (POD), transit-oriented districts or development (TOD), and traditional neighborhood development or districts (TND).

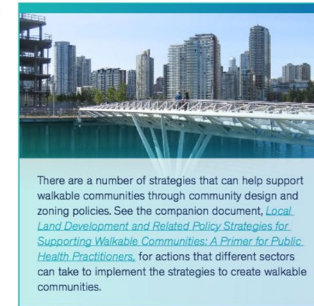
This nationwide evaluation found that although zoning code reforms are not very prevalent nationwide, they support physical activity. Areas with zoning code reforms are likely to have higher rates of leisure-time walking and active travel to work. These areas are also less likely to have leisure-time physical inactivity.

What Types of Communities Have Adopted Zoning Code Reforms?

- ▶ Zoning code reforms are not highly prevalent in the U.S.; only 18.4% of the counties with zoning authority and only 14.5% of the municipalities in the study sample had adopted zoning code reforms (in whole, in part, or as an overlay) as of 2010.
- ▶ Zoning code reforms have predominantly occurred in the Southern region of the country; 70.8% of the sampled counties and 44.0% of municipalities with zoning code reforms were located in the South. Zoning code reforms are least prevalent in the Northeast and Midwest regions of the country.
- ▶ At the county level, zoning code reforms are more common in counties with a larger population size and with a higher percentage of workers taking public transit to work. At the municipal level, zoning code reforms are more common in communities with a larger population size, with higher median home values, with a higher percentage of workers taking public transit to work, and with a younger median age of the population.

What is the Relationship between Zoning Code Reforms and Leisure-time Walking?

- ▶ Zoning code reforms are associated with:
 - ▶ 4% greater probability of adults aged 18-64 engaging in leisure-time walking
 - ▶ 4% greater probability of older adults age 65+ walking for leisure



There are a number of strategies that can help support walkable communities through community design and zoning policies. See the companion document, *Local Land Development and Related Policy Strategies for Supporting Walkable Communities: A Primer for Public Health Practitioners*, for actions that different sectors can take to implement the strategies to create walkable communities.

FACTSHEET: ZONING CODE REFORMS

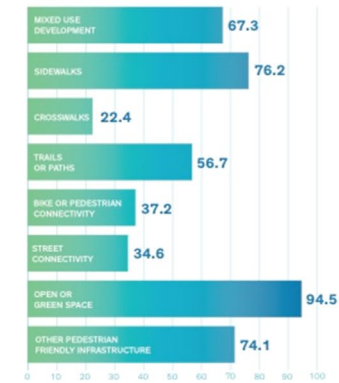
FACTSHEET:

Zoning Elements are Associated with Walking Behaviors in a Nationwide Evaluation

This factsheet serves as a companion document to the product *Local Land Development and Related Policy Strategies for Supporting Walkable Communities: A Primer for Public Health Practitioners*. This factsheet summarizes key findings from a recently completed nationwide evaluation of the relationship between zoning elements supportive of walking and both leisure time and active travel-related walking.

Communities seeking to make their land development policies and plans more supportive of walking may consider ensuring that specific elements are included in their zoning codes. Such elements or structural provisions include, but are not limited to: mixed use development; sidewalks; crosswalks; bike or pedestrian trails or paths; bike, pedestrian, and street network connectivity; parks and open space; and other types of pedestrian infrastructure such as street furniture and traffic calming measures.¹⁻⁶

Prevalence of Elements in Zoning Codes that Promote Walking



Specific Zoning Elements are Associated with Walking and Additional Benefits

This nationwide evaluation of zoning codes found that places with zoning elements were more likely to have low physical inactivity among adults aged 65 and older. All zoning elements, with the exception of crosswalks, were associated with lower rates of physical inactivity among adults aged 18-64. All zoning elements except crosswalks were also associated with higher rates of recreational walking among adults aged 18-64.

ZONING FOR MIXED USE DEVELOPMENT IS ASSOCIATED WITH:

- ▶ 3.1% lower rates of physical inactivity among adults aged 18-64¹⁰
- ▶ 4.1% lower rates of physical inactivity among older adults aged 65 and above
- ▶ 3% higher rates of recreational walking among adults (including both adults aged 18-64 and older adults aged 65 and above)

ZONING FOR SIDEWALKS IS ASSOCIATED WITH:

- ▶ 3.4% lower rates of physical inactivity among adults aged 18-64¹⁰
- ▶ 4.1% lower rates of physical inactivity among older adults aged 65 and above
- ▶ 2.9% higher rates of recreational walking among adults (including both adults aged 18-64 and older adults aged 65 and above)
- ▶ Reduced income-based disparities in rates of active travel (walking, biking, or public transit) to work⁷

FACTSHEET: ZONING ELEMENTS

<https://ihrp.uic.edu/using-zoning-regulations-to-foster-walkable-communities-best-practices/>



