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Whose Roads?

Evaluating Bicyclists' and Pedestrians' Right to Use Public Roadways

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Cyclists and pedestrians have legal rights to use public roads.

Abstract

Many people believe that *active transport modes* (walking, cycling, and their variants, also called non-motorized or human-powered transport) have less right to use public roads than motorists, based on assumptions that non-motorized travel is less important than motorized travel, and active mode users pay less than their fair share of roadway costs. This report investigates these assumptions. It finds that active modes have legal rights to use public roads, that non-motorized travel plays unique and important roles in an efficient and equitable transport system, that motorists often benefit from pedestrian and cycling improvements, that motor vehicle use imposes external costs on active travel which creates demand for separated facilities, and because active modes impose minimal roadway costs and pay general taxes that finance about half of roadway expenses they overpay their fair share of roadway costs.

Introduction

Motorists often assume that public roads are intended primarily for their use, and *active modes* (cyclists, pedestrians, and variants such as wheelchairs and skates, also called *non-motorized* or *human-powered* modes) should be treated as inferiors or excluded altogether. Active mode users are often accused of paying less than their fair share of roadway costs (Cadwell 2013; Poole 2013), or simply told to "*Get the #$%^@ off the road!*" Pedestrians and cyclists are sometimes forbidden from using a particular public road to avoid delaying motorized traffic.

These assumptions are often used to justify policies that favor motorized over non-motorized travel, including minimal investments in walking and cycling facilities, roadway design and management that create barriers to non-motorized travel, development policies that result in more dispersed land use patterns, and traffic safety programs that give non-motorized issues little attention and place the onus for reducing risk on pedestrians and cyclists.

Are these assumptions justified? What rights *do* non-motorized modes have to use public roadways? Do non-motorized modes receive a fair share of roadway resources? Do motorists really subsidize walking and cycling? This report explores these questions.

Legal Rights

Most North American jurisdictions have traffic rules based on the *Uniform Vehicle Code and Model Traffic Ordinance* (UVCMTO, usually simply called the *Uniform Vehicle Code* or *UVC*), a standard set of traffic laws published by the National Committee on Uniform Traffic Laws and Ordinances (www.ncutlo.org), a professional organization that includes a broad spectrum of traffic safety experts. The 2000 UVC states, "*Every person propelling a vehicle by human power or riding a bicycle shall have all of the rights and all of the duties applicable to the driver of any other vehicle under chapters 10 and 11, except as to special regulations in this article and except as to those provisions which by their nature can have no application.*"[1]

The League of American Cyclists maintains the *State Bike Laws Center* (www.bikeleague.org/action/bikelaws/state_laws.php) which provides links to bicycle traffic laws in each U.S. state. Although some details vary, most state and provincial traffic laws include the following provisions:

- The right to ride a bicycle on any public road, street, or bikeway except where specifically prohibited, such as on limited access highways.
- The responsibility to obey all relevant traffic laws and regulations.
- The responsibility to use hand signals to let people know you plan stop or turn. Many states allow cyclists to use their right hand to signal right turns.
- Cyclists riding two abreast shall not impede normal traffic movement.
- The responsibility to have adequate brakes, and suitable lighting and reflectors when riding at night.
- Some states require bicyclists to use an adjacent pathway if available, but these are opposed by cyclists who want the right to decide whether or not to use a facility.
- Some jurisdictions require bicyclists to wear helmets (some just children).
- The responsibility of property owners to eliminate potential hazards such as plants or moveable object that may block the view of drivers, pedestrians or bicyclists on a road.

There is sometimes debate concerning cyclists' right to use traffic lanes (Shanteau 2013). Many people have the impression that cyclists are required by law to ride as far to the right side of the roadway as possible to avoid delaying motorized traffic. Although it is true that bicycles are often slower than other vehicles, and slower vehicles are generally required to right to the right side of the roadway to avoid delaying faster vehicles, the legal requirements are more complex and include many exceptions.

[1] *Uniform Vehicle Code*, "Article XII.Operation Of Bicycles, Other Human-Powered Vehicles, And Mopeds," www.bikeleague.org/programs/bicyclefriendlyamerica/bicyclefriendlystate/pdfs/uvc_bike.pdf

The UVC includes the following sections:[2]

> 11-1205.Position on roadway
>
> (a) Any person operating a bicycle or a moped upon a roadway at less than the normal speed of traffic at the time and place and under the conditions then existing shall ride as close as practicable to the right-hand curb or edge of the roadway except under any of the following situations:
>
> > 1. When overtaking and passing another bicycle or vehicle proceeding in the same direction.
> >
> > 2. When preparing for a left turn at an intersection or into a private road or driveway.
> >
> > 3. When reasonably necessary to avoid conditions including, but not limited to, fixed or moving objects, parked or moving vehicles, bicycles, pedestrians, animals, surface hazards, or substandard width lanes that make it unsafe to continue along the right-hand curb or edge. For purposes of this section, a "substandard width lane" is a lane that is too narrow for a bicycle and a vehicle to travel safely side by side within the lane.
> >
> > 4. When riding in the right turn only lane.
>
> (b) Any person operating a bicycle or a moped upon a one-way highway with two or more marked traffic lanes may ride as near the left-hand curb or edge of such roadway as practicable.
>
> 11-1206.Riding two abreast
> Persons riding bicycles upon a roadway shall not ride more than two abreast except on paths or parts of roadways set aside for the exclusive use of bicycles. Persons riding two abreast shall not impede the normal and reasonable movement of traffic and, on a laned roadway, shall ride within a single lane.

