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"Efficiency - Equity - Clarity"

Economic Value of Walkability

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ABSTRACT

This paper describes ways to evaluate the value of walking (the activity) and walkability (the quality of walking conditions, including safety, comfort and convenience). Walking and walkability provide a variety of benefits, including basic mobility, consumer cost savings, cost savings (reduced external costs), efficient land use, community livability, improved fitness and public health, economic development, and support for equity objectives. Current transportation planning practices tend to undervalue walking. More comprehensive analysis techniques, described in this paper, are likely to increase public support for walking and other nonmotorized modes of travel.

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INTRODUCTION

What is more important, driving or walking? Conventional transportation planning practices suggest that personal motor vehicle travel is far more important than walking, representing about fifty times as many person-miles as nonmotorized travel. From a conventional planning perspective, walking (the activity) is a minor mode of travel, and walkability (the quality of walking conditions, including safety, comfort and convenience) deserves only modest public support.

But consider another perspective. Would you rather lose your ability to drive or your ability to walk? Being able to drive, although useful, is less essential than the ability to walk. With a little planning, a physically-able non-driver can engage in most common activities, but being unable to walk affects nearly every aspect of life, creating barriers to employment, recreation and social activities.

Homo sapiens are walking animals. Walking is a fundamental activity for physical and mental health, providing physical exercise and relaxation. It is a social and recreational activity. Environments that are conducive to walking are conducive to people. Walking is also a critical component of the transportation system, providing connections between homes and transit, parking lots and destinations, and within airports. Often, the best way to improve another form of transportation is to improve walkability.

This high value placed on driving and low value placed on walking in conventional planning reflects how transport is measured (Litman, 2003). Most travel surveys undercount nonmotorized travel because they ignore short trips, non-work travel, travel by children, recreational travel, and nonmotorized links. For example, most travel surveys classify "auto-walk," or "walk-transit-walk" trips simply as "auto" or "transit" Walking links are often ignored even if they take place on public rights-of-way and involve as much time as motorized links. 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. This pattern is probably similar in other countries.

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 try to count all nonmotorized travel, although participants often have trouble recording short walking trips. 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, which used more conventional survey methods. One study found that the actual number of nonmotorized trips is six times greater than indicated by conventional surveys (Rietveld, 2000). 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, as indicated in Table 2. If measured simply in terms of distance, walking seems insignificant. But walking represents a quarter of all trips and a significant portion of the total time people spend traveling. Walking conditions therefore have a major impact on how people perceive the transportation system, since we experience activities by the amount of time they take, not just distance traveled.

Table 2 **Average Annual Travel By Mode** (DfT, 2003)

	Travel		**Travel Time**		**Trips**	
	Miles	*Percent*	*Hours*	*Percent*	*Trips*	*Percent*
Walk	**192**	**2.8%**	**64**	**18%**	**245**	**25%**
Bicycle	34	0.5%	5	1.3%	14	1.5%
Motorcycle/Moped	36	0.5%	1	0.4%	3	0.3%
Car or Truck Driver	3,466	51%	140	39%	401	41%
Car or Truck Passenger	2,047	30%	82	23%	226	23%
Other private vehicles	162	2.4%	7	1.9%	8	0.8%
Public Transit	897	13%	62	17%	92	9.3%
Totals	*6,833*	*100%*	*361*	*100%*	*990*	*100%*

Walking represents just 2.8% of personal mileage, but a much larger portion of travel time and trips.

This tendency to undervalue nonmotorized travel can be particularly harmful because transportation decisions often involve tradeoffs between different travel modes (Litman, 2003b). Wide roads, high traffic speeds and large parking facilities create barriers to walking, so evaluation practices that undervalue walking tend to create automobile dependent communities ("Evaluating Nonmotorized Transportation," VTPI, 2004).

Transportation planners have standard ways to evaluate motor vehicle traffic conditions and improvements. For example, computer models such as the *Highway Design and Maintenance Model* (World Bank) and *MicroBENCOST* (TTI, 1997) calculate the monetized (measured in monetary units) value of vehicle operating cost savings, safety benefits and travel time savings from roadway improvements. This information helps justify roadway projects. Walkability is not as easily quantified and so tends to be undervalued in planning decisions. This:

- Shifts resources from walking facilities to roads and parking.
- Favors automobile-oriented land use patterns (wide roads, generous parking, low density, single-use) over pedestrian-oriented development.
- Undervalues traffic management practices that support walking, such as traffic calming.
- Undervalues pedestrian safety investments.

