

7: Factors Influencing Cycling, Walking, & Safety

Studies show that a number of factors contribute to the choice to bike or walk. These include environmental influences such as weather, density, mix of uses, and infrastructure; demographics such as income and car ownership; and other factors including education and existing levels of cycling and walking. This chapter looks at a few of these potential relationships.

Environmental Influences

Weather

Does the weather impact the choice to bicycle? The Benchmarking Project team compared average summer and winter temperatures to bike share of work trips in 50 states and did not find any compelling evidence that weather is a major influence. Montana and Alaska, for example, are among states with the coldest temperatures, yet are also among the states with the highest levels of cycling. The lack of statistically significant evidence of weather impacts on cycling levels has been noted in other studies (Pucher, Buehler 2006) pointing out much higher rates of cycling in countries such as Canada, with lower average year-round temperatures than in the U.S.. It seems likely that excessive cold, heat, and rainfall do indeed deter cycling to some unknown extent, especially among less dedicated cyclists. According to a poll by the San Francisco Bicycle Coalition for their Report Card on Bicycling, the number one reported reason for not cycling more was weather. However, it should be noted that this response came from only 15% of respondents and other reasons such as bike theft, safety, and carrying capacity ranked almost as high.

Density

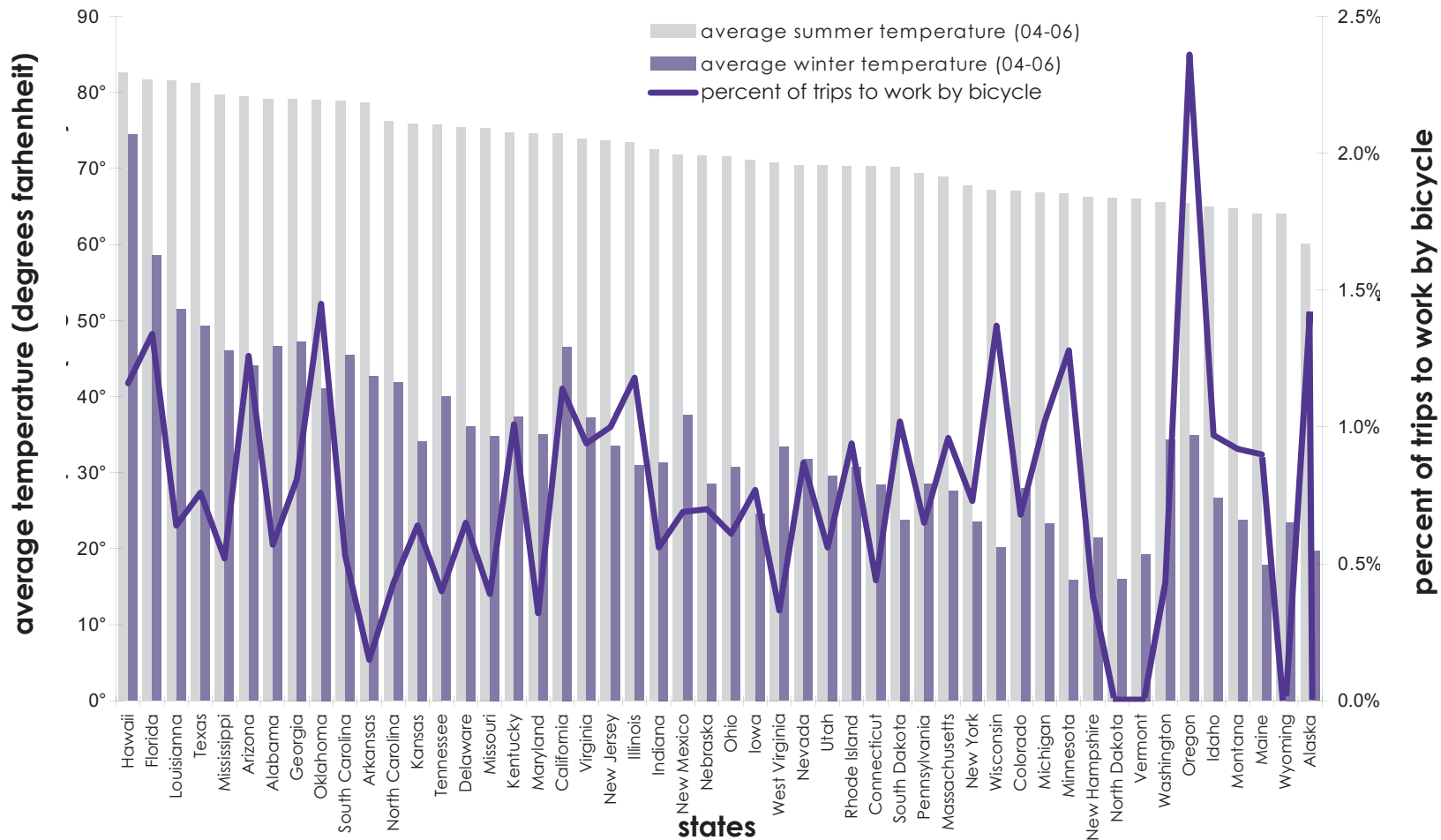
To examine the role of density in the choice to bike or walk in the U.S., the Benchmarking Project team compared residential density (persons/square mile) to the combined bicycling and walking to work mode share in major cities. Data indicates that denser cities have higher levels of cycling and walking on average than less dense cities. The five cities with the highest combined levels of cycling and walking are also among the top seven densest cities. This finding is in line with other studies (Pucher, Buehler 2006) that suggest a correlation between density and biking and walking. Dense communities have shorter trip distances, which can thus be more easily covered by walking or cycling.