People sometimes interpret these to mean that cyclists should always right as far to the right side of the roadway as possible and are prohibited from ever delaying other traffic, but this is inaccurate. The requirement to ride to the right side of the roadway only applies when cyclists are riding slower than other traffic and if the road shoulder is adequate. Cyclists have the right to "take a lane" when riding as fast as other traffic, or when space is limited, for example, if the road has no shoulder, the shoulder is hazardous due to potholes or loose gravel, or if there is a parking lane to the right of the traffic lane.[3] This provision is actually unnecessary since vehicle traffic laws contain other provisions that require slower vehicles to stay to the right side of the roadway and pull off the road if delaying more than five vehicles.

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[2] For more information on UVC regulations regarding cycling see Appendix A of this report.

[3] For information on safe and responsible cycling see the League of American Bicyclist's *Guide to Safe and Enjoyable Cycling* (LAB 2011), summarized in *Bike Sense: A Guide to the Rules of the Road,* (GVCC 2005).

The UVC also provides specific rules regarding pedestrians.[4] These include:

- Vehicular traffic shall yield the right of way to pedestrians lawfully within a crosswalk.
- Pedestrians shall obey the instructions of any applicable traffic-control device unless otherwise directed by a police officer.
- Pedestrians crossing a roadway other than within a marked crosswalk or an unmarked crosswalk at an intersection shall yield the right of way to all vehicles upon the roadway.
- Pedestrians shall not suddenly leave a curb and walk or run into the path of a vehicle which is so close as to constitute an immediate hazard.
- Between adjacent intersections at which traffic-control signals are in operation pedestrians are prohibited from crossing except at marked crosswalks.
- Where neither a sidewalk nor a shoulder is available, any pedestrian walking along and upon a highway shall walk as near as practicable to an outside edge of the roadway, and if on a two-way roadway, shall walk on the left side of the roadway (facing traffic).
- Except as otherwise indicated, any pedestrian upon a roadway shall yield the right of way to all vehicles upon the roadway.
- The driver of a vehicle crossing a sidewalk shall yield the right of way to any pedestrian and all other traffic on the sidewalk.
- No person shall drive any vehicle upon a sidewalk or sidewalk area except upon a permanent or duly authorized temporary driveway.
- Local governments may restrict pedestrians from crossing at unmarked crosswalks
- Most jurisdictions require drivers to yield to pedestrians using long canes or dog guides.
- Drivers shall exercise due care to avoid colliding with any pedestrian, any human-powered vehicle, a child or obviously confused, incapacitated or intoxicated person, and shall give an audible signal when necessary.

The American Association of State Highway and Transportation Officials (AASHTO) *Green Book* also indicates that transportation officials recognize society's responsibility to accommodate pedestrians (AASHTO 1994). It states,

> Pedestrians are a part of every roadway environment, and attention must be paid to their presence in rural as well as urban areas…Because of the demands of vehicular traffic in congested urban areas, it is often extremely difficult to make adequate provisions for pedestrians. Yet this must be done, because pedestrians are the lifeblood of our urban areas, especially in the downtown and other retail areas.

[4] For more information on UVC regulations regarding walking see Appendix B of this report.

