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Whose Roads?

Defining Bicyclists' and Pedestrians' Right to Use Public Roadways

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ABSTRACT

Many people believe that nonmotorized modes (walking, cycling, and their variations) have an inferior right to use public roads compared with motor vehicles. This reflects the belief that motor vehicles are more important to society than nonmotorized modes, and that roads are funded by motorists. This paper investigates these assumptions. It finds that nonmotorized modes have the legal right to use public roads, that nonmotorized modes provide significant transportation benefits, and pedestrians and cyclists pay a significant share of roadway costs. Although motorist user fees (fuel taxes and vehicle registration fees) fund most *highway* expenses, funding for *local roads* (the roads pedestrians and cyclists use most) originates mainly from general taxes. Since bicycling and walking impose lower roadway costs than motorized modes, people who rely primarily on nonmotorized modes tend to overpay their fair share of roadway costs and subsidize motorists.

Introduction

Motorists often assume that public roads are intended primarily for their use, and nonmotorized modes (cyclists, pedestrians, and variants such as wheelchairs and skates) should be treated as inferiors or excluded altogether. Nonmotorized mode users are sometimes accused of paying less than their share of roadway costs, 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.

Lack of respect for nonmotorized travel often justifies policies that favor motorized over nonmotorized travel, including minimal investments in walking and cycling facilities, roadway design and management that creates barriers to nonmotorized travel, development policies that result in more dispersed land use patterns, and traffic safety programs that give nonmotorized 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 nonmotorized modes receive a fair share of roadway resources? Do motorists really subsidize walking and cycling? This report explores these questions.

Legal Rights

Bicyclists have legal rights and responsibilities that vary from one jurisdiction to another. These usually include the following features (BikeMass, 2004; LawGuru, 2004).

- 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.
- The responsibility to ride single file unless passing.
- The responsibility to have a white headlight and a read tail-light on if riding between from 1/2 hour after sunset until 1/2 hour before sunrise.
- The responsibility to have adequate brakes.

Most jurisdictions require drivers to yield to pedestrians using long canes or dog guides. Some jurisdictions have laws requiring bicyclists to wear helmets (some of which only apply to children), or placing other special responsibilities on cyclists.

The *Uniform Vehicle Code* (*UVC,* the basis for most traffic laws) states, "*Every person propelling a vehicle by human power or riding a bicycle shall have all the rights and all the duties applicable to the driver of any other vehicle*" (ITE, 1992; SWCP, 2004). Most traffic laws do not differentiate between bicycles and other vehicles (Paul Hill, 1986). Some states require bicyclists to use an adjacent pathway if available, but these are increasingly being abolished to give bicyclists the choice of whether to ride on a path or the road (LAW, 1995).

Because motor vehicles impose significant risk on cyclists and pedestrians, the UVC gives drivers the responsibility to "*avoid colliding with any pedestrian or any person propelling a human powered vehicle and…exercise proper precaution upon observing any child or any obviously confused, incapacitated or intoxicated person*" (ITE, 1992), although this responsibility is often poorly enforced (Kenneth Todd, 1992).

The AASHTO "Green Book" also indicates that transportation officials recognize society's responsibility to accommodate pedestrians, stating,

> 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. (AASHTO, 1994)

Importance of Nonmotorized Transportation

Conventional planning practices often consider walking and cycling as minor transport modes, but this reflects planning bias (Litman, 2004a). Conventional travel surveys generally find that nonmotorized travel represents just 2-5% of person-trips and less than 1% of total person-miles, but this reflects their tendency to overlook or undercount shorter trips, non-work trips, off-peak trips, nonmotorized links of motorized trips, travel by children, and recreational travel (Litman, 2003). Walking and cycling trips to access motorized modes are not counted, even if they involve travel on public facilities. 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. For example, although only 7% of Canadian urban commute trips are entirely by walking, about three times as many involve a walking link, as indicated in Table 1.

