The Value of Public Transportation

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CONTENTS

SUMMARY

Public transportation has a positive impact on economic development, fiscal and environmental sustainability, healthcare, and quality of life and choice.

- Economic development effects include the creation of jobs; enabling job access; and increasing personal income, property values, business productivity, and state and local government tax revenues.
- Fiscal sustainability effects include reducing personal costs for automobile purchase and maintenance, parking, and congestion, and reducing government costs for roadway maintenance and highway expansion.
- Healthcare effects include improved physical and mental health, a reduction in injuries caused by automobile crashes, safety, and other health-related cost savings.
- Environment effects include reduced energy consumption and carbon emissions.
- People enjoy a better quality of life and more choice with the availability of public transportation.

However, there are some barriers to increasing public ridership, such as negative perceptions about public transit, a car-centric culture, and low population density.

This report examines the benefits of public transportation noted above according to existing research studies.

INTRODUCTION

Currently, Omaha has an impressive public transportation system especially considering how little funding it receives compared to other systems around the country and relatively low population density. According to Bartle and Wellman (2010), in 2008, Metro's funding was $29.52 per capita of Douglas County residents, ranking the metro area 238th among the 280 largest metro areas transit systems in the nation in per capita funding. By comparison, $179 per capita was spent on roads in the city of Omaha in 2002. Metro's expenses for 2013 are estimated to be $27.3 million (MAPA, 2013). Compare this to a recent 41.84-mile highway expansion of I-80 that cost $400 million (NDOR, 2013). Metro serves more than 4 million people a year, about equal to the number of passengers served at Eppley Airfield in 2012 (Verdis, 2012).

Currently 1.4% of commuters in Omaha use public transportation to go to work. This is lower than the U.S. national average, which is 5% of commuters (U.S. Census, 2010). This number does not include people riding the bus for other reasons beyond commuting to work. As the data suggest below, there are many reasons to implement strategies to increase this number.

This report examines the benefits of public transportation according to existing research in several areas: economic development, fiscal and environmental sustainability, healthcare, and quality of life and choice. It also examines some of the barriers to increasing public ridership.[1]

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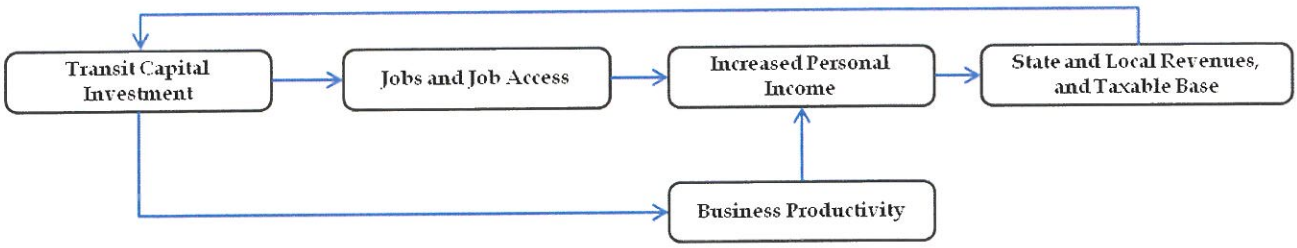
[1] To ensure accuracy, much of the data cited in this report is directly quoted from source material. Where possible, links are provided to data sources.

ECONOMIC DEVELOPMENT

Public transportation has a direct impact on economic development factors in terms of jobs and job access and also an indirect impact on the local economy in terms of increased personal income, business productivity, and increased property value through transit capital investment.[2] The existing literature has focused on what economic factors are affected by transportation investment but not on how those factors have a causal relationship to each other. In Figure 1, the feedback loop is composed of direct impacts (jobs and job access and business productivity) and indirect impacts (increased personal income and State and local revenues and taxable base).

Figure 1. The Impact of Public Transportation on Economic Development



Jobs

Workers are hired to construct and maintain public transportation infrastructure. Research shows public transportation investment directly creates jobs and does so more efficiently than other public infrastructure investments.

- $1 million spent on public transit typically generates 30-60 jobs. A typical set of transit investments creates 19% more jobs than the same amount spent on a typical set of road and bridge projects (Litman, 2013c, p. 63). Road-only projects generate just 7.8 jobs per $1 million (Garrett-Peltier, 2011).
- An average of 36,000 jobs are supported for one year, per billion dollars of annual spending on public transportation operations and capital expenditures. Over 41,000 jobs are supported for a year, for each billion dollars of annual spending on public transportation operations and nearly 24,000 jobs are supported for a year, per billion dollars of spending on public transportation capital (Weisbrod & Reno, 2009, p. ii).
- Every $1 billion invested in public transportation infrastructure supports approximately 47,500 jobs (Cambridge Systematics, 2002, p. 10).
  - In San Diego public transportation's direct contribution to the local economy is $140 million and supports an additional 3,200 jobs (Cambridge Systematics, 2002, p. 10).
  - The Central Ohio Transit Authority constructed the Easton Transit Center and Linden Transit Center for $10 million. 43,000 jobs were estimated to be created when completed (American Institute of Architects and Planners Collaborative, 2006, p. 30).

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[2] Weisbrod and Reno (2009) defined transit capital investment as including project design and construction, purchasing public equipment such as passenger vehicles, and, maintaining public infrastructure.

  - In Los Angeles, a $24 billion investment in capital and $50 billion investment in operating expenditures in public transit over 20 years was estimated to result in a 131,200-261,700 increase in jobs (Cambridge Systematics, 1999, p. 6-18).
- Money spent on vehicles and fuel provides relatively little regional employment or business activity because they are capital intensive and much of their value is imported (Litman, 2013c, p. 64).

Job Access

Commuters use public transportation to access jobs.

- Nationally, the average distance from home to work increased from 9.9 miles in 1983 to 13.3 miles in 2009. The typical job is accessible to about 27 percent of metropolitan workforce by transit in 90 minutes or less (Tomer, 2012, pp. 1-2).
- Work, school (including university and college) and shopping trips account for 75% of all transit trips in the U.S. (Litman, 2013c, p. 20).
  - If public transportation disinvestment occurred in New York City, it is estimated that about 319,800 people would lose their jobs; based on 2016 projections (Cambridge Systematics, 1999, p. 6-18).
  - In Philadelphia, if public transportation was suddenly shut down, there would be an estimated 175,000 loss in employment (Cambridge Systematics, 1999, p. 6-17).
  - Access to public transit is a significant factor in determining average rates of labor participation within Portland and Atlanta (Sanchez, 1999).