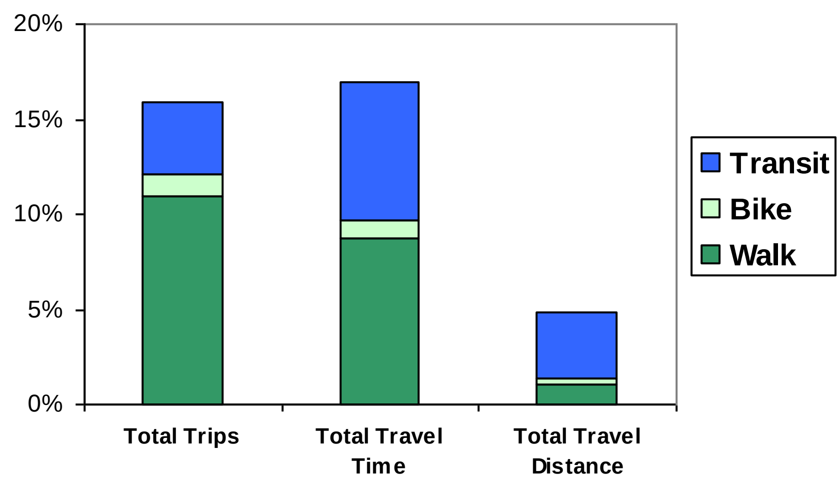
Importance of Active Modes

Critics often assume that motorized travel is more important than non-motorized travel, based on statistics, such as commute mode share data, which indicate that most travel is motorized. However, conventional transport planning practices tend to undercount and undervalue non-motorized travel (Forsyth, Krizek and Agrawal 2010; Litman 2012; Pike 2011). Conventional travel surveys often overlook or undercount shorter trips, non-work trips, off-peak trips, non-motorized trips, children's travel, and recreational travel (Litman 2011; Stopher and Greaves 2007). Many surveys ignore non-motorized trips to access motorized modes, for example, a *bike-bus-walk* trip is simply considered a *transit* commute, and a trip that involves several blocks of walking from a parked car to destinations is coded as an *automobile* trip. If instead of asking, "What portion of trips *only* involve walking," we ask, "What portion of trips involve *some* walking," walking would be recognized as a common and important mode.

Some newer surveys provide more comprehensive estimates of non-motorized travel (Pucher, et al. 2011). For example, the 2009 National Household Travel Survey found that 11.1% of travel is by walking and 1.1% by cycling, much higher than previous surveys. Although this may partly reflect actual increases in travel by these modes, it may also reflected improved survey practices that collect more walking and cycling trips. Other studies also conclude that more comprehensive surveys much more walking and cycling activity than indicated by most transport statistics (ABW 2010; Rietveld 2000).

Although walking and cycling represent a small portion of travel distance, they represent a larger portion of trips and travel time, as indicated in Figure 1. As a result, improving non-motorized travel conditions can significantly improve users' travel experience.

Figure 1 **Portion of Total Trips, Travel Time and Travel Distance** (Litman 2011)



Walking, cycling and transit represent a much larger portion of trips and travel time than distance.

The Role of Non-motorized Transportation

Non-motorized modes play unique and important roles in an efficient and equitable transportation system:

- Typically 10-20% of trips are by non-motorized modes, with higher rates in urban areas.
- Many motorized trips involve non-motorized links, for example, to access public transit and parked vehicles. Parking lots, transport terminals, airports, and commercial centers are all pedestrian environments. As a result, walking and cycling improvements can directly benefit motorists by improving connections to other modes, and access to parking facilities, which expands the range of parking spaces that serve a destination.
- Active transport improvements can help reduce transportation problems such as traffic and parking congestion, traffic accidents, chauffeuring burdens, and pollution emissions.
- Walking and cycling provide affordable, basic transport. People who are physically, economically and socially disadvantaged often rely on walking and cycling, so non-motorized modes can help achieve social equity and economic opportunity objectives.
- Non-motorized modes help achieve land use planning objectives, such as urban redevelopment and compact, mixed-use community design.
- Active transport is the most common form of physical exercise. Increasing walking and cycling is often the most practical way to improve public fitness and health.
- Pedestrian environments (sidewalks, paths and hallways) are a major portion of the public realm. Many beneficial activities (socializing, waiting, shopping and eating) occur in pedestrian environments, and improving walkability can support these activities.
- Walking and cycling are popular recreational activities. Improving walking and cycling conditions provides enjoyment and health benefits to users, and it can support related industries, including retail, recreation and tourism.

Mobility- Versus Accessibility-Based Planning (Handy 1993; Litman 2003)
A paradigm shift (a change in the way problems are defined and solutions evaluated) is occurring which affects the perceived value of non-motorized travel. The old paradigm assumed that *transportation* means *mobility* (physical travel), and so evaluated transport system performance based on travel speed. This perspective tends to assume that, due to its greater speed, motorized travel is inherently superior to non-motorized travel, and so deserves priority in planning decisions.

But mobility is not generally an end in itself; most travel is intended to provide *access* to desired goods and services. Many factors affect accessibility including mobility, the quality of access options available (the ease of walking, cycling, automobile travel, public transport, and even telecommunications), and land use factors (density, mix, roadway connectivity, etc.). When evaluated this way, non-motorized transport can play an important role in an efficient transport system by providing mobility and by providing access to motorized modes. For example, the new paradigm recognizes that a walkable, mixed-use neighborhood can provide a high level of accessibility by reducing the distances that people must travel to access common services such as shopping, education and recreation, and that planning decisions often involve trade-offs between different types of access; for example, streets designed to maximize automobile traffic volumes and speeds tend to create barriers to walking and cycling.

These benefits vary depending on perspective and conditions. Some result from increased walking and cycling activity, and others only result if automobile travel is reduced. Some benefits are *internal* (they directly benefit mode users), others are *external* (they benefit other people). Table 1 summarizes various walking and cycling benefits and costs.