Walking and Cycling Facilities

The extent and quality of cycling and walking facilities almost certainly affect levels of cycling and walking, but the available data are so flawed that they do not always reveal the obvious relationships. U.S. bike advocates commonly look to places like the Netherlands, where cities have invested heavily in infrastructure for cycling. These investments (including bike lanes, separated paths, and specialized signals and traffic signs for cyclists) may contribute to a cycling mode share that reaches between 30-50% in most Dutch cities. This report compared miles of cycling facilities per square mile to levels of cycling in cities. Results suggest there may be a relationship between facilities and mode share. Although it is not true in every case, the general trend is that cities with higher levels of cycling have more bike facilities per square mile than cities with lower cycling levels. (cont. page 87)

Weather's Influence:

Do cold and hot temperatures keep cyclists away?

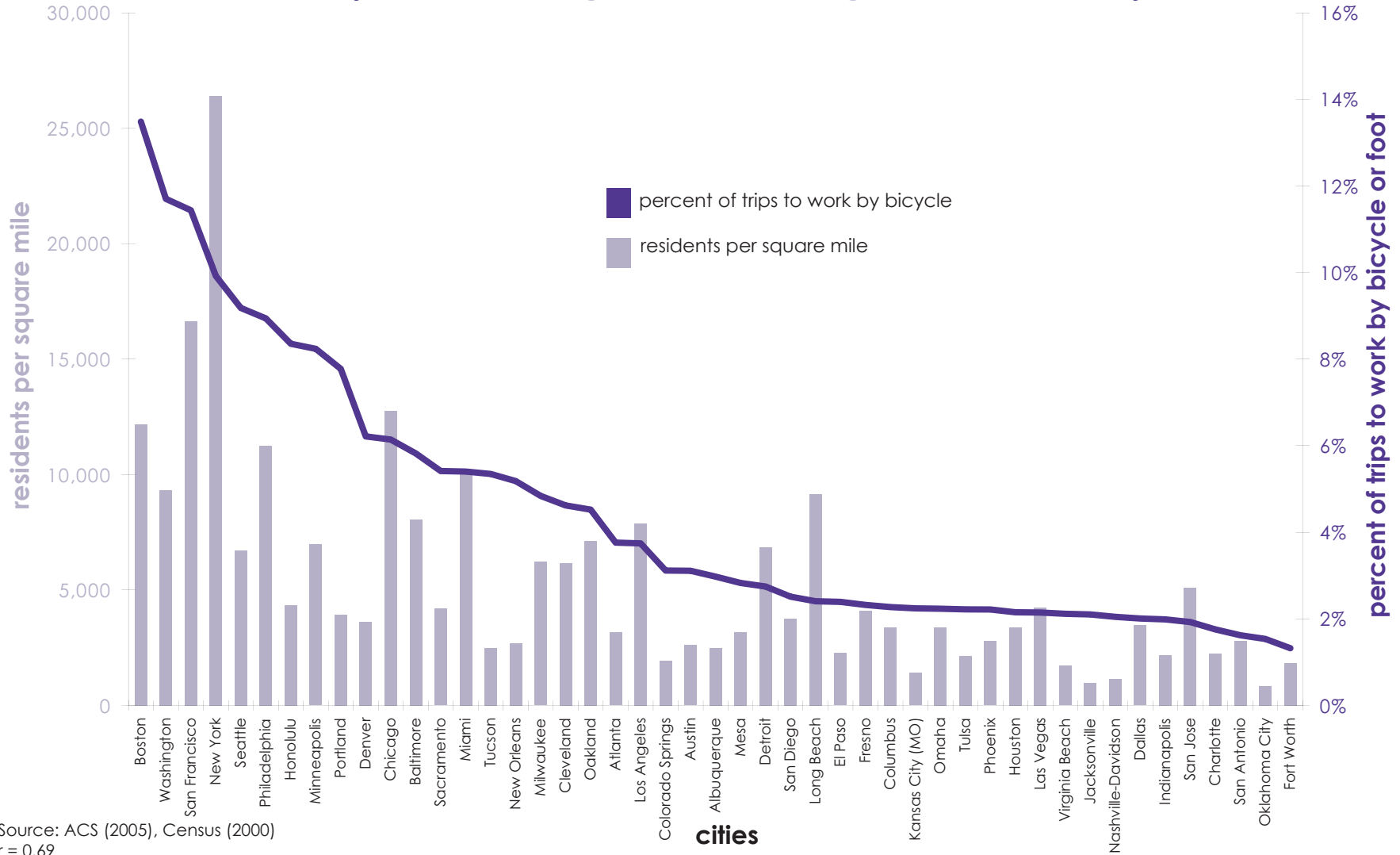


Source: ACS (2005), USHCN (2004-2006)

A REVIEW OF AVERAGE SUMMER AND WINTER TEMPERATURES and cycling levels in 50 states indicates no obvious correlation between the two. This finding is in line with other studies (Pucher, Buehler 2006) that point out much higher rates of cycling in countries such as Canada, that average lower year-round temperatures than in the U.S.

Weather is not a major factor influencing cycling levels.

Residential Density and Biking and Walking Levels in Major U.S. Cities



Denser cities have higher rates of cycling and walking.

CITIES WITH THE MOST PEOPLE PER SQUARE MILE HAVE HIGHER levels of cycling and walking, on average, than less-dense cities. Boston, Washington, San Francisco, and New York, the cities with the highest combined rates of cycling and walking, are also among the top seven densest cities. The least dense cities, including Oklahoma City, Jacksonville, Nashville and Kansas City, are among the cities with the lowest levels of cycling and walking.

Demographic Influences

Income