Personal Income

Investment in public transit can increase personal income through employment by building public transportation infrastructure and through public transportation operations.

- $1 billion of national investment in capital spending on public transportation produces $1.1 billion in worker income. $1 billion of operations spending produces $1.8 billion in worker income (Weisbrod & Reno, 2009, p. ii).
- Nationally, a sustained program of transit capital investment will generate an increase of $0.8 million in personal income for each $10 million in the short run (during year one). In the long term (during year 20), these benefits increase to $18 million for personal income (Cambridge Systematics, 1999, pp. E-1-E-2).
  - In Philadelphia, if public transportation was suddenly shut down, residents would lose an estimated $10.1 billion in annual personal income (Cambridge Systematics, 1999, p. 6-17).
  - In Los Angeles, a $24 billion investment in capital and $50 billion investment in operating expenditures in public transit over 20 years was estimated to result in a $8.9-16.0 billion increase in personal income (Cambridge Systematics, 1999, p. 6-18).

Property Values

The existing literature shows public transportation investment is associated with increased property values directly and indirectly.

- The general consensus in the literature is that the accessibility benefits of living near transit outweigh the potential nuisance effects, and that proximity to public transit does lead to higher home values and rents in many cases (Wardrip, 2011, p. 2).
- In some parts of the world, high-quality bus-rapid-transit systems can increase property values by as much as 25% (Schmitt, 2013).

- A study of Boston, Chicago, Minneapolis-St. Paul, Phoenix, and San Francisco found that residential sales prices for transit-shed areas outperformed the study region as a whole by 41.6%. Stations with higher levels of transit access saw the most price resilience within and across regions (Becker & Young, 2013, pp. 1-2).
- The Hiawatha Light Rail Line in Minnesota has provided a $5,229 price-advantage to single family homes and $15,755 price-advantage to multifamily homes in areas near rail stations. The light rail line has produced an increase of $47.1 million in residential property value between 2004 and 2007 (Goetz et al., 2010, summary).
- Between 1997 and 2001, Dallas Area Rapid Transit (DART) commercial properties located near stations increased in value 24.7%, while properties not served by rail increased in value by only 11.5%. Values of residential properties near the station rose 32.1% compared with a 19.5% increase for properties not served by rail stations (APTA, 2007, p. 10).
- For homes in Buffalo, NY, every foot closer to a light rail station increases average property values by $2.31 (using geographical straight-line distance) and $0.99 (using network distance) (Hess & Almeida, 2007, p. 1,041).
- A study in the San Francisco Bay Area found that for every meter closer a single-family home was to a BART station, its sales price increased by $2.29, all else being equal. Alameda County homes near BART stations sold on average for 39% more than otherwise comparable ones 20 miles from the nearest station (Cervero et al, 2004, cited in Weisbrod & Reno, 2009, p. 24).
- Studies over two decades show average housing value premiums associated with being near a station (usually expressed as being within 1/4 to 1/2 mile of a station) are 6.4% in Philadelphia, 6.7% in Boston, 10.6% in Portland, 17% in San Diego, 20% in Chicago, 24% in Dallas, and 45% in Santa Clara County (Cervero et al, 2004, cited in Weisbrod & Reno, 2009, p. 24).

Business Productivity

Public transportation improves urban density and enables the transfer of information more easily with others. It also helps to increase business sales, all of which improve business productivity.

- Business productivity improves as "specialized knowledge spreads more quickly through social networks, enhancing human capital and labor productivity in technology and skill industries that benefit from such interaction" (Weisbrod & Reno, 2009, p. 53). In other words, public transportation improves business productivity by increasing urban density and reducing congestion, which enables people to efficiently interact with others in transferring knowledge, skills and services. A 5% increase in effective density translates to an increased productivity of 0.09% or roughly $70 million per year (Weisbrod & Reno, 2009, p. 54).
- $1 billion of national investment in capital spending on public transportation produces approximately $3.6 billion of added business output (sales volume), which provides $1.8 billion of GDP (gross domestic product) (Weisbrod & Reno, 2009, p. ii).
- Every $10 million invested in transit capital projects yields $30 million in business sales while a $10 million investment in transit operations generates $32 million in business sales (Cambridge Systematics, 2002, p. 8). That is, every $1 invested in public transportation returns up to $3 in business sales (APTA, 2010, p. 2).
  - In St. Louis, a 25-year transit modernization plan was expected to generate a $2.3 billion return in business sales (Cambridge Systematics, 2002, p. 8).

  - If public transportation disinvestment occurred in New York City, it is estimated there would be a loss of $18.9 billion in annual business sales; based on 2016 projections (Cambridge Systematics, 1999, p. 6-18).
  - In Philadelphia, if public transportation was suddenly shut down, business sales would drop by $16.3 billion annually, as of 2010 (Cambridge Systematics, 1999, p. 6-17).
  - Business located near the light rail line in Dallas experienced a 33 percent increase in retail sales, compared to 3 percent growth overall in the city (Reconnecting America, 2012, p. 2).
- About 73 percent of the retail price of gas (when it was under $2.00 a gallon) and 86 percent of the retail price of cars immediately leaves the local economy. The money saved by not using car travel translates into more money available to be spent in the local economy (CEO for Cities, 2010, p. 5).

State and Local Revenues and Taxable Base

Public transportation is associated with an increase in personal income and property values as well as the improvement of business productivity (discussed above). Thus, government can expect to collect more income, sales, and property taxes from public transportation investments.

- The $32 billion U.S. public transportation industry generates up to a 6-to-1 net return on investment, which translates into higher revenues for cities and states (Cambridge Systematics, 2002, p. 11).
- Every $1 billion invested in public transit generates nearly $500 million in federal, state, and local tax revenues from added business sales tax volume (APTA, 2012 cited in Reconnecting America, 2012 p. 2).
- A land-use strategy focused on denser, transit-friendly smart growth development would produce 10 times more tax revenues per acre than conventional suburban development (Smart Growth America, 2013, p. 6).
- By investing $1 billion in public transportation, state and local governments could expect $159 million in tax revenues from added corporate, personal, sales, property, and other taxes and fees. Specifically, increases include: sales and property taxes ($82 million), personal income taxes ($36 million), other taxes and fees ($31 million), and corporate profits and dividend taxes ($4 million) (Weisbrod & Reno, 2009, p. 32).
- On average, a typical state orlocal government in the U.S. could realize a 4 to 16 percent gain in revenues due to the increases in income and employment generated by investments in transit (Cambridge Systematics, 1999, p. E-2).
  - Between 1994 and 1998, the increase in the taxable value of properties located near Dallas' DART rail stations was 25% more than elsewhere in the metropolitan area (Cambridge Systematics, 2002, p. 11).
  - Through 2010, Washington's Metrorail system was estimated to generate $2.1 billion in tax revenues for the Commonwealth of Virginia, exceeding the amount of projected public investment (Cambridge Systematics, 2002, p. 11).