Table 1 **Distribution of Non-Motorized Benefits** (Litman 2012; COWI 2009)

	Improved Active Travel Conditions	Increased Active Transport Activity	Reduced Automobile Travel	More Compact Communities
Potential Benefits	• Improved user convenience and comfort • Improved accessibility for non-drivers, which supports equity objectives • Option value • Supports related industries (e.g., retail and tourism) • Increased security	• User enjoyment • Improved public fitness and health • Increased community cohesion (positive interactions among neighbors due to more people walking on local streets) which tends to increase local security	• Reduced traffic congestion • Road and parking facility cost savings • Consumer savings • Reduced chauffeuring burdens • Increased traffic safety • Energy conservation • Pollution reductions • Economic development	• Improved accessibility, particularly for non-drivers • Transport cost savings • Reduced sprawl costs • Openspace preservation • More livable communities • Higher property values • Improved security
Potential Costs	• Facility costs • Lower traffic speeds	• Equipment costs (shoes, bikes, etc.) • Increased crash risk	• Slower travel	• Increases in some development costs

This table summarizes active transport benefits and costs.

Various academic and government-sponsored studies have estimated the value of these benefits (Litman 2009 and 2012; NZTA 2010; Zhang, et al. 2005). Many only consider a portion of benefits: some include health and environmental benefits, others include user savings and congestion reductions, but few include parking savings or reduced chauffeuring responsibilities. For example, Gotschi (2011) evaluated Portland, Oregon's $138-605 million bicycle facility investments based on healthcare savings ($388-594 million), increased longevity ($7-12 billion) and fuel savings ($143-218 million). Grabow, Hahn and Whited (2010) estimated the economic value of bicycling in Wisconsin, including bicycle manufacturing and sales ($593 million), tourism and recreational value ($924 million), physical activity health benefits ($320 million), and pollution emission reductions ($90 million). UK Department for Transport research estimated that an integrated program that increases walking in British towns provides benefits worth £2.59 for each £1.00 spent, considering just reduced mortality (Cavill, Cope and Kennedy 2009; DfT 2010). Including other benefit categories (reduced congestion, parking costs, user costs, etc.) could significantly increase these values.

The following section discusses some of these benefits in more detail.

Walking and Cycling Community Benefits
A portion of non-motorized benefits are directly perceived by local residents, and so are reflected in increased property values in areas that have better walking and cycling conditions and higher levels of non-motorized travel activity.

For example, Cortright (2009) found that in typical U.S. metropolitan regions a one point increase in Walkscore (www.walkscore.com) is associated with a $700 to $3,000 increase in home values, indicating the value consumers place on walkability. Similarly, Pivo and Fisher (2010) found that office, retail and apartment values increased 1% to 9% for each 10-point WalkScore increase. Buchanan (2007) found 5.2% higher residential property values and 4.9% higher retail rents in London neighborhoods with good walking conditions. Song and Knaap (2003) found that, all else being equal, house prices are 15.5% higher on average in walkable neighborhoods. Eppli and Tu (2000) found 11% higher property values in New Urbanist neighborhoods compared with otherwise similar homes in conventional, automobile-dependent communities.

Residential property values also tend to increase with proximity to public trails (Racca and Dhanju 2006). Karadeniz (2008) found that each foot closer to Ohio's Little Miami Scenic Trail increases single-family property sale prices $7.05, indicating that values increase 4% if located 1,000 feet closer to the trail (this paper provides a good overview of the literature on this subject). Some studies indicate that proximity to trails and bike paths reduces the value of abutting properties, due to concerns over reduced privacy and increased crime (Krizek 2006). However, Racca and Dhanju (2006) conclude, "The majority of studies indicate that the presence of a bike path/trail either increases property values and ease of sale slightly or has no effect." Paths and trail benefits are likely to be largest in communities where walking and cycling are widely accepted and supported, and if residents can self-select, so people who value walking and cycling can locate near such facilities, while people who dislike such facilities can move away.

Retailers sometimes oppose non-motorized improvements, such as streetscaping and bicycle lanes, because they assume that motorists are better customers than pedestrians and cyclists, but this is often untrue (Sztabinski 2009; TA 2006). Bicycle parking is space efficient and so generates about five times as much spending per square meter as car parking (Lee and March 2010).