Income could play a role in the decision to bike or walk. As graphs in Chapters 3 and 4 show, the majority of pedestrians and cyclists earn less than \$35,000 a year. However, income seems to play more of a role in the choice to walk to work. Among states, 30%-60% of people who walk to work earn less than \$15,000 year. More than 2/3 of people who walk to work nationwide earn less than \$35,000 a year. Although income may play a role in the decision to walk to work for some people, among states with higher levels of walking, such as New York, income levels are more evenly distributed among pedestrians. This suggests that income factors less into the decision to walk in dense transit-oriented cities.

Car Ownership

Owning a car definitely influences levels of walking and cycling. According to the 2005 ACS, cities with the highest levels of biking and walking have the lowest car ownership rates. Although the statistical relationship is strong, the causation might run in both directions. Those who walk or cycle a lot are less likely to need or want a car. And those who do not own a car are more likely to need to walk or cycle for some trips. At any rate, it is clear that high levels of car ownership are strongly related to low levels of walking and cycling.

Levels of Cycling and Walking

To see how levels of cycling and walking affect safety, the project team compared fatality data reported by cities to ACS 2005 bicycle and pedestrian mode share (trips to work). Results were consistent with previous research (Jacobsen, 2003) indicating a negative correlation between levels of cycling and walking and fatality rates. Cities with the highest levels of cycling generally have lower bicycle fatality rates. Cities with the highest rates of pedestrian fatalities are also among those with the lowest levels of walking. A possible explanation could be that in places where more cyclists and pedestrians

are present, drivers are more used to sharing the roadways with cyclists and are more aware of pedestrians at crossings. Environmental factors that contribute to increased bicycling and walking (such as signed routes, bike lanes and sidewalks) may also contribute to increased safety.