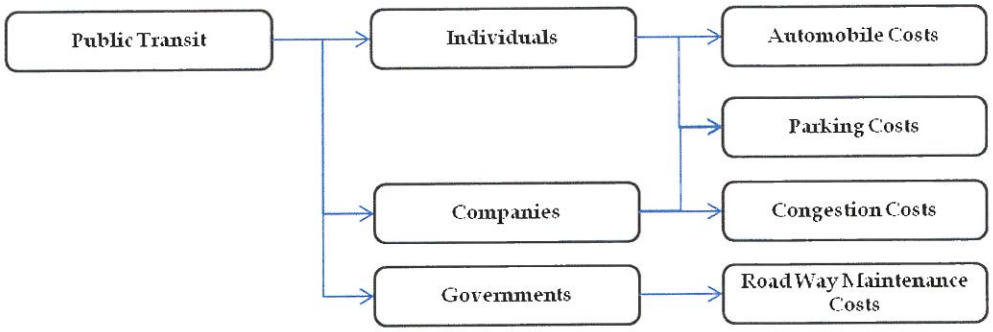
Summary and Conclusion

The literature shows public transportation investment creates jobs and improves job access. These direct impacts generate indirect impacts, such as increased personal income, business productivity, state and local tax revenues, and taxable base. The next section addresses how public transportation contributes to enhancing financial sustainability with costs savings.

FISCAL SUSTAINABILITY & COST SAVINGS

Public transit users can save money by using less gas, reducing maintenance, and not paying for parking. Businesses can also save money with decreased congestion and parking costs. Furthermore, public transit is associated with improved local financial capacity because of a reduction in roadway maintenance costs.

Figure 2. The Impact of Public Transit on Cost savings



Automobile Costs

Auto drivers incur costs to buy a car and pay auto taxes, insurance fees, maintenance costs, and gas. They reduce those costs by using public transportation.

- For every dollar earned, the average U.S. household spends 18 cents on transportation, 94 percent of which is for buying, maintaining and operating cars (APTA, 2007, p. 4).
- In 2009, the average cost to own car in the U.S. was $5,570, including license and registration ($554), depreciation ($3,321), and financing ($758) (Weisbrod & Reno, 2009, p. 47).
  - The estimated annual cost of car ownership in Nebraska was $3,571 based on 2010 data, which is among the 10th most-expensive in the U.S. This includes costs of $1,575 for taxes and fees, $1,069 for gasoline, $580 for insurance, and $347 for repairs (Bankrate, 2013).
- Transit availability can reduce the need for an additional car, a yearly expense of $6,251 in a household budget (APTA, 2007, p. 4).

- The availability of quality public transportation services on a widespread scale[3] lead to 10-20% lower rates of automobile ownership in cities where such services are provided and used. This can lead to savings in terms of annual cost per vehicle, which varies from $4,232 to $6,901/year depending on the type of vehicle. A reduction of 10% automobile ownership for new public transportation passengers who are commuters would lead to a savings of $2.5 billion/year as of the year 2030 (Weisbrod & Reno, 2009, p. 47).
- Shifting from driving to transit saves fuel and oil, which typically total about 10¢ per vehicle-mile reduced. Additional mileage-related costs such as depreciation, insurance, parking, vehicle repairs, risk of crashes, and traffic and parking citations typically average 10-15¢ per mile, so a shift would lead to cost savings of 20-25¢ per mile. Savings may be greater under congested conditions, or where transit users avoid parking fees or road tolls (Litman, 2013c, p. 31).
- A household can save $1,300 per year in a region with a well-established rail system (Litman, 2013c, p. 31).
- Transit riders save about $1,400 in gas per year (APTA, 2007, p. 4).
- In 2008, the U.S. average public transportation fare per trip was $1.12. This is compared to an average cost of $2.93 per automobile trip (not including parking costs), $1.81 over the average cost per public transportation trip. Over the course of a year, a transit user cost savings totals $905 per traveler (Weisbrod & Reno, 2009, p. 46).
  - In Silicon Valley, CA, commuters using the Santa Clara Valley Transit Authority's Altamont Commuter Express spend $2,688 annually to ride the rail compared with $5,282 if they went by car (Cambridge Systematics, 2002, p. 7).
- For every $10 million invested, over $15 million is saved in transportation costs to **both highway and transit users**. These costs include operating costs, fuel costs, and congestion costs (Cambridge Systematics, 1999, p. E-1).

Parking Costs

Commuters, businesses and cities can reduce parking costs due to public transit.

- Consumers can save $100 to $1,200 per vehicle year in residential parking costs by using public transportation instead; based on 2001 U.S. dollars (Litman, 2013c, p. 31).
- Average central business district 12-hour daily parking rates in 2010 in the U.S. were $15.92 and $8.48 for the most and least expensive rates (NPA, 2010, p. 3).
  - Most of the time on-street parking in the Omaha Old Market is free and unrestricted, even during the busiest periods in the Old Market on Fri and Sat night. During this same period, Park Four in the Old Market costs $5.00 - $8.00 to park for one hour (Walker Parking Consultants, 2011, p. vi).
- Building typical parking facility costs range from $389 total annual cost per space (including land, construction and operating and maintenance costs) in the suburbs to $2,645 annual cost per space in the central business district (Litman, 2013c, p. 42). Encouraging transit use can save businesses and cities money in building and operating costs.

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[3] Cities where peak period public transportation is widely available with 15 minute headways and land use is conducive to walking to and from public transportation stops or stations (Weisbrod & Reno, 2009, p. 47).

- The minimum cost to build a new parking garage at the University of Nebraska at Omaha (UNO) for 870 spaces is estimated to be $11.25 million or nearly $13,000 per space (not including costs for operation and maintenance) (UNO Parking/Traffic Master Plan Final Report, 2011).
- In academic year 2013-2014, UNO is paying $365,000 (not including shuttle costs) for use of the parking garage at Crossroads (University of Nebraska Board of Regents, 2011).
- Stanford's commitment to encourage use of public transportation and other modes reduced drive-alone rates for all university commuters from 59.6% in 2003 to 36.9% in 2013, avoiding over $100 million in parking construction costs (Stanford, 2013).