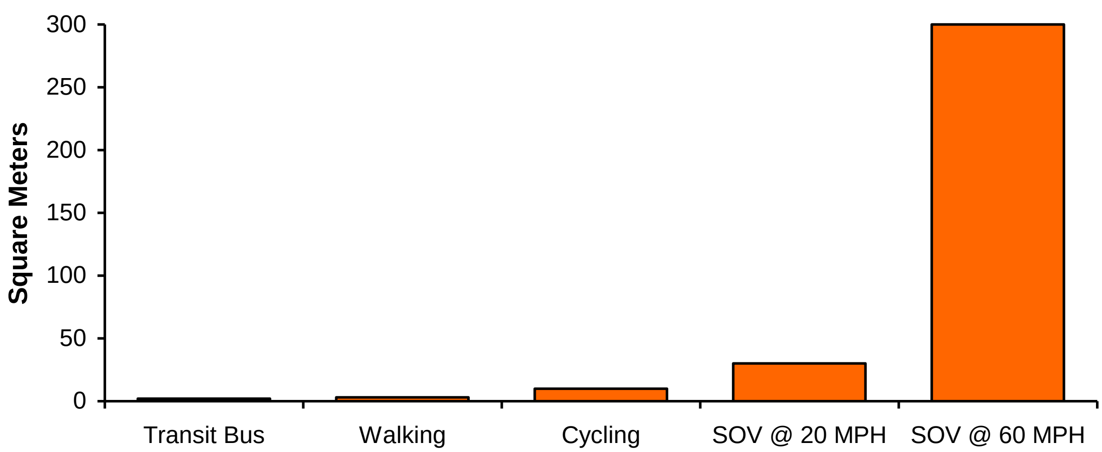
Congestion Impacts
Motorists often complain when cyclists delay vehicle traffic (Cadwell 2013), but active transport can help reduce overall traffic delays by reducing urban-peak vehicle travel and therefore traffic congestion. Walking and cycling conditions can affect vehicle trip generation in several ways:

- Poor walking and cycling conditions force people to drive for even short trips. In urban areas a significant portion of motor vehicle travel (often 10-30%) consists of short trips that could shift to active modes (Litman 2010). Were walking conditions are poor, such as along an urban arterial, people will drive even across the road or from one driveway to another, adding friction and cross traffic that creates delays.
- Poor walking and cycling conditions increases chauffeuring trips (special trips made to transport a non-driver) which often include empty backhauls, so each passenger-mile generates two vehicle-miles of travel. In automobile-dependent areas such trips can represents a major portion of urban-peak trips.
- Poor walking and cycling conditions discourage public transit and rideshare travel (car- and vanpooling), which reduces longer vehicle trips.

These impacts tend to be greatest in commercial districts, and near schools and recreational centers, where many short trips begin and end.

Space requirements, and therefore congestion impacts, per passenger-mile vary depending on a mode's size, speed, and occupancy. Shy-distance (space between a vehicle and other objects) increases exponentially with speed, so at 30 mile-per-hour (MPH) vehicles can safety travel about 50 feet apart, but at 60 MPH they require about 300 feet. Figure 2 compares the typical road space requirements for various modes (also see "Roadway Costs," Litman 2009).

Figure 2 **Road Space Requirements By Mode** (based on Bruun and Vuchic 1995)



The space required per passenger varies depending on vehicle type, speed and travel conditions. Automobile travel requires one to two orders of magnitude more road space per passenger-mile than walking, cycling and public transport.

Under some circumstances, non-motorized travel can delay motorized traffic. To analyze overall congestion impacts, bicycling conditions are divided into four classes:

1. *Uncongested roads and separated paths*. Bicycling in these conditions causes no traffic congestion.
2. *Congested roads with space for bicyclists*. Bicycling on a road shoulder (common on highways), a wide curb lane (common in suburban and urban areas), or a bike lane contributes little traffic congestion except at intersections where turning maneuvers may be delayed. Table 2 summarizes these impacts.

Table 2 **Passenger-Car Equivalents for Bicycles by Lane Width** (AASHTO 1990)

	< 11 ft. Lane	11-14 ft. Lane	> 14 ft. Lane
Riding With Traffic	1.0	0.2	0.0
Riding Against Traffic	1.2	0.5	0.0

3. *Narrow, congested roads with low speed traffic.* Bicycling on a narrow, congested road where cyclists can keep up with traffic (common on urban streets) probably causes less congestion than an average car due to bicycles' smaller size.
4. *Narrow, congested roads with moderate to high speed traffic*. Bicycling on a narrow, congested road where the rider cannot keep up with traffic and faster vehicles cannot easily pass can cause significant congestion delay.

Congestion is reduced when motorists shift to bicycling under the first three conditions. Only under condition 4 does a shift fail to reduce congestion. This represents a small portion of cycling travel because most bicyclists avoid riding under such conditions if possible, and bicycling is forbidden altogether on urban freeways.

Empirical evidence indicates that, all else being equal, improved walking and cycling conditions and shifts from driving to these modes tends to reduce traffic congestion. For example, a major study for the Arizona Department of Transportation analyzed the relationships between land use patterns and traffic conditions in Phoenix, Arizona (Kuzmyak 2012). It found significantly less congestion on roads in older, higher density areas than in newer, lower density suburban areas due to more mixed land use (particularly more retail in residential areas), more transit and nonmotorized travel, and a more connected street grid which provides more route options and enables more walking. As a result, residents of older neighborhoods generate less total vehicle travel and drive less on major roadways, reducing traffic congestion.