Advocacy and Education

Advocacy's Impact

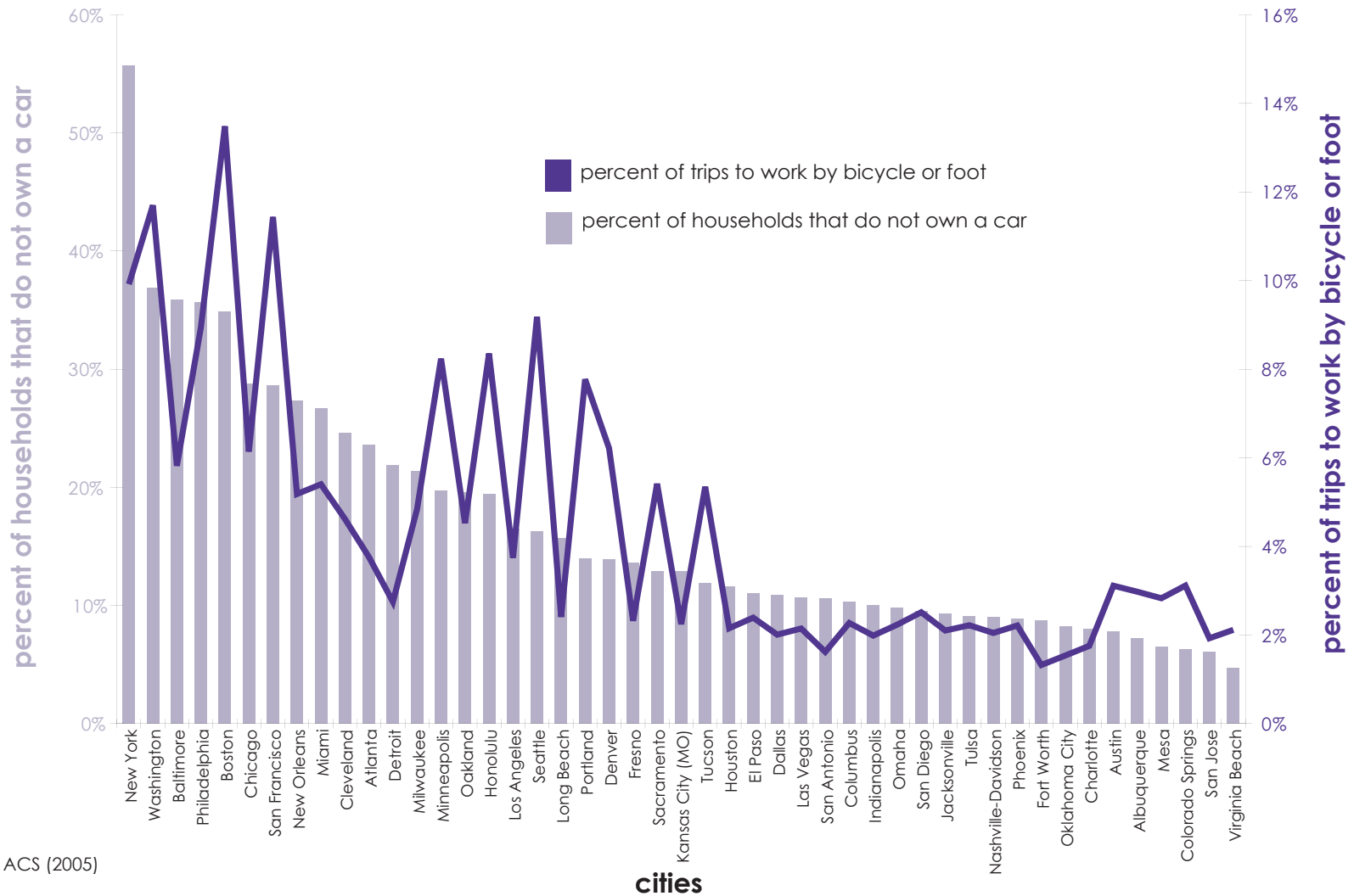
One of the objectives of Thunderhead's Benchmarking Project is to measure the effectiveness and evaluate results of advocacy efforts to increase cycling and walking. Chapter 6 discussed the difficulties presented by attempting to quantify advocacy. Every bicycle and pedestrian advocacy organization is different in structure and operations. A number of the organizations surveyed have been around for a decade or more, while others are only one to two years old. Some organizations are volunteer-run, while others have teams of full-time staff.

This report compared per capita income (organization revenue/city population) and staffing levels of organizations to levels of cycling and walking. Results indicate a positive correlation between levels of biking and walking to work and the standardized income ($r = 0.58$) and staffing levels ($r=0.55$) of Thunderhead organizations. Although one cannot assume that these are causally related, this at least suggests that the presence of a strong advocacy organization can be an indicator of a city's bicycling and walking levels.

Education's Impact

Another potential factor contributing to biking, walking and safety is education. Many advocacy organizations and government agencies sponsor bicycle, pedestrian and driver safety courses and outreach efforts which may impact mode share and safety. No data on education efforts was collected for this report. There is a severe deficiency in evaluation of these efforts. Thunderhead plans to collect more data on educational efforts including levels of participation and promotion in future benchmarking efforts.