To their credit, many transportation professionals support walking more than is justified by their own evaluation practices. They intuitively know that transport diversity in general, and walking in particular, are important to society and so favor walkability improvements. Although most travel surveys indicate that only about 5% of trips are by walking, many local transportation agencies devote 10-15% of their resources to nonmotorized facilities and services. However, this occurs despite, rather than as a result of, conventional transportation survey data and evaluation methods.

This is a timely issue because there is growing interest in walking as a form of transport, increased recognition of the benefits of transportation diversity (Litman, 2001a), and support for creating more walkable communities. Better tools for evaluating walkability can help with many transportation and land use planning decisions (Sælensminde, 2002; Litman, 2002).

This paper investigates the value of walking (the activity) and walkability (the quality of walking conditions, including factors such as the existence of walking facilities and the degree of walking safety, comfort and convenience). It identifies categories of economic benefits, describes how they can be measured, and the degree to which these are reflected in current transportation and land use planning. This paper can only provide a general review of these issues – more research is needed to create practical tools that can be used by transport planners to quantify the full benefits of walkability.

Most analysis in this paper applies to any form of nonmotorized transportation, including cycling and skating and wheelchair use. For simplicity I use the term “walking” and “walkability”, but readers may wish to substitute “nonmotorized travel” and “nonmotorized travel conditions” to be more inclusive.

WHY WALKING IS UNDERVALUED

There are several reasons that walking and walkability tend to be undervalued in conventional transport planning. Some of these are discussed below.

Difficult to Measure

Walking tends to be more difficult to measure than vehicle travel, and walkability tends to be more difficult to evaluate than motor vehicle traffic. As mentioned earlier, travel surveys often collect little information on total walking activity, and it is relatively easy to count vehicles, measure traffic speeds and incorporate vehicle travel into travel models. Walking is given little attention in most travel models. As a result, most walking is invisible to transportation planners. However, travel surveys can collect more detailed information on nonmotorized travel (for example, asking respondents to identify any walking trip on public right-of-way), and in recent years new techniques have been developed to better evaluate walkability ("Evaluating Nonmotorized Transport," VTPI, 2004).

Low Status

Walking is generally considered a lower status activity compared with motorized travel. Civic leaders and transportation professionals generally prefer to be associated with improvements to air travel, driving conditions, and major transit service, since they are perceived as more important. Because it is used by lower-income people, walking tends to be stigmatized while motorized transport tends to be associated with success and progress.

Low Cost

One of the reasons that walking tends to be overlooked is that it is so inexpensive. As a result there is not an organized walking industry as with automobile, transit and air transport, and there is little dedicated funding. Improved walkability can provide consumer cost savings, but such avoided costs are difficult to predict and are often given little consideration.

"Will Take Care of Itself"

Decision-makers often seem to assume that walking can take care of itself. For example, it is possible to walk along most roads, either in the roadway or on dirt paths that develop along road shoulders, even if they lack sidewalks and paths. As a result, many new communities are built without sidewalks, and few communities devote significant resources to upgrading walkability in built-up areas. Such insensitivity to walking conditions is misplaced: areas with poor walkability tend to have significantly less walking and more driving than more walkable areas.

CATEGORIES OF ECONOMIC IMPACTS

Economics refers to the allocation of valuable resources. This can include both market resources (money, labor and land) and nonmarket resources (safety, clean air, wildlife habitat and aesthetic features). *Economic impacts* refers to benefits and costs, that is, an increase or reduction in resource value.

This section describes major categories of economic impacts associated with walking, the degree to which they are recognized in current transport evaluation, and how they can be evaluated (Litman, 2002a; "TDM Evaluation," VTPI, 2004; Litman, 2004a). The report, *Evaluating Public Transit Benefits and Costs* (Litman, 2004b) provides similar analysis for transit economic evaluation, which provides a model and useful information for evaluating non-motorized transportation.

Accessibility

Accessibility (or just *Access*) refers to the ability to reach desired goods, services and activities (Litman, 2003b). Walking is an important form of access, both by itself and in conjunction with other modes (transit, driving, air travel, etc.). Walking provides basic mobility, that is, many people rely on walking to access activities with high social value, such as medical services, essential errands, education and employment ("Basic Mobility," VTPI, 204). It is particularly important for people who are transportation disadvantaged (people with disabilities, elders, children, and people with low incomes). Poor walking conditions can contribute to *social exclusion*, that is, the physical, economic and social isolation of vulnerable populations. Pedestrian access to public transit is an important accessibility factor.