Recreation and Fitness

Critics sometimes argue that walking and cycling primarily provide recreational travel, with the implication that this frivolous. For example, Poole (2013) asks, "Why should I—either as a highway user-tax payer or a general taxpayer—have to pay for someone else's hobby?"

Travel surveys indicate that about half of all active transport is "recreational," including travel for exercise, sport and cultural events, and socializing (Kuzmyak and Dill 2012; Litman 2012), but so is more than half of all motor vehicle travel (BTS 2002). This assumes that automobile trips that serve recreational purposes are important, but walking and bicycling trips that serve the same purposes are not. For example, they value a car carrying passengers to walk or ride on a trail, or to a gym to pedal a stationary bike, but not people who walk or bike directly from their home. This is arbitrary, inefficient and unfair, reflecting a bias against non-motorized travel.

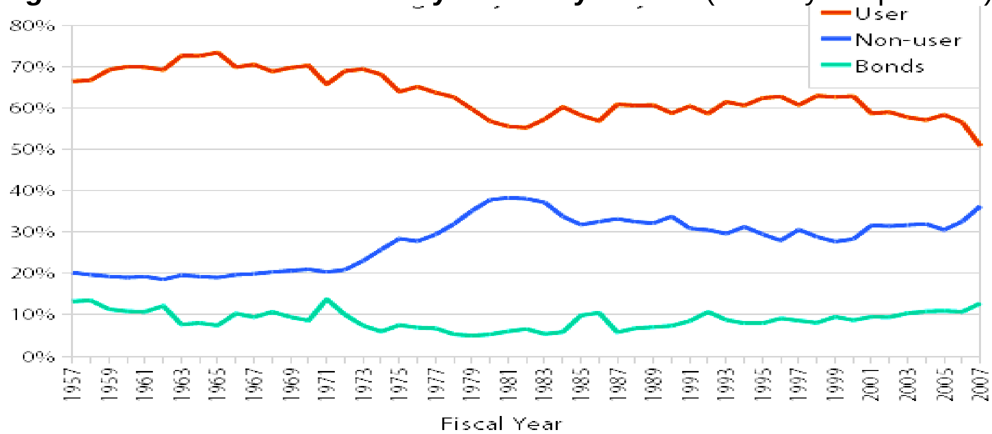
Roadway Funding

Many people assume that pedestrians and cyclists bear less than their fair share of roadway costs because they do not pay fuel taxes and registration fees, and so argue that pedestrians and bicyclists have less right to use roadways, and that spending roadway funds on non-motorized facilities (what they call *diversions*) is unfair (Cadwell 2013; Poole and Moore 2010; Poole 2013 and 2014). However, that does not reflect a comprehensive analysis of roadway spending (Litman 2013 and 2014).

Various roadway cost allocation studies have estimated the roadway costs of specific vehicle types and travel conditions (Balducci and Stowers 2008; FHWA 1997; Jones and Nix 1995). These studies indicate that heavier vehicles impose greater road wear, larger and faster vehicles require more road space, larger vehicles impose more accident risk on other road users, and motor vehicles impose pollution costs. Most cycling occurs on roadways, a minor portion occurs on special facilities which tend to be much cheaper to build than automobile facilities. For example, separated paths typically cost $120,000 to $500,000 per mile (a path is equivalent to two traffic lanes, one in each direction), compared with $2 to $20 million per mile for highway lanes (Bushell, et al. 2013; WSDOT 2004). Described differently, a road system used just for walking and cycling could be much cheaper to build and maintain than one used for motor vehicle traffic. This suggests that walking and cycling facility construction and maintenance costs are an order of magnitude smaller per passenger-mile than motor vehicle travel.

Contrary to common perceptions, cyclists do help pay for roadways. Currently, only about half of U.S. roadway expenditures are financed by motor vehicle user fees (Henchman 2013). The portion of roadway expenses funded by user fees is declining, as indicated in Figure 3, because roadway costs increase with inflation, but fuel taxes and registration fees, are fixed fees that do not. Vehicle user fees would need to double to fully fund roadway costs. The rest of highway expenses are financed by general taxes that people pay regardless of how they travel.

Figure 3 **Share of Roadway Funds By Source** (Subsidy Scope 2009)



The portion of total roadway expenditures financed by motor vehicle fees is declining.

In 2011, U.S. governments spent $206 billion on roads and motorists drove 2,946 billion miles, so roadway costs averaged about 7.0¢ per mile (FHWA 2014). That year motorists paid $127 billion in road user fees, which averages 4.3¢ per mile – the remaining 2.7¢ spent on roads is from general taxes. A typical motorist who drives 12,000 annual miles imposes $840 in roadway costs, pays $516 in roadway user fees and $224 in general taxes spent on roadways. Non-drivers tend to travel less, people who rely primarily on bicycling for transportation typically ride 3 to 6 miles per day or 1,000 to 2,000 annually. If their costs are an order of magnitude smaller than automobile travel (0.7¢ per mile), a typical cyclist imposes $7 to $14 in roadway costs, and pays $224 in general taxes toward roadways, a significant overpayment.