Comparing Car Ownership to Cycling and Walking Levels

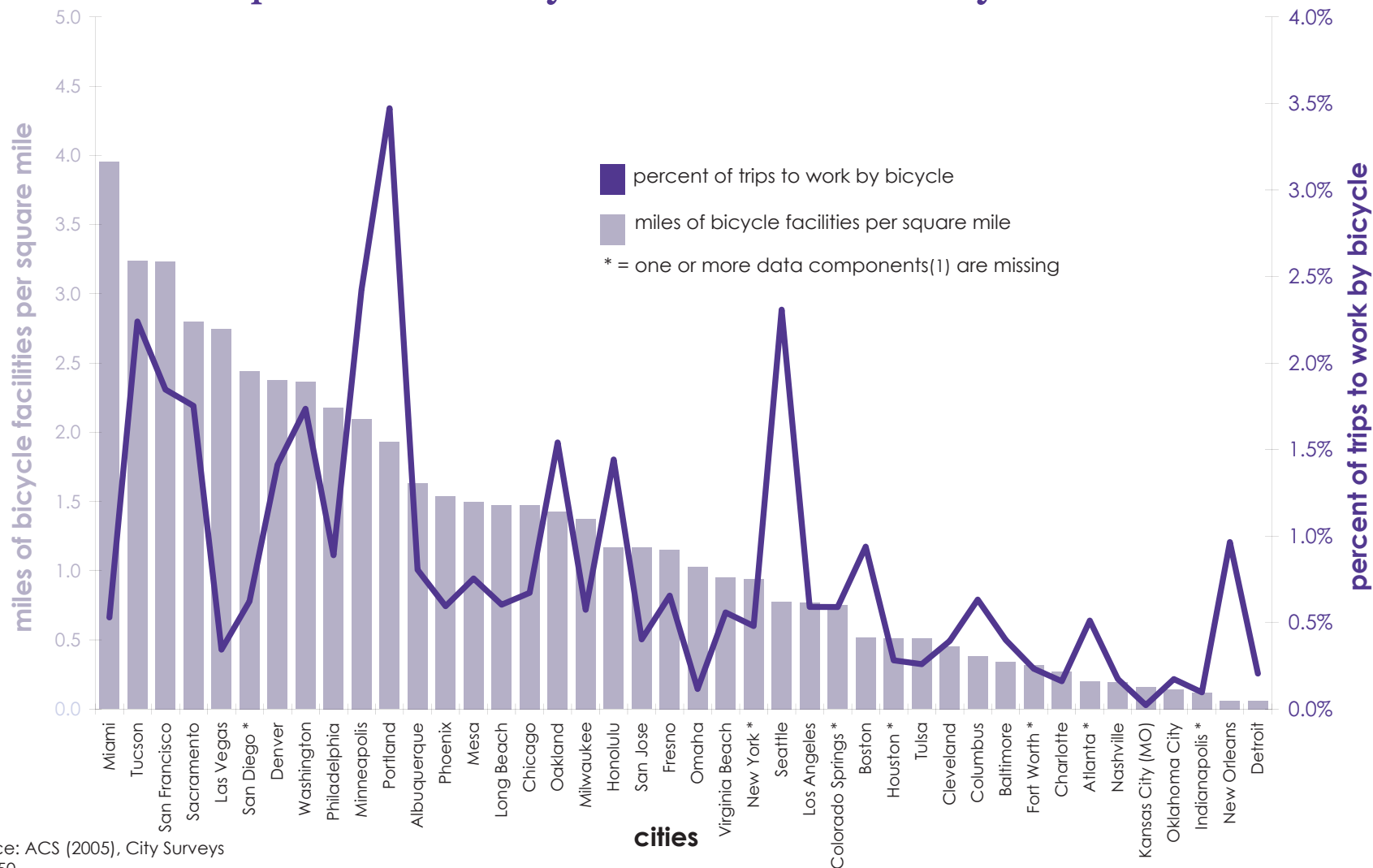


Source: ACS (2005)
r = 0.76

Cities with higher rates of cycling and walking have lower car ownership rates.

IN NEW YORK CITY, 56% OF ALL HOUSEHOLDS DO NOT OWN A CAR and New York has the fourth highest rate of combined cycling and walking mode share. Boston, San Francisco, and Washington have the three highest combined rates of cycling and walking of all major U.S. cities and are also among the top seven cities for households without a car. In cities where cycling and walking rates are lowest, the percentage of households without a cars is also very low.