Congestion Costs

Businesses can expect two benefits from public transit in terms of efficiency. The first is staff efficiency. Workers can improve individual efficiency by reducing commuting hours and this is associated with an increase in profits for businesses. The second is logistical efficiency. The primary role of manufacturers is to deliver goods to customers on schedule. If traffic conditions are bad, they may not provide their products and services to consumers on time. Consequently, this could negatively affect their reputation and profits. Thus, companies can receive benefits from public transit use in terms of congestion cost savings.

- Lost hours due to traffic congestion in U.S. urban areas increased from approximately 2.66 billion in 1990 to 5.46 billion in 2010 (Lomax, Schrank, & Eisele, 2012, p. 3). At least 45% of the total cost of congestion is borne by businesses (Weisbrod & Reno, 2009, p. 52).
  - According to the *Urban Mobility Report*, commuters in dense urban regions such as Washington, DC and Los Angeles bear congestion costs that average 34 hours of delay and 16.5 gallons of fuel annually, which is much smaller than the additional 104 hours of travel time and 183 gallons of fuel consumed annually by residents in sprawled, automobile-dependent regions such as Jacksonville, Nashville and Houston (Litman, 2013a, p. 8).
  - In 2010, the Omaha area in Iowa and Nebraska traffic congestion resulted in an annual total of 24 hours of delay per commuter, which equaled a cost of $489 per commuter or $217 million in total (Texas Transportation Institute, 2010).
- Public transportation services in America's most congested cities saved travelers 1.1 billion hours of added travel time (APTA, 2007, p. 6).
  - In Los Angeles, average highway delay would increase travel time by 47% if transit service ceases (Anderson, 2013).
- High quality public transit provides $0.044 to $1.51 worth of congestion cost reduction (Aus$2008) per marginal transit-vehicle km of travel, with an average of 45¢ (Litman, 2013c, p. 35).
- If a bus carries 16 passengers under urban-peak conditions, and 8 of the passengers would otherwise travel by automobile (either driving themselves or chauffeured), the congestion reduction benefit is (8-3) x $0.25 = $1.25 per vehicle-mile (Litman, 2013c, p. 39).

Road Way Maintenance & Highway Expansion Costs

Municipal governments are likely to issue debt to build public infrastructure and, hence capital spending is one of the main contributors to municipal debt (Krueger & Walker, 2010). In particular, roadway maintenance costs are associated with an increase in capital spending. Public transportation can help to reduce these costs.

- A land-use strategy that uses transit-friendly, smart growth development saves an average of 38 percent on upfront costs for new construction of roads, sewers, water lines and other infrastructure (Smart Growth America, 2013, p. ii).
- Where a transit project avoids or defers the need for major highway expansion, the avoided costs can be considered a benefit of transit. Urban highway capacity expansion typically costs $4-10 million per lane-mile for land acquisition, lane pavement and intersection reconstruction (Cambridge Systematics 1992 cited in Litman, 2013c, p. 49).
- Thirty car drivers shifting to transit provides savings worth between $0.24 and $2.76 per mile, depending on assumptions, in 2001 U.S. dollars (Litman, 2013c, p. 50).

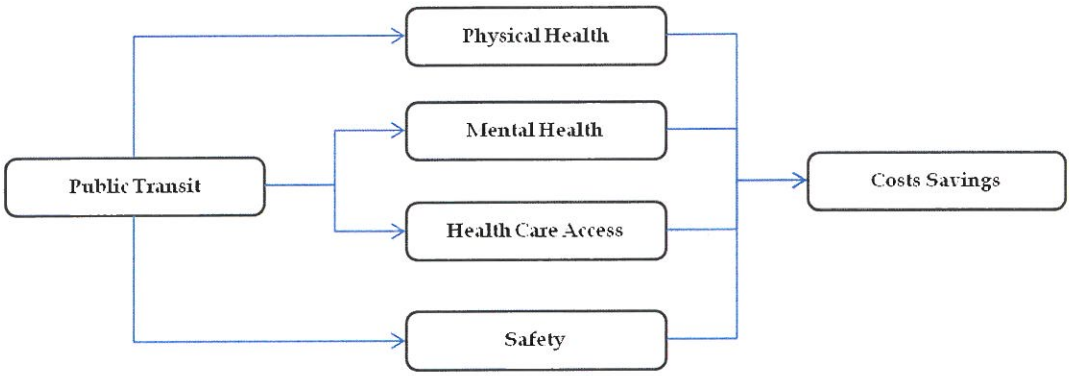
Summary and Conclusion

This section has examined the impact of public transit on fiscal sustainability in several areas: automobile, parking, congestion, and road way maintenance costs. The literature shows public transportation benefits individuals, companies, and governments. Public transportation users can save money spent on cars, gas, and parking. Individuals and businesses can improve their productivity with reduced congestion and parking costs. Lastly, public transportation enables governments to spend less on roadway maintenance and highway expansion.

HEALTH CARE AND COST SAVINGS

The literature shows public transit is associated with the improvement of physical and mental health and safety and a reduction in fatalities and injuries, which lead to cost savings. The research shows public transit users tend to be healthier than car users because they walk more and thus save on health care costs. Individuals can also save on health care costs by reducing pollution that cars produce, and improving access and safety.

Figure 3. The Impact of Public Transit on Health



Physical and Mental Health

People can get exercise by using public transportation. This helps improve health and prevents obesity and related diseases. Further, air pollutants that negatively affect health can be reduced through the use of public transit (see also the environment section below). The existing literature also describes health problems caused by road stress that can be avoided by using public transportation.

- Inadequate physical activity contributes to numerous health problems, causing an estimated 200,000 annual deaths in the U.S., and significantly increasing medical costs. Among physically able adults, average annual medical expenditures are 32% lower for those who achieve physical activity targets ($1,019 per year) than for those who are sedentary ($1,349 per year). Average annual per capita health care costs increase an average of $125 for people who are overweight and $395 for people who are obese. The annual incremental costs associated with U.S. obesity total $117 billion (Litman, 2010, p. 18).
- The costs of obesity account for approximately nine percent of total U.S. health care spending (APHA, 2010, p. 2).
  - In 2011, 29.3% of adults in Douglas County, Nebraska were obese; higher than the national average of 28.5% (Health Matters, 2013).
- The extra walking related to transit use has been estimated at a lifetime savings of $5,500 per person in 2007 dollars. When accounting for decreases in quality of life, such as disabilities related to obesity, the estimated savings are even higher (Edwards, 2008 cited in Active Living Research, 2009, p. 2).