Table 1 **Commute Trips By Mode** (Statistics Canada, 1992)

	Car Only	Walking All or Part	Transit All or Part
Winnipeg	73%	16%	15%
Vancouver	72%	20%	12%
Calgary	72%	21%	12%
Canada	69%	22%	10%
Toronto	61%	24%	20%
Ottawa	60%	33%	16%
Average	*68%*	*23%*	*14%*

Although only about 7% of urban commutes are entirely by walking, about 23% involve some walking on public facilities.

Some newer travel surveys attempt to count all nonmotorized trips (although participants often have trouble recording short walking trips so they still tend to be undercounted). The 2001 National Household Travel Survey (BTS, 2001) found that walking represents 8.6% of personal trips, about 50% more than reported in the 1995 National Personal Travel Survey (NPTS), which used more conventional survey methods. In 2000, the Southern California Metropolitan Transportation Authority increased the portion of travel involving nonmotorized modes assumed for transport planning purposes from about 2% of regional trips (based on conventional travel surveys) up to about 10%, based on more comprehensive data from the 1995 NPTS. According to a U.K. survey, walking represents 2.8% of total mileage, 17.7% of total travel time, and 24.7% of total trips (Litman, 2004a). Rietveld (2000) finds that conventional surveys count only about one-sixth of total nonmotorized trips.

Walking and bicycling provide basic mobility, that is, they allow people to access goods, services and activities society considers high value (also called *essential* or *lifeline*), including people who have few travel alternatives. Accommodating nonmotorized travel therefore deserves additional priority than indicated by simply considering its share of total travel activity.

Benefits of Nonmotorized Transportation

Some experts believe that walking and cycling can do little to solve transportation problems because they only consider motorized trips that shift completely to nonmotorized modes, ignoring the important role walking and cycling play in an efficient transport system (Litman, 2004a). Walking and cycling often substitute for local errand trips, support use of transit and ridesharing, and help create more accessible land use patterns (Litman, 2004b). One study found that residents in a pedestrian friendly community walked, bicycled, or rode transit for 49% of work trips and 15% of their non-work trips, 18- and 11-percentage points more than residents of a comparable automobile oriented community (Cervero and Radisch, 1995). Litman (2004b) found that a mile of nonmotorized travel tends to leverage about seven miles of reduced automobile travel. According to some studies, 5-10% of urban automobile trips can reasonably shift to nonmotorized transport (ADONIS, 1999; Litman, 2004b; "Nonmotorized Transportation Planning," VTPI, 2004).

Conventional transport planning tends to consider a narrow range of planning objectives and so undervalues strategies that provide modest but multiple benefits, such as incentives to shifts from motorized to nonmotorized travel. Although such strategies are not usually considered the most cost effective way of reducing traffic congestion, road and parking facility costs, consumer costs, accidents, pollution, or improving mobility for non-drivers, they provide all of these benefits and more. The potential benefits of increased walking and cycling can be particularly large because the greatest impacts tend to occur in urban areas where traffic congestion, facility costs, crash risk and pollution problems are worst. As a result, a modest reduction in total regional vehicle mileage that is concentrated in congested urban areas may provide significant benefits.

Conventional planning tends to value motorized travel more than nonmotorized travel. A motor vehicle trip to a health club is counted, but a recreational walk or cycling trip is often ignored.

Conventional planning undervalues nonmotorized transportation benefits by separating transportation and recreation objectives. Recreational walking and cycling provide health benefits, user enjoyment and tourist business, but these benefits are often ignored. From a conventional transport planning perspective, a vehicle trip to a gym is important, but recreational walking or cycling is not.

Biased Language in Transportation Planning (Litman, 2003)
Transportation planning practices are often unintentionally biased toward motorized travel. For example, projects that increase road or parking capacity are often called "improvements," although from many perspectives they are harmful. Wider roads and larger parking facilities can degrade the local environment, and projects that increase vehicle traffic volumes and speeds can reduce the safety and mobility of nonmotorized travel. Calling such changes "improvements" indicates a bias in favor of one activity and group over others. Objective language uses more specific and neutral terms, such as "added capacity," "additional lanes," "modifications," or "changes."