Relationship Between Bicycle Facilities⁽¹⁾ & Bicycle Mode Share



Source: ACS (2005), City Surveys

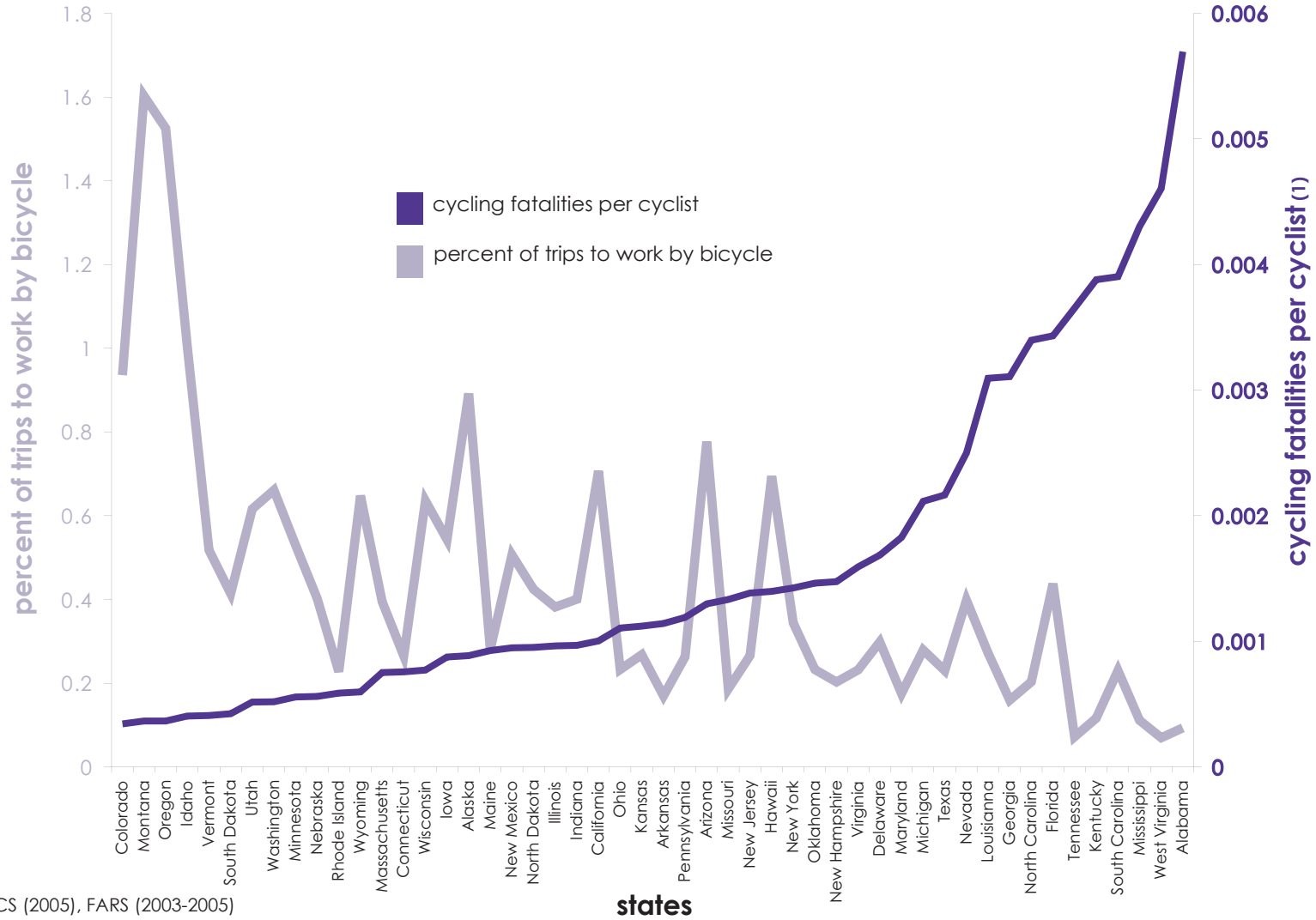
r = 0.50

(1) Bicycle facilities include on-street striped bike lanes, multi-use paths and signed bike routes.

THIS REPORT COMPARED MILES OF BICYCLE FACILITIES PER SQUARE MILE to bike-to-work mode share in major cities. In general, there appears to be a connection between the supply of facilities and levels of cycling. It should be noted, though, that the cities with the highest levels of cycling are not the cities with the highest supply of facilities and vice versa. Also, this illustration does not include quality and connectivity of facilities and is limited by the inability of work trip data to convey accurate cycling levels.

Cities with more bike facilities have higher cycling levels.