- Overall Americans only walk about 6 daily minutes on average; however, public transit users spend a median of 19 daily minutes walking, which nearly achieves the U.S. Center for Disease Control recommendation of 22 daily minutes of moderate physical activity (Litman, 2010, p. 14).
- Nationwide, 29 percent of those who use transit were physically active for 30 minutes or more each day, solely by walking to and from public transit stops. Transit users took 30 percent more steps per day and spent 8.3 more minutes walking per day than did people who relied on cars. Conversely, reliance on an automobile for travel was associated with higher obesity rates at both the county and individual level (Active Living Research, 2009, p. 2).
  - A New York City Department of Health study found that people who commute by walking, cycling or public transit achieve about twice the total (transportation and recreational) exercise as automobile commuters, and so are much more likely to achieve public health targets of thirty or more daily minutes of moderate physical activity (Litman, 2012, p. 4).
  - An Atlanta, Georgia travel survey found that public transportation users are more likely to walk, walk longer average distances, and are more likely to meet recommended physical activity targets by walking than non-transit users (Litman, 2012, p. 14).
  - A new light rail transit system in Charlotte, North Carolina was estimated to save $12.6 million in public health costs over nine years (Litman, 2013c, p. 47).
- Emissions from road vehicles are the largest contributors to smog. Over 200 million passenger cars and light trucks log almost 2 trillion miles on American roads every year. These vehicles account for about 50% of air pollution nationwide—even higher in polluted cities (Cambridge Systematics, 2002, p. 5).
- In the U.S., every summer, high smog levels cause 159,000 trips to the emergency room, 53,000 hospital admissions and 6,000,000 asthma attacks (Cambridge Systematics, 2002, p. 5). According to the U.S. Environmental Protection Agency, asthma attacks lead to 2 million emergency room visits and 5,000 deaths per year in the U.S. Asthma accounted for more than 14 million missed school days. In terms of related health care costs and lost productivity, asthma costs totaled $14 billion (APTA, 2007, p. 7).
- The annual cost of health damage from motor vehicle pollution is estimated to be between $29 billion and $530 billion (APTA, 2003, p. 2).
- 70,000 people die annually from diseases caused by air pollution; nearly twice the number of people killed in traffic crashes (APTA, 2003, p. 2).
  - In the South Coast Region (Los Angeles, Orange, Riverside, and San Bernardino Counties), the costs of air pollution per year are $1,250 per person. The area can save $22 billion per year if air quality standards are met (APHA, 2010, p. 6).
  - During the 1996 Atlanta Olympic Games, expanded transportation services reduced morning peak auto use by 22.5 percent and reduced mobile source emissions. There was a 44.1 percent reduction in asthma-related medical visits among HMO enrollees (APTA, 2003, p. 2).
- The average car driver in the U.S. spends nearly 450 hours a year or 11 work weeks stuck in traffic due to congestion. From this road stress, people may suffer a mounting level of frustration, anger, and hostility. This type of road stress is related to cardiovascular disease, suppressed immune system functioning, and strokes. Expanding and enhancing public transportation provides an opportunity to decrease stress and its negative impacts on our health (APTA, 2003, p. 3).

Health Care Access

The cost of transportation to and from medical treatment can be substantial. Public transportation enables patients to access health care at a more affordable rate.

- Medicaid and Medicare services pay nearly $3.5 billion a year to provide transportation to non-emergency medical treatment.34 In 2000, over 100 million Medicaid trips were funded at an average cost of $16 per trip.34 More than half of Medicare ambulance trips (as many as 90 percent in rural areas) may be for non-emergencies at a cost that can exceed $500 per trip (APTA, 2003, p. 3).
  - In Florida, the Metro-Dade Transit Agency provides Medicaid recipients with a monthly pass that provides unlimited rides to clients, including trips for medical care. The pass saves the Medicaid program over $600,000 a month (APTA, 2003, p. 3).
  - In Rhode Island, RIPTA's bus and paratransit service provides non-emergency transportation to all Medicaid recipients with an average cost of 45 cents per trip, the lowest in the country (APTA, 2003, p. 3).

Safety

People can prevent fatalities and injuries and improve safety through public transportation.

- In 2000, nearly 42,000 people died in vehicle crashes and another 3.2 million were injured. Taken as a whole, the pain, suffering, cost of care, lost income and lost productivity from vehicle accidents remains one of the nation's most severe and persistent public health problems, costing the nation $200 billion annually (APTA, 2003, p. 3; APHA, 2010).
- According to the National Center for Injury Prevention and Control, traffic crashes caused an estimated 1,186,070 years of life lost in the U.S. in 2006, which reduces average lifespans approximately 0.4 years or about 5% (Litman, 2012, p. 5).
- According to the CDC, traffic crashes continue to be one of the largest causes of deaths and disabilities for people aged 1-44 years (Litman, 2012, p. 6).
- Total per capita traffic fatalities (including transit and automobile occupants, and pedestrians) decline significantly as transit ridership increases in a community (Litman, 2010, p. 7).
- Public transportation trips result in 190,000 fewer deaths, injuries and accidents annually than trips by car, providing $2 billion to $5 billion in safety benefits, based on 1994 data (APTA, 2003, p. 3).
- Riding the bus is 170 times safer than automobile travel, according to National Safety Council data (APTA, 2003, p. 3).
- Increased walking, cycling and public transit travel tends to increase overall security and reduce crime rates by providing more monitoring of city streets and transit waiting areas (Hillier & Sahbaz, 2006, cited in Litman, 2010, p. 8).
- Transit users generally face lower overall crime risks than motorists, and all else being equal, per capita crime rates tend to decline as transit ridership increases in a community, probably due to a combination of improved surveillance, better policing and emergency response and improved economic opportunity for at-risk residents (Litman, 2013, p. 47).

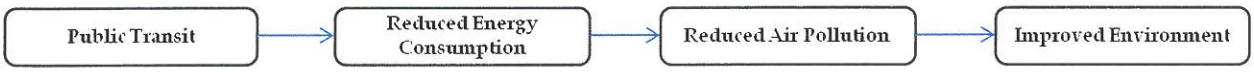
Summary and Conclusion

Public transportation helps to decrease the probability of modern diseases, such as obesity and stress and prevent fatalities and injuries from accidents and improve safety. It also improves health care access. This allows for substantial savings on healthcare costs.