The terms "traffic" and "trip" often refer only to motor vehicle travel. Travel surveys and traffic counts usually under-record nonmotorized trips, because they ignore or undercount short trips, non-work travel, travel by children, recreational travel, and nonmotorized links. Although most automobile and transit trips begin and end with a pedestrian or cycling link, they are usually classified simply as "auto" or "transit" trips. This undervalues nonmotorized transport.

The term "efficient" is frequently used to mean increased vehicle traffic speeds. This assumes that increasing motor vehicles speeds increases overall efficiency. This assumption is debatable. High vehicle speeds can reduce total traffic capacity, increase resource consumption, increase costs, and increase automobile dependency, reducing overall economic efficiency.

Level of service (LOS) is a qualitative measure describing operational conditions for a particular user group (motorists, cyclists, pedestrians, etc.). Transportation professionals often assume that, unless specified otherwise, level of service applies only to motor vehicles. It is important to indicate which users are considered when level of service values are reported.

Biased Terms	**Objective Terms**
Traffic	Motor vehicle traffic, pedestrian/bike traffic
Trips	Motor vehicle trips, person trips
Improve	Change, modify, expand, widen
Enhance	Change, increase traffic speeds
Deteriorate	Change, reduce traffic speeds
Upgrade	Change, expand, widen, replace
Efficient	Faster, increased vehicle capacity
Level of service	Level of service for…

Examples:

Biased: *Level of service* at this intersection is rated "D." The proposed *improvement* will cost $100,000. This *upgrade* will make our transportation system more *efficient* by *enhancing* capacity, preventing *deterioration* of *traffic* conditions.

Objective: *Level of service* at this intersection is rated "D" *for motorists* and "E" *for pedestrians*. A *right turn channel* would cost $100,000. This *road widening project* will *increase motor vehicle traffic speeds and capacity* but may *reduce safety and convenience to pedestrian travel*.

Roadway Funding

Economic efficiency and equity require that consumers should bear their share of costs for the goods and services they use, unless a subsidy is specifically justified ("Market Principles," VTPI, 2004). Many people assume that pedestrians and cyclists contribute less than their fair share toward roadway costs because they do not pay vehicle user fees (fuel taxes, vehicle registration fees, and road tolls), and so argue that pedestrians and cyclists deserve less right to use roadway facilities. However, this assumption is wrong.

Although user fees fund most *highway* expenses, *local roads* are mainly funded through general taxes that residents pay regardless of how they travel. The majority (probably more than 90%) of walking and bicycling occurs on locally funded roads, since most highways are unsuited to walking and bicycling. Table 2 shows that in 2002, $27.9 billion were spent on U.S. local roads, of which only $3.1 billion was from user fees. General tax funding averaged about 5.6¢ per motor vehicle mile of travel on local roads. Roadway user charges fund only about 70% of roadway expenditures (only 60% excluding bond revenues), indicating that fuel taxes would need to increase more than 45% to fully cover these costs. Canadian local roads are also funded primarily by general taxes.

Table 2 **Roadway Revenues and Expenditures (2002 Dollars)** (FHWA, 2003)