Relationship Between Bicycle Fatalities and Mode Share



Source: ACS (2005), FARS (2003-2005)

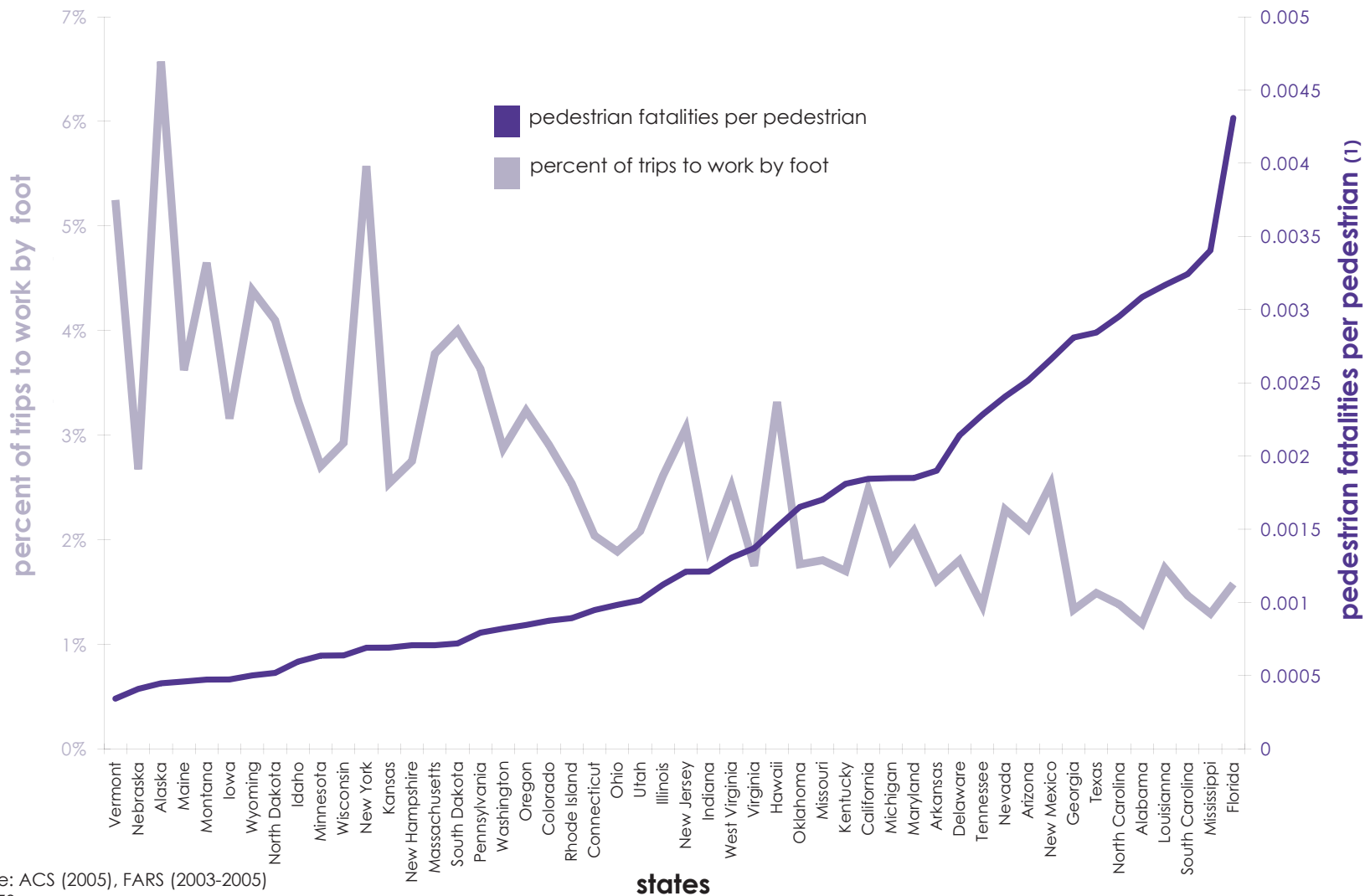
$r = -0.55$

(1) Cycling fatalities per cyclist = 3 yr. average number of cyclist fatalities / number of people who commute by bike.

Bicyclists are safer in numbers.

MANY STUDIES NOW SHOW THAT BICYCLING SAFETY INCREASES GREATLY AS cycling levels rise (Jacobsen, 2003). For this illustration, bike to work mode share from the ACS 2005 was compared to FARS bicycle fatality data. To figure the fatality rate, the project team divided the three-year average number of bicycle fatalities by the number of people who bike to work. The result is a negative correlation ($r=-0.55$) that suggests greater cycling levels may mean increased safety for cyclists.