ENVIRONMENTAL IMPACT

Public transportation contributes to environmental protection by reducing energy consumption and emissions.

Figure 4. The Impact of Public Transit on the Environment



Reduced Energy Consumption

The primary goal of many energy policies is to reduce dependence on non-renewable fuel sources such as oil. Oil dependence can be reduced by encouraging car drivers to use public transportation.

- In 2011, 2.9 billion gallons of fuel was wasted due to congestion (enough to fill four New Orleans Superdomes) (Lomax et al., 2012, p. 5).
- In 2005, 340 million gallons of gasoline were saved through transit's contribution to decreased congestion (Davis & Hale, 2007, p. 1).
- Each year, public transportation use in the U.S. saves: 1.4 billion gallons of gasoline, representing 4 million gallons of gasoline per day; the equivalent of 34 supertankers of oil, or a supertanker leaving the Middle East every 11 days; the equivalent of 140,769 fewer service station tanker trucks each year; and the equivalent of 300,000 fewer automobile fill-ups each day (APTA, 2007, p. 5).
- Public transportation saves more than 855 million gallons of gasoline a year, or 45 million barrels of oil. These savings equal about one month's oil imports from Saudi Arabia and three months of the energy that Americans use to heat, cool and operate their homes, or half the energy used to manufacture all computers and electronic equipment in America (Shapiro, Hassett, & Arnold, 2002, p. 4).
- For every passenger mile traveled, public transportation uses about one-half the fuel of private automobiles, sports utility vehicles (SUVs) and light trucks (Shapiro, Hassett, & Arnold, 2002, p. 5).
- Across 17 life-cycle energy indicators, buses were rated from 0.8 (peak) to 6.4 (off-peak) on an on-road energy inventory, compared to automobiles (sedans, SUVs, and pick-up trucks), which were rated from 4.6 to 7.8 on the inventory (Chester & Horvath, 2008, p. 42).
- A bus with seven passengers is about twice as energy efficient as an average automobile, and a bus with 50 passengers is about ten times as energy efficient. Rail transit systems tend to be about three times as energy efficient as diesel bus transit. New hybrid buses are about twice as energy efficient as current direct drive diesel (Litman, 2013c, p. 53)

Reduced Air Pollution, including Carbon Emissions

Public transportation contributes to protecting the environment by reducing carbon dioxide (CO_2) emissions and greenhouse gas effects.

- Transportation is the second largest source of greenhouse gas and private automobiles produce the largest portion of greenhouse gas emissions (USDT, 2010). Approximately 85% of transportation sector emissions are related to the surface transportation system (APTA, 2008, p. 2).

- Over 200 million passenger cars and light trucks log almost 2 trillion miles on American roads every year. These vehicles account for about 50% of air pollution nationwide—higher in polluted cities (Cambridge Systematics, 2002, p. 5).
- Congestion in 498 urban areas in the U.S. in 2011 produced 56 billion pounds of CO_2—equivalent to the liftoff weight of over 12,400 Space Shuttles with all fuel tanks full (Lomax et al., 2012, p. 5).
- An average private vehicle emission rate is about 1.0 pound of CO2 per mile. An automobile driven by a single person 20 miles round trip to work will emit 20 pounds of CO2. Thus, the savings by using existing public transit service would be about 20.0 pounds of CO2 per daily trip. Over the course of a year, an individual could potentially reduce their CO2 emissions by more than 4,800 pounds (assuming 240 days of transit travel per year). This represents slightly more than two metric tons of CO2 or about ten percent of a two-car family household's carbon footprint of 22 metric ton per year. In contrast, if one were to weatherize their home and adjust their thermostat the carbon savings would be approximately 2,800 pounds of CO2 (Davis & Hale, 2007, p. 2).
- Reducing the daily use of one low occupancy vehicle and using public transit can reduce a household's carbon footprint between 25-30% (Davis & Hale, 2007, p. 2).
- Public transportation produces 95 percent less carbon monoxide (CO), 90 percent less in volatile organic compounds (VOCs), and about half as much carbon dioxide (CO2) and nitrogen oxide (NOx), per passenger mile, as private vehicles. Energy-related carbon dioxide emissions represent 82 percent of total U.S. human-made greenhouse emissions (APTA, 2007, p. 7).
- Public transportation systems decrease CO2 emissions by 37 million metric tons annually (APTA, 2008, p. 3).
- In 2005, public transportation reduced CO2 emissions by 6.9 million metric tons. If current public transportation riders were to use personal vehicles instead of transit they would generate 16.2 million metric tons of CO2 (Davis & Hale, 2007, p. 1).
- For every passenger mile traveled, public transportation produces only a fraction of the harmful pollution of private vehicles: only 5 percent as much carbon monoxide, less than 8 percent as many volatile organic compounds, and nearly half as much carbon dioxide and nitrogen oxides. The reduced VOC and NOx emissions that result from public transportation use save between $130 million and $200 million a year in regulatory costs (Shapiro, Hassett, & Arnold, 2002, p. 5).
- Light rail, subway, and bus systems currently reduce emissions by: 70,000 tons of VOCs, 27,000 tons of nitrogen oxides (NOx), 745,000 tons of carbon monoxide (CO), and 7.4 million tons of carbon dioxide (CO_2) annually (Cambridge Systematics, 2002, p. 5).
- If a suburban bus carries 20 passengers, half of whom would have driven an automobile, the net pollution-reduction benefit is estimated to be 40¢ per bus-mile (Litman, 2013c, p. 56).

Summary and Conclusion

The literature shows public transportation contributes to environmental protection by reducing fossil fuel energy consumption and its emissions. Specifically, public transit users use less energy and emit less air pollution than car drivers. Consequently, using public transportation contributes to greater environmental protection.

QUALITY OF LIFE AND CHOICE

Public transportation provides travel opportunities to people who do not have a car or who cannot or do not want to drive a car. Higher oil prices, free-pass programs, and emergency conditions encourage people to use public transit.