Although motor vehicle user fees fund a major share of *state highway* expenses, *local roads*, the roads that pedestrians and cyclists use most, are mainly funded through general taxes that residents pay regardless of how they travel. General tax funds are also spent on various traffic services, such as policing, emergency services, and subsidized parking (Litman 2009). One study estimated that on average household in Wisconsin pays $779 in annual general taxes to help finance roads (SSTI 2011). Similarly, in Canada during 2009–10, all levels of government spent $28.9 billion on roads and collected $12.1 billion in fuel taxes and $4.4 billion in other transport user fees, indicating that road user fees cover about 64% of costs (TC 2010).

It is difficult to estimate the amount governments spend on non-motorized facilities. Less than 2% of federal and state transportation funds are devoted to pedestrian and cycling programs (ABW 2018). One well-funded project, the FHWA's Nonmotorized Transportation Pilot Program, invested about $25 annually per capita on pedestrian and bicycling improvements during a four-year period, which is less than 10% of what local governments spend on roadways. This suggests that local governments typically devote

5-10% of their transportation budgets to sidewalks and bicycle facilities. Bicyclists also ride on roadways, but their small size and light weight minimize their roadway costs.

In addition to roadway subsidies, motor vehicle travel imposes other external costs (costs not borne directly by individual users), including parking subsidies, congestion delays and crash risk imposed on other road users, and environmental damages (Litman 2009; van Essen, et al. 2007). Table 3 summarizes estimates of these costs, which indicates that automobile use has external costs averaging about 29.3¢, while cycling costs average about 0.9¢ and walking just 0.2¢ per mile.

Table 3 **External Costs (Cents per Mile)** (Litman 2009)

Cost	Automobile	Bicycle	Walk
Roadway subsidies	3.3¢	0.3	0.0
Parking subsidies	10¢	0.2	0.0
Traffic congestion	4¢	0.2	0.0
Crash risk imposed on others	8¢	0.2	0.2
Environmental costs	4¢	0.0	0.0
Totals	*29.3¢*	*0.9¢*	*0.2¢*

This table summarizes estimates of various external costs of transportation.

Summary of User Costs and Payments

Overall, local and regional governments are estimated to spend $300-500 annually per automobile in general taxes on local roads and traffic services, averaging more than 6¢ per mile driven on local roads (Litman 2009; SSTI 2011). Only 0.7¢ of this is paid through vehicle user charges, meaning that driving is subsidized through general taxes by about 5.6¢ per mile on local roads. Automobiles also impose other external costs, including parking subsidies, congestion and crash risk imposed on other road users, and environmental damages. Pedestrians and cyclists tend to impose lower costs than motor vehicles and bear an excessive share of motor vehicle external costs, particularly crash risk and pollution exposure. A shift from driving to bicycling and walking provides various savings and benefits, including benefits to motorist, including reduced traffic and parking congestion, reduced chauffeuring burdens, and reduced accident risk and pollution emissions.

For an average household, the costs imposed approximately equals the costs they bear, but people who drive less than average and use non-motorized modes tend to overpay their share of costs, while those who drive more than average underpay. This indicates that non-drivers pay more than their share of transportation costs.

The automobile industry has published studies which claim that motorists pay more than their share of costs (Dougher 1995; Spindler 1997), but they violate standard cost allocation principles by including all vehicle taxes rather than just special user charges, and by considering only *highway* expenditures, ignoring *local roadway* costs and other external costs associated with motor vehicle use. Virtually all studies that use appropriate analysis procedures conclude that motorists significantly underpay the costs they impose on society (FHWA 1997; Litman 2012; Parry, Walls and Harrington 2007; van Essen, et al. 2007).

Example:

Two neighbors each pay $250 annually in general taxes that fund roads and traffic services. Mike Motorist drives 10,000 miles annually on local roads, while Frances Footpower bicycles 2,500 miles. The table below compares their tax payments with their costs.

Table 4 **Local Roadway Payments Versus Costs**

	Mike	Frances
A. Annual local mileage	10,000 by car	3,000 by bike
B. Household's general taxes used for road related services	$250	$250
C. Motorist user fees spent on local road (0.2¢ per mile)	$24	$0
D. Total road system contribution (B + C)	$294	$250
E. Tax payment per mile of travel (B/A)	2.9¢	10¢
F. Roadway costs (cars = 5.6¢/ml, bicycles = 0.2¢/ml)	$560	$48
Net (D – F)	*Underpays $166*	*Overpays $252*

Non-drivers pay almost as much as motorists for local roads but impose lower costs. As a result, they tend to overpay their share of roadway costs.

Optimal Investment In Active Transport

This section discusses ways to determine the optimal amount of transportation resources (funding and road space) that should be devoted to non-motorized modes.