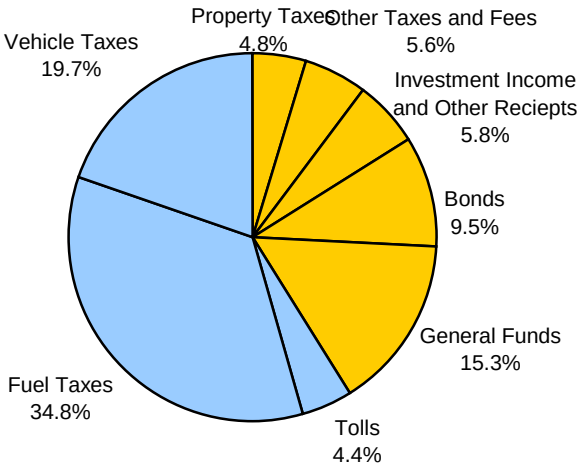
	Source	Federal	State	Local	Total
User Fees (fuel and vehicle taxes) (millions)	Table HF-10	$26,842	$49,689	$3,106	$79,637
Other Funds (general taxes) (millions)	"	$1,719	$7,864	$24,770	$34,353
Total Roadway Funding (millions)	"	$28,561	$57,553	$27,876	$113,990
Portion Other Funds (millions)	"	6.0%	13.7%	88.9%	30.1%
Roadway Mileage	Table HM-10	120,570	773,289	3,072,647	3,966,506
Vehicle Mileage (millions)	VM-3	2,415,413		440,343	2,855,756
User Fee Funding (cents/vehicle-mile)	Calculated	1.1¢	2.0¢	0.7¢	3.8¢
Other Funding (cents/vehicle-mile)	"	0.0¢	0.3¢	5.6¢	1.2¢

Local roads are funded primarily by local taxes, resulting in a subsidy to driving.

The portion of roadway expenses funded by user fees is declining because legislators are reluctant to increase fuel taxes and registration fees (Puentes and Prince, 2003). Funding for roadway improvements and even maintenance increasingly comes from general taxes, primarily sales taxes. Wach (2003) found that between 1995 and 1999 local general tax revenues spent on highways grew three times as fast as user fee revenues.

It is difficult to know exactly what portion of transport funds are devoted to nonmotorized facilities (Litman, 2004a). Local governments devote perhaps 5-15% of transportation agency budgets, but other levels of government provide far less support. For example, the state of Oregon is considered a leader in nonmotorized planning because it devotes 2% of state transport funds to nonmotorized facilities. Most states probably spend less than 1%. The costs of separated nonmotorized facilities should not necessarily be charged to pedestrians and cyclists, since they are needed due to the risk and discomfort imposed by motor vehicle traffic. Areas with minimal motor vehicle traffic do not usually require separate facilities.

Figure 1 **Transportation Funding Sources** (Puentes and Prince, 2003)



About 40% of highway funding is from general taxes and bonds. User funding is declining because legislators are reluctant to raise fuel taxes and vehicle fees.

General tax funds are also spent on various traffic services, such as policing, emergency services, and subsidized parking facilities. A typical household pays several hundred dollars annually in general taxes to fund roads and traffic services, as indicated in the studies summarized below.

- Traffic services (besides roadway facility costs) are estimated to average 2.8¢ per urban vehicle mile in 1992 dollars, or about 3.8¢ in 2004 dollars (Small, 1992).
- Local governments in the Chicago region spend an average of $130 per registered motor vehicle in general taxes devoted to roads and traffic services (Urbanczyk and Korlett, 1995).
- Public expenditures on highways, roads, streets and traffic services average $413 annually per capita in the Puget Sound region (PSRC, 1996).
- The city of Edmonton spends an average of $291 annually per resident on roads and traffic services (KPMG, 1996).
- Local governments in Wisconsin spent $585 annually per household on local roads and traffic services, only 14% of which originated from user fees (DeCicco and Morris, 1998).

Overall, roadway costs average about 5¢ per vehicle-mile for facilities and about 1¢ per vehicle-mile for traffic services. Larger, faster and heavier vehicles tend to impose higher costs because they require more road space, more complex intersections, more parking space, more maintenance, and more sophisticated traffic management (Urban Institute, 1990; Jones and Nix, 1995; FHWA, 1997; Litman, 2004c). A road system used just for walking and cycling costs far less than what is needed to accommodate motorized traffic.