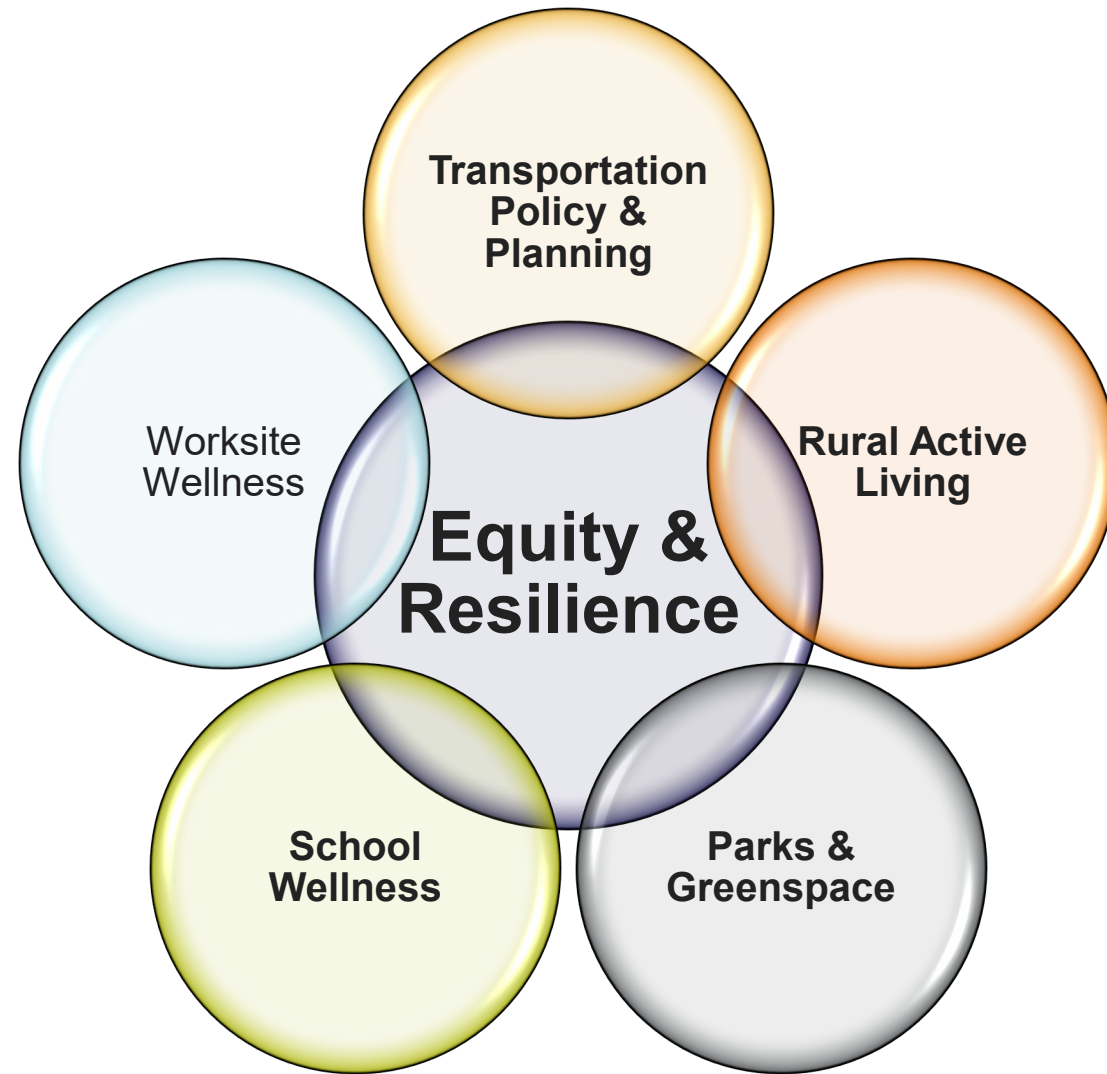
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Learn More about PAPREN

What is PAPREN?

- A **CDC-funded thematic research network** of the CDC Prevention Research Centers and is funded by the Physical Activity and Health Branch within DNPAO.
- A key **research partner** of the Active People, Healthy Nation Initiative.
- PAPREN is grounded in the **Community Preventive Services Task Force recommendations** that call for land use and transportation strategies for supporting physical activity.
- PAPREN **advances the evidence base and puts research into practice through collaboration across sectors** with a shared vision of achieving active communities.
 - Includes researchers, planners, engineers, policy makers, green space managers, advocates, public health professionals and others!
 - **We have 842 members!** Great professional networking opportunity (and it's entirely free!)

PAPREN Work Groups



Join and Connect with Us!

- Email: papren@umassmed.edu
- Website: <https://papren.org>



- Join the Network!
- Join a Work Group (or 2)!

A screenshot of the PAPREN website. The top navigation bar includes the PAPREN logo (Physical Activity Policy Research and Evaluation Network), an email contact link (papren@umassmed.edu), and a 'QUESTIONS Contact Us' link. The main content area is titled 'Get Involved' and features a breadcrumb trail: HOME / ABOUT / GET INVOLVED. Below this is a 'Join PAPREN' section with a descriptive paragraph and a registration form. The form has three main sections: 'Full Name*' with a placeholder 'e.g. Johnny Appleseed', 'Organization Name*' with a placeholder 'Organization', and 'Email Address*' with a placeholder 'e.g. jappleseed@gmail.com'. To the right of the form is a sidebar menu with items: 'About', 'What Is PAPREN?', 'Get Involved' (highlighted with a blue arrow), 'Leadership Team', 'FAQs', and 'Applied Evaluation Project'. Below the sidebar is another menu with 'Events' and 'Groups'. At the bottom of the page is a dark blue banner with the text 'Sign Up for our Newsletter' and a white form with fields for 'First', 'Last', 'Organization', and 'Email', and a teal 'Submit' button.