Evaluation Methods

Several methods can be used to evaluate walkability, taking into account the quality of pedestrian conditions and the geographic distribution of destinations (FDOT, 2002; "Evaluating Nonmotorized Transportation," VTPI, 2004). Accessibility can be evaluated using resident surveys, field surveys and Geographic Information Systems (GIS) to determine the portion of important destinations (medical services, shops, schools, jobs, government offices, etc.) that can be conveniently reached by walking or walk-transit-trips, particularly by disadvantaged populations. The value of marginal changes in walking conditions can be quantified using contingent valuation surveys to determine the value people place on improved pedestrian accessibility, and cost savings compared with other access options (such as driving).

Consumer Cost Savings

Walkability affects consumer transport costs. Good walking conditions allow consumers to save on vehicle expenses. For example, one study found that households in automobile-dependent communities devote 50% more to transportation (more than $8,500 annually) than households in communities with more accessible land use and more multi-modal transportation systems (less than $5,500 annually) (McCann, 2000).

Evaluation Methods

Consumer savings from improved walkability can be evaluated based on potential transportation cost savings. For example, walkability improvements that allow more people to walk or ride transit, rather than drive, can reduce vehicle ownership and operating costs.

At a minimum, shifting reduced driving saves fuel and oil, which typically total about 10-15¢ per vehicle-mile reduced, and more under congested conditions. Vehicle operating cost savings can be particularly large because walking tends to substitute for short trips when vehicle engines are cold, during which they are less efficient. In addition, depreciation, insurance and parking costs are partly variable, since increased driving increases the frequency of vehicle repairs and replacement, reduces vehicle resale value, and increases the risks of crashes, traffic and parking citations. These additional mileage-related costs typically average 10-15¢ per mile, so cost savings total 20-25¢ per mile reduced. Savings are greater if improved travel options allows a household to own fewer vehicles. Potential savings are summarized in the table below.

Table 3 **Potential Vehicle Cost Savings** ("Vehicle Costs," VTPI, 2003)

Category	Description	How It Can Be Measured	Typical Values
Vehicle Operating Costs	Fuel, oil and tire wear.	Per-mile costs times mileage reduced.	10-15¢ per vehicle-mile. Higher under congested conditions.
Long-Term Mileage-Related Costs	Mileage-related depreciation, mileage lease fees, user costs from crashes and tickets.	Per-mile costs times mileage reduced.	10¢ per vehicle-mile.
Special Costs	Tolls, parking fees, Parking Cash Out, PAYD insurance.	Specific market conditions.	Varies.
Vehicle Ownership	Reductions in fixed vehicle costs.	Reduced vehicle ownership times vehicle ownership costs.	$3,000 per vehicle-year.
Residential Parking	Reductions in residential parking costs due to reduced vehicle ownership.	Reduced vehicle ownership times savings per reduced residential parking space.	$100-1,200 per vehicle-year.

Reducing automobile travel can provide a variety of consumer savings. (2001 U.S. dollars).

The "Costs of Driving" chapter of the *Online TDM Encyclopedia* (VTPI, 2004), the "Vehicle Costs" chapter of *Transportation Cost and Benefit Analysis* (Litman, 2004a), and *Evaluating Public Transit Benefits and Costs* (Litman, 2004b) provide additional information on potential cost savings.

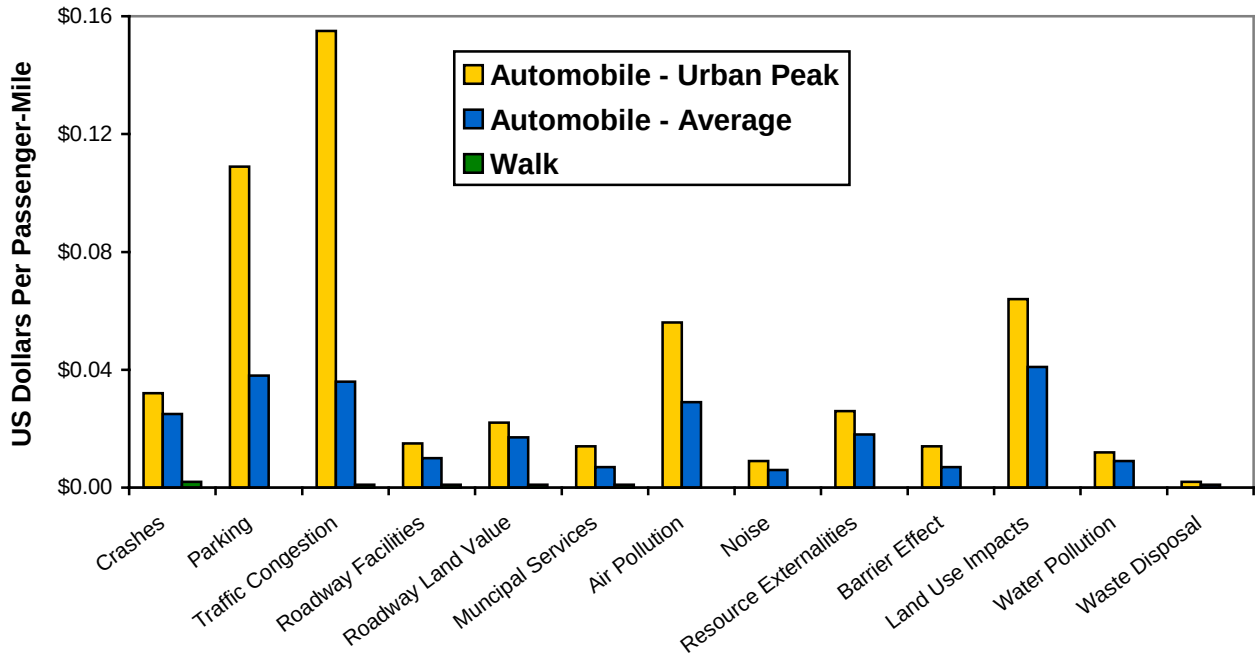
Public Cost Savings (Reduced Transport Externalities)