In addition to road and traffic service costs, 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, environmental damages, and the opportunity cost of land devoted to roads (Litman, 2004c). Motorists benefit from various indirect and hidden subsidies. For example, most zoning codes require the provision of off-street parking for motorists, yet non-drivers receive no comparable benefit. These external costs reflect an economically inefficient and unfair subsidy of driving relative to nonmotorized travel ("Market Principles," VTPI, 2004). Table 3 summarizes estimates of these costs, which indicates that automobile use has external costs averaging about 28¢, while cycling costs average about 1¢, and walking averages just 0.2¢ per mile.

Table 3 **External Costs (Cents per Mile)** ("Transportation Costs," VTPI, 2004)

Cost	Automobile	Bicycle	Walk
Parking Subsidies	10¢	0.2	0
Traffic Congestion	4¢	0	0
Crashes	8¢	0.2	0.2
Environmental Costs	4¢	0	0
Roadway Land Value	2¢	0.6	0
Totals	*28¢*	*1¢*	*0.2¢*

This table summarizes estimates of various external costs of transportation.

It could be considered equitable to allocate funds to each mode based on its level of use (Litman, 2004a). Funding should be based on *person trips* rather than *person miles* so higher speed modes are not subsidized at the expense of lower-speed modes. For example, there is no particular reason that society should subsidize a 50-mile commute trip at a greater rate than a 1-mile commute trip if both get employees to work. Funding based on trips allows pedestrians and cyclist to receive a fair share of public support. As described earlier, nonmotorized travel is much more common than conventional travel surveys indicate and plays a more important role in an efficient transportation system, suggesting that a far greater portion of funding should be devoted to walking and cycling.

Additional funding for nonmotorized transportation improvements can be justified on the grounds that such projects have been underfunded in the past and so additional investments in the future, and because nonmotorized improvements provide multiple benefits. For example, nonmotorized investments can be funded from accounts devoted to improving mobility, reducing congestion, energy conservation and emission reductions, providing basic mobility for non-drivers, improving public health, and supporting urban redevelopment. Because walking and cycling provide both transportation and recreation benefits, expenditures on pedestrian and bicycling improvements can be justified from both transportation accounts and recreation accounts.

Summary of User Costs and Payments

On average, local and regional governments 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. 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 these costs, particularly crash risks, because they are relatively unprotected. A shift from driving to bicycling and walking reduces external costs, providing benefits to society, such as road and parking facility savings, reduced crash risk and congestion delay imposed on other road users, and reduced environmental impacts (Litman, 2004b). This indicates that non-drivers pay more than their share of transportation costs.

For an average household, the costs imposed approximately equals the costs they bear, but people who drive less than average and use nonmotorized modes tend to overpay their share of costs, while those who drive more than average underpay.

The automobile industry has published reports claiming that motorists pay more than their share of costs (Dougher, 1995; Spindler, 1997). However, these studies violate standard cost allocation principles by including all vehicle taxes, including general sales taxes, rather than just user charges, and by considering only *highway* expenditures, ignoring *local roadway* costs and other external costs associated with motor vehicle use ("Evaluating Criticism of TDM," VTPI, 2000). Virtually all studies that use appropriate analysis procedures conclude that motorists significantly underpay the costs they impose on society (FHWA, 1997; Delucchi, 1998; Litman, 2004a).

Example:

Two neighbors each pay $300 annually in local taxes that fund roads and traffic services. Mike Motorist drives 10,000 miles annually on local roads, while Frances Footpower bicycles 3,000 miles. The table below compares the costs they impose with what they pay in taxes.

Table 4 Local Roadway Payments Versus Costs

	Mike	Frances
A. Annual local mileage	10,000	3,000
B. Household's general taxes used for road related services.	$300	$300
C. Motorist user fees spent on local road (0.2¢ per mile).	$24	$0
D. Total road system contribution (B + C)	$324	$300
E. Tax payment per mile of travel (B/A).	3.2¢	10¢
F. Roadway costs (cars = 5.6¢/ml, bicycles = 0.2¢/ml)	$560	$48
Net (D – F)	*Underpays $236*	*Overpays $252*

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

Other Equity Issues

Walking and bicycling provide basic mobility for people who are transportation disadvantaged ("Basic Access," VTPI, 2004). Accommodating nonmotorized travel therefore deserves a higher priority than indicated by simply considering its share of total travel activity.