Figure 5. The Impact of Public Transit on Quality of Life

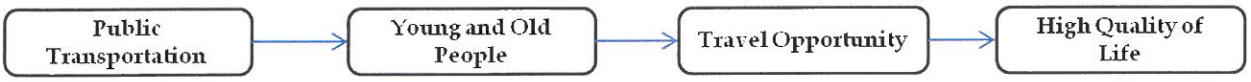
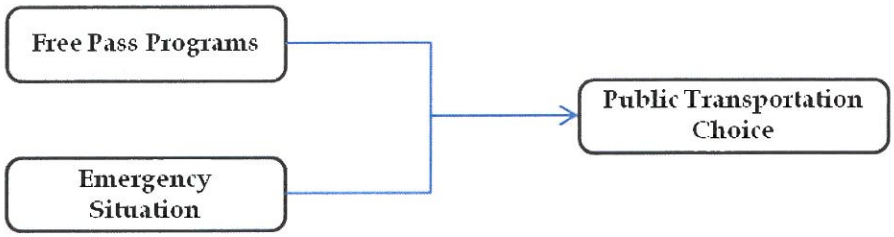


Figure 6. Factors Affecting Public Transportation Choice



Quality of Life

Public transportation provides travel opportunities to old and young people and people with disabilities who cannot drive a car or who cannot drive due to emergencies.

- Generally, low income households are associated with higher levels of transit use (Ewing & Cervero, 2003 cited in Trans Link, 2010, p. 8). Most transit trips are made by lower-income riders (less than $20,000 annual income in 2002). They represent 63% of riders in small transit systems, 51% in medium size transit systems, and 41% of riders in large transit systems (Litman, 2013c, p. 20).
  - In Omaha, 15,524 households do not have access to vehicles (U.S. Census, 2010).
- By 2020, 40% of the U.S. population will be older adults and many will be unable to drive. One-fourth of today's 75+ age group does not drive. Public transportation options represent a lifeline for older adults, linking them with family, friends and a changing society (Cambridge Systematics, 2002, p. 13).
- Over 54 million Americans have disabilities. Nearly 35% say they are uninvolved in their communities, and the lack of effective transportation options contributes to an unemployment rate of approximately 75% (Cambridge Systematics, 2002, p. 13).
- 21% of transit passengers report that if transit service were unavailable they would not make the trip (Litman, 2013c, p. 20).
- During emergency situations and disasters, people need public transportation.
  - During the 1989 Loma Prieta earthquake in San Francisco, the Bay Bridge was closed for a month. BART carried 75 percent of trans-bay commuters—up from 35 percent before the bridge closed—helping avert a major economic disruption (APTA, 2007, p. 10).
  - Across the nation, buses are used as heated or air-conditioned shelters and treatment centers for emergency workers at the sites of fires or hazardous materials incidents (APTA, 2007, p. 10).

Travel Choice

Increasingly, people do not want to drive and choose public transportation as a travel choice. Governments and businesses can also encourage choice ridership with fare-free transit.

- According to the National Household Travel Survey, from 2001 to 2009, the annual number of vehicle miles traveled by young people (16 to 34-year-olds) decreased from 10,300 miles to 7,900 miles per capita—a drop of 23 percent. Simultaneously, from 2001 to 2009, the number of passenger-miles traveled by 16 to 34-year-olds on public transit increased by 40 percent (Davis & Dutzik, 2013, p. 2). Young people tend to rely on public transportation more due to increased oil prices, new licensing laws, improved technology, and changes in values and preferences (Davis & Dutzik, 2013, p. 1).
- According to the Federal Highway Administration, from 2000 to 2010, the number of young people (14 to 34 years-old) who do NOT have driver's license increased from 21 percent to 26 percent (Davis & Dutzik, 2013, p. 2).
- Currently, 35 states have outlawed texting while driving, and nine states have outlawed handheld cell phone use while driving. (Davis & Dutzik, 2013, p. 3). Web and mobile technology make public transportation seem more convenient to younger people (Sheller, 2013).
- Overall, 33% of transit trips in the U.S. are made by discretionary riders (people who have the option of driving a car). This increases to 36% in large transit systems (Litman, 2013c, p. 20).
- "Unlimited Access" transit pass programs encourage students and faculty to use public transportation while reducing auto-related expenditures and saving universities millions (Cambridge Systematics, 2002, p. 12). Evidence indicates that ridership will usually increase from 20% to 60% in a matter of just a few months, and even more in some areas, when fare-free public transit service is offered (Volinski, 2012, p. 3).
  - The Milwaukee County Transit System provides a free-pass program (UPASS) to students at four schools. In particular, students from the University of Wisconsin-Milwaukee use of the transit system doubled after implementing the UPASS program (APTA, 2007).
  - A survey done after the first semester of UNO's free bus pass MavRide program by Student Government (spring 2011) indicated that 93% of students participating in MavRide and who took the survey (n = 81; 20% of MavRide's 400 participants) decreased the number of times they drove to campus after receiving their MavRide card. Extrapolating these findings to the 400 students who participated in MavRide in spring 2011, parking space use was decreased by 129 spots per day (UNO Student Government, 2011).
  - Jaffe (2012) reported that nearly 30 percent of regular car commuters in Boston and Cambridge, Massachusetts, gave up their full-time parking permits immediately after a brief free-transit trial, with most downgrading to an occasional permit and a few making a full switch to transit.
  - In the case of Corvallis, OR, a fare-free public transit service adopted in 2011 increased public ridership by 43% within two months of it starting with no increase in service hours (Volinski, 2012, p. 3).

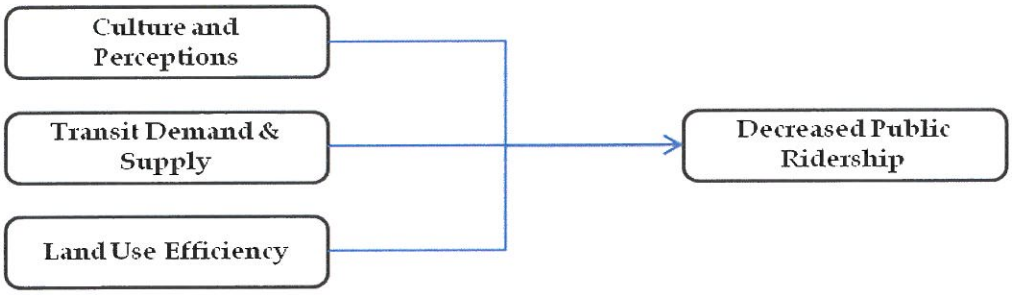
Summary and Conclusion

This section has examined how public transportation influence people's quality of life and transportation choice. The literature shows that public transportation enables people who cannot drive to get around. Free pass programs and emergency situations are associated with more public transportation ridership.

BARRIERS

Some of the barriers to increasing public transit ridership include culture and perceptions, transit demands, and land use efficiency.