Motor vehicle use imposes various public costs for road and parking facilities, traffic congestion, crash risk, and environmental damages (Murphy and Delucchi, 1998; Litman, 2000). Shifting travel from motorized to non-motorized modes reduces these external costs. Walking substitutes for relatively short vehicle trips, which tend to have high costs per vehicle-mile. In particular, energy consumption and pollution emissions are several times higher than average for short trips when engines are cold, and parking costs are high when measured per vehicle-mile, since these costs are divided into few miles. A short walking trip often substitutes for a longer motor vehicle trip. As a result, each percentage shift of vehicle trips to walking can reduce transport external costs by several percentage points, particularly under urban-peak conditions when emission and parking costs are high.

Evaluation Methods

A variety of methods are used to calculate the external cost savings that result when travel shifts from driving to non-motorized modes (Litman, 2004a). Figure 1 illustrates one comparison of the estimated external costs of driving and walking. Shifting travel from driving to walking can help reduce various external costs, providing savings estimated to average approximately 25¢ per vehicle-mile reduced, and 50¢ per vehicle-mile reduced under urban-peak conditions.

Figure 1 **Estimated External Costs of Automobile Travel and Walking** (Litman, 2004a)



This figure compares the estimated external costs of automobile and pedestrian travel. Shifting from driving to walking provides savings averaging approximately 25¢ per vehicle-mile reduced, and 50¢ per vehicle-mile reduced under urban-peak conditions.

Land Use Efficiency

Low-density development with large amounts of land paved for roads and parking imposes various economic, social and environmental costs (Appleyard, 1981; Burchell, 1998; Litman, 2002; "Land Use Evaluation," VTPI, 2004). Walkability improvements can help reduce these costs by reducing the amount of land required for transport facilities and encouraging more accessible, clustered land use patterns, and supporting Smart Growth development patterns (Ewing, Pendall and Chen, 2002; "Smart Growth," VTPI, 2004). This provides economic, social and environmental benefits.

Evaluation Methods

There are many factors to consider when evaluating the impacts of transportation decisions on land use patterns. Evaluating these impacts requires:

1. An understanding of how transportation in general, and walkability in particular, affect land use patterns (Litman, 2002; "Land Use Impacts on Transportation," VTPI, 2004). Compared with driving, walking requires far less space for travel and parking, does not require building setbacks to mitigate traffic noise, and encourages more clustered development patterns. As a result, walkable communities can devote less land to pavement and tend to result in higher development densities than is common with more automobile-oriented transport systems, reducing per capita land consumption.
2. An understanding of the economic impacts of different types of land use patterns, including the economic, social and environmental benefits from reduced impervious surface (Arnold and Gibbons, 1998) and more clustered development patterns (USEPA, 1999). The table below summarizes various land use benefits from improved walkability. Not every walkability improvement provides every one of these benefits, but in general, a more walkable community will achieve most of them.

Table 4 **Land Use Benefits of Improved Walkability**

Economic	Social	Environmental
Improved accessibility, particularly for non-drivers. Reduced transportation costs. Increased parking efficiency (parking facilities can serve more destinations). Can increase local business activity and employment. Support for transit and other alternative modes. Special support for some businesses, such as walking tourism. Health cost savings from improved exercise.	Improved accessibility for people who are transport disadvantaged. Reduced external transportation costs (crash risk, pollution, etc.). Increased neighborhood interaction and community cohesion. Improved opportunities to preserve cultural resources (e.g., historic buildings). Increased exercise.	Reduced land needed for roads and parking facilities. Openspace preservation. Reduced energy consumption and pollution emissions. Improved aesthetics. Reduced water pollution. Reduced "heat island" effects.