It is sometimes argued that automobile travel also provides basic mobility, so the costs of roads and traffic services should not be charged to individual users. Even residents who never drive rely on roads for service vehicles, for utility access, and for walking and bicycling. But basic access can be provided by a far cheaper road system than what is needed in automobile dependent areas. Since most current roadway expenditures result from the need to accommodate additional automobile traffic and the wear imposed by motor vehicles, it makes sense to allocate most roadway costs to vehicle users.

Critics of using transportation funds for pedestrian and cycling improvements tend to ignore the direct and indirect benefits that motorists can receive from nonmotorized improvements. Motorists can benefit from reduced traffic and parking congestion, tax savings, reduced crash risk and air pollution, reduced need to chauffer non-driving family and friends, more efficient land use, and increased travel options that they may value in the future ("Evaluating Transportation System Diversity," VTPI, 2004).

Basic fairness suggests that everybody should be able to use public roads without unnecessary restriction or excessive risk, since roads are a valuable public resource and basic mobility is an essential activity. Prohibiting a particular mode from using public roads can be considered as inequitable as excluding a particular racial or ethnic group from using public parks or public restrooms. Similarly, it is unfair to allow ignore the pedestrian and cyclists' needs in facility design and management, resulting in greater travel barriers or risk than other travelers face.

There is inherent inequity in the distribution of crash costs. Although any road user can make a mistake that contributes to an accident, pedestrians and bicyclists are more likely to be injured or killed when a collision occurs. In other words, non-motorized travelers bear a greater share of crash costs than they impose, regardless of who causes a particular crash. This not only causes injuries to pedestrians and cyclists, it also imposes protective costs, such as longer trips or travel foregone. This inequity tends to increase as drivers feel safer due to improved safety features (seat belts, air bags, etc.), resulting in greater risk imposed on vulnerable road users (Chirinko and Harper, 1993; "Takeback Effects," VTPI, 2004).

Highways and motor vehicle traffic by their nature create barriers to walking and bicycling. This is called "community severance" or the "barrier effect." (Litman, 2004c). This occurs because highways are large structures that tend to be difficult for pedestrians and cyclists to cross, particularly when highways carry heavy, high-speed vehicle traffic. Although these impacts can be mitigated by pedestrian crossings, bridges and tunnels, there is usually still a significant increase in crossing time, reduced mobility for non-drivers, and a degradation of the pedestrian and cycling environment.

Bicycles are sometimes considered to cause traffic delays, implying that programs to encourage cycling contradict, rather than support, congestion reduction objectives. But bicycles usually cause less congestion than automobiles (Litman, 2004b). Only on congested roads with narrow lanes, high-speed traffic and no suitable alternative routes are cyclists likely to increase traffic delay, and most cyclists avoid riding in these conditions because it is unpleasant. Conflicts over road space can be considered primarily the fault of motorists, since bicycles require less space than motor vehicles. Of course, other types of vehicles also delay traffic. Trucks, delivery vehicles, farm equipment, and vehicles with elderly drivers probably cause more traffic delays than bicycles. If occasional delay justifies prohibiting cycles, these vehicles should also be banned.

Improved traffic laws enforcement can minimize congestion delays. Slower vehicles (including bicycles) are required to stay to the right side of the roadway, and must get off the roadway, when safe to do so, if they delay five or more vehicles, to let faster vehicles pass. Excessive delay by cyclists therefore indicates that traffic laws are inadequately promoted and enforced, or facility improvements are needed to reduce conflicts.