One approach for evaluating roadway spending fairness is to assume that funding should be allocated based approximately on mode share. Since the U.S. spends $206 billion total on roads, and about 1% of total trips are currently by bicycle and 12% by walking, this would justify about $2 billion annual cycling investments, or $26 billion annual investments in active modes. MAP-21, the current U.S. federal transportation law, dedicates up to 10% of Surface Transportation Program funding to enhancements, which does approach active transportation's 13% mode share, but these funds are spent on a wide range of programs including paths, scenic highways, landscaping, historic preservation, environmental and education programs, so cycling and pedestrian currently receive much less than their mode share.

Even greater investments can be justified for these reasons:

- Investments should be based on potential rather than current mode shares. The FHWA's Nonmotorized Transportation Pilot Program showed that walking and cycling mode shares increase significantly after facilities are improved, indicating latent demand; people want to walk and bicycle more than they currently do (FHWA 2014).
- For the last half-century transportation agencies have underinvested in cycling facilities. In other words, the relatively low levels of non-motorized travel in North America partly reflect a self-fulfilling prophesy: automobile-oriented planning prevents people from walking and cycling as much as they want (Pucher and Buehler 2009). Improving walking and cycling conditions can offset this, resulting in more optimal travel options.
- Current demographic and economic trends are increasing demand for non-motorized travel, so additional investments are justified now to accommodate this future demands.
- Walking and cycling can provide additional benefits not recognized in conventional economic evaluation, including traffic and parking congestion reductions, consumer savings, public fitness and health, and support for economic development (Litman 2012).
- Active transport helps achieve social equity objectives. Physically, economically and socially disadvantaged people tend to rely on walking and cycling for basic mobility.

Anti-Harassement Ordinance
(http://ladotbikeblog.wordpress.com/2011/07/20/bicyclist-anti-harassment-at-city-council-today)

Motorists sometimes attack pedestrians' and cyclists' rights to use public roads by yelling, honking, threats or assault. Such harassment is unpleasant and discourages active transport. Although severe cases, such as a motorist intentionally hitting a cylist, are clearly illegal and subject to criminal charges and civil litigation, many cases are unsuited to legal action.

To address this the City of Los Angeles passed an anti-harassment ordinance which specifically prohibits threatening, assaulting or forcing bicyclists off the street (http://clkrep.lacity.org/onlinedocs/2009/09-2895_RPT_ATTY_06-10-11.pdf).

Summary

Critics sometimes claim that pedestrians and cyclists have less right to use public roads than motorists, arguing that active modes are less important than motorized travel and underpay their share of roadway costs. These claims are inaccurate.

Bicyclists and pedestrians have legal, moral and practical rights to use public roads. Of course, pedestrians and cyclists must observe traffic rules. Most jurisdictions have adopted the Uniform Vehicle Code wording which requires slower cyclists to ride to the right to allow faster traffic to pass, but this does not prohibit cyclists from riding in a traffic lane when traveling as fast as motorized travel or when required for safety.

Non-motorized modes play a unique and important role in an efficient and equitable transport system, including affordable basic mobility, access to motorized modes (automobile and public transit), exercise and enjoyment. Conventional planning tends to undercount and undervalue active travel, it is more common and more beneficial than recognized by conventional planning.

Although pedestrians and cyclists do not generally pay road user fees, they do help finance roadways. About half of total roadway costs, and the majority of *local* roadway costs, are financed by general taxes, which people pay regardless of how they travel. Automobile travel enjoys other subsidies, including unpriced parking and government support for vehicle and fuel industries. Because they are relatively light, small and slow, tend to travel relatively few annual miles, and their facilities (sidewalks and paths) are relatively inexpensive to build and maintain, pedestrians and cyclists impose much smaller costs than motorists. People who drive less than average tend to overpay their fair share of these costs, while those who drive more than average underpay. As a result, pedestrians and bicyclists tend to subsidize motorists.

There are additional justifications for motorists to help finance active transport facilities and programs. Motorists can benefit from pedestrian and cycling improvements that reduce their traffic and parking congestion, accident risk and chauffeuring burdens. Motor vehicle use imposes external costs on pedestrians and cyclists, including accident risk, delay (called the *barrier effect*), noise and air pollution. Motorists are often unwilling to slow down as would be required to safely accommodate pedestrians and cyclists. It is therefore fair and efficient for motorist to finance some or all of the costs of special facilities such as crosswalks, bike lanes, separated paths, etc.

In most communities, 12-20% of all trips are by walking and cycling, and there appears to be significant latent demand for non-motorized travel: walking and cycling activity increase when non-motorized travel conditions are improved. Current demographic and economic trends are expected to increase walking and cycling demand, yet only 2-4% of total transport funding is devoted to pedestrian and cycling facilities. As a result, it is economically efficient and equitable to increase the portion of resources (money and road space) devoted to non-motorized travel.

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