This table summarizes various benefits from a more walkable community.

Community Livability

Description

Community Livability refers to the environmental and social quality of an area as perceived by residents, employees and visitors (Weissman and Corbett, 1992; "Livability," VTPI, 2004). This includes safety and health (traffic safety, personal security, public health), local environmental quality (cleanliness, noise, dust, air quality, water quality), community cohesion (neighborliness, respect, community identity), opportunities for recreation and entertainment, aesthetics, and the existence of unique cultural and environmental resources (e.g., historic structures, mature trees, traditional architectural styles).

Walkability has major impacts on community livability. Streets are a major portion of the public realm, that is, places where people interact with their community. More attractive, safe and walkable streets increase community livability (Forkenbrock and Weisbrod, 2001). Residents on streets with higher traffic volumes and speeds are less likely to know their neighbors, and show less concern for their local environment, than residents on streets with less vehicle traffic (Appleyard, 1981).

Evaluation Methods

Community livability provides a variety of direct and indirect benefits. It can affect property values and business activity in an area, which can be measured with various techniques such as hedonic pricing and contingent valuation (Hanley and Spash, 1993; LGC, 2001; Litman, 2004a). This may not reflect total livability benefits, since benefits to non-residents are not necessarily reflected in property values. The value of walkability varies, depending on several factors:

- Pedestrian-friendly, new urbanist community design tends to increase property values (Eppli and Tu, 2000).
- In automobile dependent areas, sidewalks may have little effect on adjacent property values.
- Reduced vehicle traffic can increase adjacent property values, in part, because it improves walking safety and comfort (Bagby, 1980).
- Proximity to public trails often increases residential and commercial property values (NBPC, 1995).

To the degree that improved walkability increases community cohesion, it may help reduce crime and other social problems in an area (Litman, 2002). However, such relationships are difficult to measure and walkability is just one of many related factors that affects community cohesion.

Health

Physical Activity refers to physical exercise. Inadequate physical activity is a major contributor to health problems. Health experts recommend at least 30 minutes of moderate exercise a day, at least 5 days a week, in intervals of ten-minutes or more (Surgeon General, 199).

Diseases Associated With Physical Inactivity (Killingsworth and Lamming, 2001)

- Heart disease
- Hypertension
- Stroke
- Diabetes
- Obesity
- Osteoporosis
- Depression
- Some types of cancer

An increasing portion of the population, including many children, lack regular physical activity. Although there are many ways to be physically active, walking is one of the most practical ways to increase physical activity among a broad population. Walking tends to be particularly important for elderly, disabled and lower-income people who have few opportunities to participate in sports or formal exercise programs. Health experts believe that more balanced transportation systems can contribute to improved public health by accommodating and encouraging active transportation (Sallis, et al, 2004).

The health benefits of increased walking and improved walkability are potentially large ("Health and Fitness," VTPI, 2004). Cardiovascular diseases are the leading causes of premature death and disability in developed countries, causing ten times as many lost years of productive life as road crashes (Murray, 1996). Even modest reductions in these illnesses could provide significant health benefits.

Walking has a relatively high crash fatality rate per mile of travel, but this is offset by reduced risk to other road users and by the fact that pedestrians tend to travel less overall than motorists (for example, a walking trip to a local store often substitutes for a longer car trip to a more distant shopping center). International research suggests that shifts to nonmotorized transport increases road safety overall ("Safety Evaluation," VTPI, 2004). For example, the Netherlands has a high level of nonmotorized transport, yet per capita traffic deaths and the cyclist death rate per million km ridden is much lower than in more automobile dependent countries (Pucher and Dijkstra, 2000).

Evaluation Methods

Public surveys can be used to determine the degree that people in an area rely on walking for exercise, and the degree to which improved walkability would increase physical activity by otherwise sedentary people. More research is needed to determine how changes in walkability affect physical activity and public health.

Economic Development

Economic Development refers to progress toward a community's economic goals, including increases in economic productivity, employment, business activity and investment. Walkability can affect economic development in several ways (LGC, 2001).

Retail and employment centers are affected by the quality of their pedestrian environment, particularly in urban areas and resort communities. The popularity of retail malls, suburban office campuses, and pedestrian-oriented resort communities are indications of the high values that consumers place on pedestrian environmental quality. A shopping center or office complex may become more economically competitive if walking conditions improve. Pedestrianized commercial districts ("Mainstreets") can be important for urban revitalization, although they must be carefully implemented to be effective (Tyler, 1999; Bohl, 2002; "Downtowns," VTPI, 2004).