It is sometimes argued that nonmotorized travel is dangerous and should be discouraged (or at least, should not be encouraged). Walking and cycling tend to have higher fatality rates per mile than motorized travel, but this tends to be offset by the following factors (Litman, 2004b):

- Non-motorized travel imposes minimal risk to other road users.
- Non-drivers tend to travel less than motorists. A short walking or cycling trip often substitutes for a longer motorized trip. A typical motorist drives 5 to 10 times as far each year as a typical non-driver walks and cycles.
- Pedestrian and cyclist risk can be significantly reduced (Pucher and Dijkstra, 2000). Many nonmotorized crashes result, in part, from inexperience or carelessness on the part of pedestrians and cyclists. A responsible and cautious pedestrian or cyclist has significantly lower risk than the overall average.
- Walking and cycling provide significant health benefits that can offset crash risks.

Taking these factors into account, a responsible adult cyclist or pedestrian who follows traffic rules and wears a helmet is estimated here to have a per-trip crash fatality rate that is comparable to that of automobile travel, imposes minimal crash risk on other road users, and significantly increases aerobic health. Per capita pedestrian and cycling accidents tend to decline as nonmotorized travel increases in a community. There is no evidence that walking and cycling by responsible adults increases overall road fatalities or health risk.

Summary

This paper shows that bicyclists and pedestrians have legal, practical and moral rights to use public roads. Nonmotorized travel plays an important role in the transportation system, and provides many benefits to society, including benefits to users, motorists and residents. Nonmotorized modes provides basic mobility for people who are physically, economically and socially disadvantaged. Conventional transportation planning tends to overlook and undervalue nonmotorized transportation.

Pedestrians and cyclists pay more than their fair share of roadway costs. Although most highway expenses are funded through motor vehicle user fees, local roads and traffic services are funded primarily through general taxes that residents pay regardless of their travel habits. Motor vehicle use also imposes a variety of external costs, including parking subsidies, congestion, uncompensated crash damages, and environmental impacts. Pedestrians and cyclists impose much less external costs, due to lower costs per mile, and because they tend to travel fewer miles per year. In general, people who drive less than average overpay their true share of transportation costs, while those who drive more than average underpay. As a result, pedestrians and bicyclists tend to subsidize motorists.

Current transportation investment and management policies tend to favor motor vehicle use at the expense of non-motorized modes. Policy changes to better protect pedestrians and cyclists, and increase non-drivers' mobility tend to increase equity.

References

AASHTO, *Policy on Geometric Design of Highways and Streets*, American Association of State Highway and Transportation Officials (www.aashto.org), 1994.

ADONIS, *Best Practice to Promote Cycling and Walking* and *How to Substitute Short Car Trips by Cycling and Walking*, ADONIS Transport RTD Program, European Union (www.cordis.lu/transport/src/adonisrep.htm), 1999.

Robert Cervero and Carolyn Radisch, *Travel Choices in Pedestrian Versus Automobile Oriented Neighborhoods*, UC Transportation Center, UCTC 281 (www.uctc.net), 1995.

Robert Chirinko and Edward Harper, Jr., "Buckle Up or Slow Down? New Estimates of Offsetting Behavior and their Implications for Automobile Safety Regulation," *Journal of Policy Analysis and Management*, Vol. 12, No. 2, 1993, pp. 270-296.

The *Cornell Law Website* (www.law.cornell.edu/topics/state_statutes.html) has U.S. traffic laws.

John DeCicco and Hugh Morris, *The Costs of Transportation in Southeastern Wisconsin*, American Council for an Energy-Efficient Economy (www.aceee.org), 1998.

Mark Delucchi, *Annualized Social Cost of Motor-Vehicle Use in the U.S., 1990-1991; Report #7*, Institute of Transportation Studies (www.uctc.net), 1998;

Royola Dougher, *Estimates of the Annual U.S. Road User Payments Versus Annual Road Expenditures*, American Petroleum Institute (Washington DC), 1995.

FHWA, *Highway Statistics 2002*, Federal Highway Administration (www.fhwa.dot.gov), 2003.