Relationship Between Pedestrian Fatalities and Mode Share



Source: ACS (2005), FARS (2003-2005)

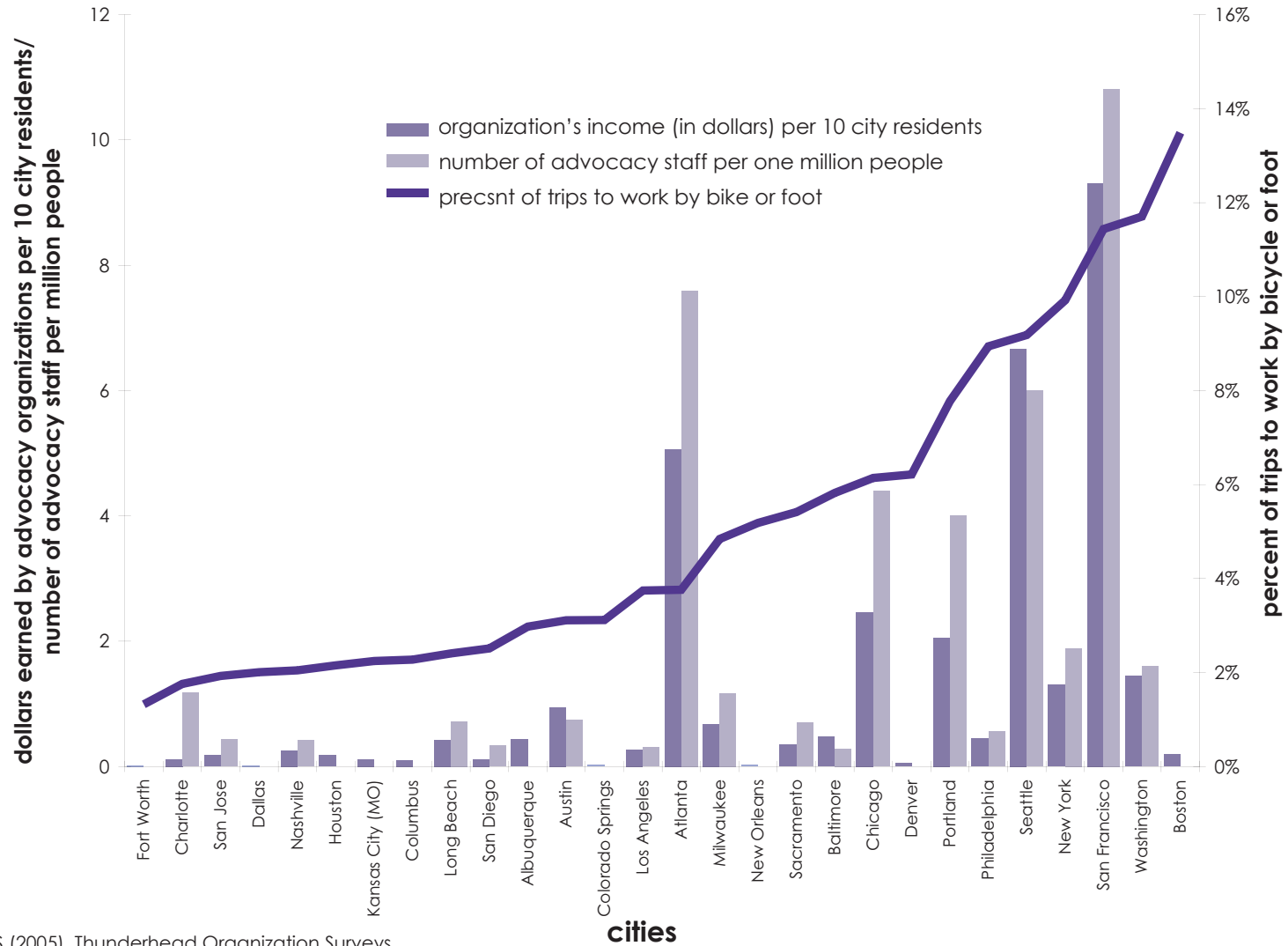
r = -0.70

(1) Pedestrian fatalities per pedestrian = 3 yr. average number of pedestrian fatalities/ number of people who commute by foot.

STATES WITH HIGHER LEVELS OF WALKING HAVE LOWER RATES OF pedestrian fatalities. For this illustration, pedestrian worker mode share from the ACS was compared to FARS data on pedestrian fatalities. To figure the fatality rate, the three-year average number of pedestrian fatalities was divided by the number of people who walk to work. The result is a negative correlation (r=-0.70) that suggests higher levels of walking may increase safety.

Higher levels of walking contribute to pedestrian safety.

Relationship Between Advocacy Capacity and Mode Share



Source: ACS (2005), Thunderhead Organization Surveys

$r = 0.58$ (organization income per 10 residents/bike + walk levels) $r = 0.55$ (organization staffing per million residents/bike + walk levels)

Advocacy capacity and higher levels of cycling and walking may be linked.

THUNDERHEAD COMPARED THE COMBINED LEVELS OF BIKING and walking to work from the ACS 2005 to standardized income and staffing levels of Thunderhead member organizations representing these cities. Positive correlations ($r=0.58$ and $r = 0.55$) suggests a relationship may exist between advocacy capacity and levels of cycling and walking.