Expenditures on fuel and vehicles tend to provide relatively little employment and business activity compared with other common consumer expenditures ("TDM and Economic Development," VTPI, 2004; Litman, 2004b). Walking that substitutes for driving, and therefore reduces fuel consumption and dependency on fuel and vehicles imported from other regions tends to provide economic development benefits.

Evaluation Methods

Walkability can affect economic development in several ways, each must be considered separately (Litman, 2002; "TDM and Economic Development," VTPI, 2004). Market surveys and property assessments can be used to identify how walkability factors affect commercial activity (such as retail sales), consumer satisfaction, competitiveness, employment, tax revenue, and property values in an affected area. Economic analysis techniques using input-output tables can be used to determine how changes in consumer expenditures affect regional employment and business activity (Weisbrod, 2000).

Equity

Equity refers to the distribution of resources and opportunities. Transport decisions can affect equity in various ways. There are several different equity issues, including *horizontal equity* (which assumes that people should generally be treated equally), and *vertical equity* (which assumes that society should provide extra support to disadvantaged people) ("Equity Evaluation," VTPI, 2004).

Walkability can help achieve several equity objectives, including a fair distribution of public resources for non-drivers, financial savings and improved opportunity for lower-income people, increased accessibility to people who are transportation disadvantaged, and providing basic mobility.

Evaluation Methods

Because there are different types of equity, a variety of factors should be considered when evaluating transportation equity impacts. The table below describes five equity indicators that can be used to evaluate the overall equity impacts of changes in walkability.

Table 5 **Equity Summary** ("Equity Evaluation," VTPI, 2004)

Indicator	Description
Treats everybody equally.	This reflects whether a policy treats each group or individual equally.
Individuals bear the costs they impose	This reflects the degree to which user charges reflect the full costs of a transportation activity.
Progressive with respect to income	This reflects whether a policy makes lower-income households better or worse off.
Benefits transportation disadvantaged	Whether a policy makes people who are transportation disadvantaged better off by increasing their options or providing financial savings.
Improves basic mobility and access	This reflects whether a policy favors more important transport (emergency response, commuting, basic shopping) over less important transport.

This table describes five indicators of transportation equity that can be used when evaluating walkability equity impacts.

The most practical approach to evaluating equity impacts is to define equity objectives and performance indicators, and then evaluate the degree to which a particular policy or project helps achieve them ("Transportation Planning," VTPI, 2004). Equity benefits are difficult to monetize (there is no easy way to add equity benefits to other benefits such as vehicle cost savings or increased property values), but most communities seem to place a high value on achieving equity objectives (Forkenbrock and Weisbrod, 2001).

SUMMARY OF ECONOMIC IMPACTS

Table 6 summarizes the categories of economic benefits described above that should be considered when evaluating walking. In most situations, several impacts should be considered, with results added to determine total benefits. For example, a particular walkability improvement may improve accessibility, provide consumer cost savings, increase community livability (and therefore local property values), improve public fitness and health, benefit the local economy (increasing employment, tax revenue and property values), and support strategic land use and equity objectives. The project's full value is the sum of these individual benefits.

Table 6 **Walkability Economic Impacts**

Name	Description	Measuring Techniques
Accessibility	Degree that walking provides mobility options, particularly for people who are transportation disadvantaged.	Travel modeling, analysis of travel options.
Consumer cost savings	Degree to which walking provides consumer transportation cost savings.	Consumer expenditure surveys
Public cost savings (reduced external costs)	Degree that walking substitutes for vehicle travel and reduces negative impacts.	Determine to what degree walking reduces motor vehicle travel, and the economic savings that result.
Efficient land use	Degree that walking helps reduce the amount of land used for roadway and parking facilities, and helps create more accessible, clustered land use.	Identify the full economic, social and environmental benefits of more pedestrian-oriented land use.
Livability	Degree that walking improves the local environment.	Property values, business activities, consumer preference surveys.
Public fitness and health	Degree that walking provides physical exercise to people who are otherwise sedentary.	Travel and health surveys to determine the number of people who benefit from walking exercise.
Economic development	Degree to which walking makes commercial areas more attractive and shifts consumer expenditures to goods that provide more regional economic activity and employment.	Market surveys and property assessments. Input-output table analysis.
Equity	Degree that walkability helps achieve various equity objectives.	Various indicators of horizontal and vertical equity.