FHWA, *1997 Federal Highway Cost Allocation Study*, USDOT (www.ota.fhwa.dot.gov/hcas/final), 1997.

Paul Hill, *Bicycle Law and Practice*, Bicycle Law Books (Falls Church), 1986.

ITE, *Uniform Vehicle Code*, ITE (www.ite.org), 1992.

Joseph Jones and Fred Nix, *Survey of the Use of Highway Cost Allocation in Road Pricing Decisions*, Transportation Association of Canada (www.tac-atc.ca), August 1995.

KPMG, *The Cost of Transporting People in the City of Edmonton*, Transportation Department (Edmonton), 1996.

LawGuru, *Internet Law Library* (www.lawguru.com/ilawlib/17.htm), 2004.

LAW, *How to Repeal a Mandatory Sidepath Law*, League of American Bicyclists (www.bikeleague.org), 1995.

Todd Litman, "Measuring Transportation: Traffic, Mobility and Accessibility," *ITE Journal* (www.ite.org), Vol. 73, No. 10, October 2003, pp. 28-32, available at www.vtpi.org.

Todd Litman, *Economic Value of Walkability*, VTPI (www.vtpi.org), 2004a.

Todd Litman, *Quantifying the Benefits of Nonmotorized Transport for Achieving Mobility Management Objectives*, VTPI (www.vtpi.org), 2004b, previously "Bicycling and Transportation Demand Management," *Transportation Research Record 1441*, 1994, pp. 134-140.

Todd Litman, *Transportation Cost and Benefit Analysis Guidebook*, VTPI (www.vtpi.org), 2004c. Also see "Transportation Costs" in the VTPI *Online TDM Encyclopedia* (www.vtpi.org).

MassBike, *Laws Pertaining to Bicyclists*, Bike, MassBike (www.massbike.org/bikelaw/bikelaw.htm), 2004.

PSRC, *The Costs of Transportation; Expenditures on Surface Transportation in the Central Puget Sound Region for 1995*, Puget Sound Regional Council (www.psrc.org/costs.pdf), 1996.

John Pucher and Lewis Dijkstra, "Making Walking and Cycling Safer: Lessons from Europe," *Transportation Quarterly*, Vol. 54, No. 3, Summer 2000, available at www.vtpi.org.

Robert Puentes and Ryan Prince, *Fueling Transportation Finance: A Primer on the Gas Tax*, Center on Urban and Metropolitan Policy, Brookings Institute (www.brookings.edu/es/urban), 2003.

Piet Rietveld, "Nonmotorized Modes in Transport Systems: A Multimodal Chain Perspective for The Netherlands," *Transportation Research D*, Vo. 5, No. 1, Jan. 2000, pp. 31-36.

Ken Small, *Urban Transportation Economics*, Harwood (Chur), 1992.

SWCP, *Uniform Vehicle Code Section Pertaining to Bicycling: CHAPTER 11 - UVC: Rules of the Road - Pt. 3*, Southwest Cyberport (www.swcp.com/~nmts/laws/UVCBicycles.htm), 2004.

Z. A. Spindler, *Automobiles in Canada; A Reality Check*, Canadian Automobile Association. (www.caa.ca), 1997.

Kenneth Todd, "Pedestrian Regulations in the United States: A Critical Review," *Transportation Quarterly*, Vol. 45, No. 4, October 1992.

Urban Institute, *Rationalization of Procedures for Highway Cost Allocation*, Trucking Research Institute (Washington DC), 1990.

David Urbanczyk and Jeanette Corlett, *The Cost of Driving in the Chicago Metropolitan Region*, Metropolitan Planning Council (Chicago), Working Paper No. 2, 1995.

VTPI, *Online TDM Encyclopedia*, VTPI (www.vtpi.org), 2000.

Martin Wachs, *Improving Efficiency and Equity in Transportation Finance*, The Brookings Institute (www.brook.edu), 2003.

Michael Wright, "Transportation Language Policy", memo, West Palm Beach, Florida, 14 November 1996.