This table summarizes various categories of impacts to consider when evaluating walking.

PLANNING APPLICATIONS

The value of walkability can be incorporated into transport planning decisions in various ways, reflecting various perspectives and assumptions. Three approaches are described below.

Proportional Share

One approach that many people seem to consider fair and efficient is to allocate transport resources (money, land, public services, etc.) based on each mode's share of travel activity. For example, a mode which represents 2% of travel should receive about 2% of resources, and a mode which represents 20% of travel should receive 20% of resources.

As discussed earlier in this paper, conventional travel surveys undercount walking. Although only about 5-10% of trips are made completely by walking, 15-30% of urban trips involve at least one walking link. By this measure, a major share of transport resources should be devoted to walking.

Walking only represents a small portion of total person-mileage. However, a short walking trip often substitutes for a longer automobile trip. For example, consumers may choose between walking to a nearby store or driving to a supermarket. Motorists tend to travel far more (about 3 times as much on average) as non-motorists. There is no obvious reason that society should subsidize automobile trips and motorists at a greater rate than walking trips and non-drivers.

It is difficult to know exactly what portion of transport funds are devoted to non-motorized facilities, since this is not usually separated in transportation budgets. Local governments devote a relatively large portion of infrastructure funds to walking facilities, perhaps 5-15% of transportation agency budgets, and somewhat more if recreational trail expenditures are also included. However, other levels of government provide much less support. For example, the state of Oregon is considered a leader in nonmotorized planning because it devotes 2% of state transport funds to walking and cycling facilities. Most states probably spend less than 1% of their transport budgets on walking facilities. The table below illustrates the estimated portion of transport expenditures devoted to walking, using upper-bound values (actual numbers are probably smaller). By this estimate, walking receives somewhat less than its proportion of trips as measured by conventional travel studies, and far less than indicated by more comprehensive counts.

Table 7 **U.S. Roadway Expenditures** (Based on FHWA, 2000)

	Roadway Expenditures (billions)	**Walking Facility Expenditures** (billions)	**Estimated Portion Devoted To Walking**
Federal	$30.8	$0.8	2.5%
State	$66.4	$0.7	1%
Local	$31.3	$3.1	10%
Totals	*$128.5*	*$4.6*	*3.5%*

This table shows the estimated portion of roadway expenditures devoted to walking. About 10% of the federal transportation budget is devoted to "Enhancements," of which about half is spent on Bike/Ped projects. Assuming half of this is devoted to walking, this represents 2.5%.

This discrepancy between the portion of travel by walking and the portion of resources devoted to walking becomes far larger when other public resources devoted to transport are included, such as expenditures on parking facilities and traffic services, and the opportunity cost of public lands devoted to roadways.

There are many reasons to criticize the assumption that each mode should receive its proportional share of transport resources. It is backward looking, reflecting the transportation patterns resulting from past decision, rather than forward looking, reflecting the transportation system society wants in the future. Some modes provide special social benefits, bear special costs, or reduce externalities. There are several reasons that walkability improvements might deserve *more* than a proportional share of transportation resources:

- As described earlier, walking provides basic mobility and serves trips with high social value.
- Walking is particularly important for people who are transportation disadvantaged. Walkability improvements provide equity benefits, and bear special costs associated with serving people with disabilities.
- Some walking facility improvements can be included in other transport budgets (e.g., transit facilities, airports, parking facilities, ferry terminals, etc.) because they serve these modes.
- Walking provides both transportation and recreation benefits. It therefore deserves funding from both transportation and recreation budgets. For example, it may be appropriate to devote 10% of a jurisdiction's transportation budget *and* 20% of its recreation budget to pedestrian facilities.

If we apply the principle that each mode should receive its proportional share of transportation resources, this suggests that walking should receive 10-20% of *total* transportation resources (not just municipal transport agency funds), five to ten times what is currently devoted to walking facilities and services, in addition to a significant share of recreational funding.

Cost Allocation

Transportation cost allocation evaluates to what degree each user group pays its share of transportation facilities and services through special user charges such as road tolls, fuel taxes and vehicle registration fees (FHWA, 1997; Litman, 2004a). This reflects the principles of horizontal equity (consumers should pay for what they get and get what they pay for unless a subsidy is specifically justified), and economic efficiency (prices should equal marginal costs) ("Market Principles," VTPI, 2004).

Many people assume that because motorists pay fuel taxes and other roadway fees, nonmotorized modes underpay their fair share of transportation costs. This is not necessarily true. Although vehicle use fees fund major highways, local roads are funded through general taxes that residents pay regardless of how they travel, and motor vehicles impose other public costs besides roadway expenditures. An average household pays several hundred dollars annually in general taxes for local roads and traffic services, and pays hundreds of dollars in parking subsidies. When all impacts are considered, motorists generally underpay their share of costs, while walking receives less than its fair share of resources (Litman, 1998; Litman, 2004a). The example below illustrates this point.

Example

Two neighbors each pay $300 annually in local taxes that fund transport facilities and services. Mike drives 10,000 miles annually on local roads, while Frances walks 3,000 miles. The table below compares their tax payments and transportation costs.

Table 8 **Local Transportation Payments and 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¢/ml, walking = 0.2¢/ml)	$500	$48
Net (D – F)	*Underpays $176*	*Overpays $252*

Non-drivers pay almost as much as motorists for local transportation facilities and services, but impose lower costs. As a result, they tend to overpay their fair share.

Although an *average* household pays its share of transport taxes, those who drive less than average subsidize their neighbors who drive more than average. These subsidies can be significant, totaling hundreds of dollars annually for somebody who relies primarily on nonmotorized transport. These cross subsidies are far greater when other external motor vehicle costs are also considered, such as public resources devoted to parking facilities, uncompensated crash damages, and environmental damages (Litman, 2004a).

This suggests that applying cost allocation principles, motorists should pay significantly more than they currently do in user fees, and more resources should be devoted to nonmotorized transport facilities or nondrivers should receive tax discounts ("Market Reforms," VTPI, 2004).

Benefit-Cost Analysis

A third approach to evaluating transportation policies and programs, and the approach that is considered best for maximizing efficiency, is benefit-cost analysis (Litman, 2001b). This compares the incremental costs and benefits of a policy or project.

Benefit-cost analysis is applied to individual policies and projects, so it is difficult to make broad conclusions as to what effect its application would have on transport decision making. However, for reasons described below, it is likely that more rigorous application of benefit-cost analysis would tend to increase the resources devoted to walking.

- As described earlier, current transportation planning practices tend to undercount walking. Better counting of walking trips will tend to recognize more demand, and therefore greater potential benefits from walkability improvements.
- Few economic analysis account for the full range of benefits from improved walkability and increased walking described in this paper. More comprehensive analysis is likely to identify greater benefits and so justify greater investments.
- Only recently have nonmotorized evaluation tools been developed, such as pedestrian level-of-service rating. Applying such tools can improve our ability to predict how a particular policy or project will affect nonmotorized travel, which can justify greater investments in walkability.
- There is increasing recognition of the diminishing economic benefits from increased highway investments (Boarnet and Haughwout, 2000; "TDM and Economic Development," VTPI, 2004), the significant social costs of automobile dependency, and the large potential social benefits of a more diverse transportation system (Litman, 2001a).
- There is increasing recognition of the value of smart growth land use management to achieve social objectives ("Smart Growth," VTPI, 2004). These strategies place a high value on walkability.
- Current transportation funding is biased against nonmotorized modes. Only a small portion of total transport funds may be used for nonmotorized facilities, and financial match requirements are sometimes higher. More neutral investment policies would increase the amount of money available for walking.

More comprehensive benefit-cost analysis requires better techniques to measure and predict travel impacts of improved walkability, and to evaluate the full economic impacts that result, including indirect and nonmarket impacts that are not usually quantified in transport planning such as environmental, economic development and equity impacts.

CONCLUSIONS

Conventional transportation planning practices treat walking as a minor transport mode and recognize only modest benefits from improved walkability and increased walking activity. This results from evaluation practices that undercount nonmotorized travel and undervalue walking benefits.

From other perspectives it is clear that walking is a critical component of the transport system, and that improved walkability and increased walking can provide significant benefits to society. Improved walkability increases accessibility, provides consumer and public cost savings, increases community livability, improves public health and supports strategic economic development, land use and equity objectives. A variety of methods can be used to evaluate these impacts.

Conventional planning practices may conclude that walking currently receives a fair and efficient share of transportation resources. However, this reflects an undercounting of walking trips, an undervaluation of walking benefits, and undervaluation of motor vehicle costs. More comprehensive evaluation indicates that walking receives less than its appropriate share of transportation resources, and that walkability improvements can provide a high economic return on investment.

Greater appreciation of the full benefits of walking could change planning priorities. It would justify devoting more government funding to walking facilities and programs, shifting road space from traffic and parking lanes to sidewalks and paths, policies to create more walkable land use patterns, and greater efforts to manage motor vehicle traffic to improve walking safety and comfort. These shifts support and are supported by other transport and land use management reforms that improve transportation options, reduce automobile dependency and create more accessible land use.

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