Figure 7. Barriers of Public Transportation



Culture and Perceptions

A car-centric culture and negative perceptions of public transportation may negatively influence ridership.

- Public transit costs are fixed, whereas vehicle travel costs vary. For example, most public transit users pay $1.0 to go to work by bus regardless of congestion. However, vehicle travel costs may increase or decrease depending on traffic flow. Thus, people choose a car over public transit because they recognize only the minimum fuel costs of car-driving and not other costs such as congestion costs (Jaffe, 2013).
- Critics sometimes argue that transit is inefficient because transit travel tends to be slower than driving, citing particular trips that take much longer by transit than automobile (Litman, 2013c, p. 84).
  - Travel time unit costs (cents per minute or dollars per hour, as reflected by opportunity costs and consumers willingness to pay for travel time savings) are generally lower for high quality public transit than for driving, since transit travelers can work or relax. As a result, even if transit travel takes more minutes per trip, travel time costs may be lower. For example, if transit travel is comfortable its travel costs are estimated to average 25% of wage rates, compared with 50% or more of wage rates for driving under congested conditions (Litman, 2013c, p. 84).
  - When people shift from driving to public transit they often change their destinations to increase efficiency. For example, automobile travelers tend to shop at automobile-dependent suburban locations. People who rely on transit tend to shop more at neighborhood stores and downtown business districts (Litman, 2013c, p. 85).
  - Transit can also provide special time savings by reducing the need for special chauffeuring trips and for exercise (Litman, 2013c, p. 85).
- Currie, Delbosc, and Mahmoud (2013) found in a study of young people's perceptions of public transportation in Melbourne, Australia that nearly 40% of the sample found it difficult or very difficult to feel safe traveling on public transport at night. This compares to 14 percent during the day and 12 percent in general (p. 7).
- Those who drive more tend to live in lower-density, suburban areas and have a "pro-driving" attitude, showing that travel behaviour, attitude, and the built environment are mutually reinforced (Bagley & Mokhtarian, 2002). However, there is evidence that

preferences and habits can change. Handy et al. (2005) found that even though attitude explains travel behaviour in the present, changes in the built environment can influence mode choice over time. These long-term elasticities show that if transit-supportive land use and transit supply are introduced, driving culture has the potential to transform, over time, into more of a transit culture (Trans Link, 2010, p. 8).

Transit Demand and Supply

Low parking and roadway congestion costs and high car ownership in a community are associated with lower public transportation demand (Tayler et al., 2009; Transit link, 2010). Adequate transit supply is also necessary for transit-oriented communities to work.

- Easy parking availability encourages more single-occupancy vehicle use, thus creating a never ending demand for more parking (Weinberger et. al., 2008).
- Significant mode shift cannot be achieved where there is high road volume capacity and plentiful free parking (Chathman, 2008 cited in Trans Link, 2010, p. 3).
  - Most of the time on-street parking in the Omaha Old Market is free and unrestricted, even during the busiest periods in the Old Market on Fri and Sat night. During this same period, Park Four in the Old Market costs $5.00 - $8.00 to park for one hour (Walker Parking Consultants, 2011, p. vi).
  - The 2011 Road Way Congestion Index[4] for Omaha was 0.87 (higher is heavy congestion), compared with other middle population cities such as 1.06 for Knoxville and 0.93 for New Haven. The U.S. average was .99 (RITA, 2011).
- Browson and Boehmer (2004) report that the likelihood of walking and biking is inversely related to the number of automobiles owned per household (Trans Link, 2010, p. 8).
  - 16.2% of housing units in Omaha have 3 or more vehicles. This is lower than 19.8% for the U.S. but higher than Des Moines (16%) and Kansas City, MO (13.4%) (ACS, 2007-2011).
- Higher density, large employment clusters with low levels of parking and a mix of uses adjacent to rapid transit greatly influences transit use (Badoe & Miller, 2000 in Trans Link, 2010, p. 4).
- A generally accepted threshold level of service for transit-oriented developments is frequencies of 15 minutes or better during most of the day (Dittmar & Ohland, 2004 cited in Trans Link, 2010, p. 8).
- Providing real-time information at transit stops and stations has the potential to increase ridership (Litman, 2008 cited in Trans Link, 2010, p. 6). The quality of transit facilities at stations, such as signage, travel information, and amenities, can also attract new riders (Brons et al., 2009 cited in Trans Link, 2010, p. 6).
- The most important determinant of user satisfaction with a transit stop or station is frequent, reliable service in an environment of personal safety, and only indirectly the physical characteristics of that stop or station (Taylor, Iseki, Miller, & Smart, 2009, p. v).

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[4] The Roadway Congestion Index (RCI) is a measure of vehicle travel density on major roadways in an urban area. An RCI exceeding 1.0 indicates an undesirable congestion level, on an average, on the freeways and principal arterial street systems during the peak period.

Land Use Efficiency

Land use density can have an effect on public transportation ridership.

- Low population density is positively associated with drive-alone mode choice (Cervero, 2002).
- The general consensus among researchers is that 7 units per acre will provide for basic 30 minute bus service. Other research suggests that there is a per capita ridership cap after 20-30 persons per acre is reached (Reconnecting America, 2013).
- Higher densities generally support greater levels of transit service, as there are more potential riders in the same amount of space. On average 9% of workers commute to work by public transit in American cities with a 14.2 population density (persons/hectare). An average 19.7% workers use public transportation to go to work in Canadian cities with a 28.3 population density and an average of 38.8% of workers use public transportation in European cities with a 49.9 population density (Trans Link, 2010, p. 3).
    - Omaha has a relatively small population size in relation to a large land area compared with other metropolitan cities. The population is 421,570 and area is 116 square miles (30044ha or 14 persons/hectare). The population density of the City ranked 95th in the United States (U.S. Census, 2010).

Summary and Conclusion

This section examined some barriers of public ridership. The literature and data show that negative perception on public transportation, low transit demands and supply, and low density may decrease public ridership.

REFERENCES

ACS. (2010). American Community Service. Retrieved from http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_5YR_DP03

Active Living Research. (2009). Active Transportation: Making the Link from Transportaion to Physical Acitivity and Oesity: Building Evidence to Provent Childhood Obesity and Support Acitive Communities. Retrieved from http://puff.lbl.gov/transportation/transportation/pdf/alr-brief-active-trans.pdf

American Institute of Architects and Planners Collaborative. (2006). Building Livable Communities with Transit: Planning, Developing, and Implementing Community-Sensitive Transit: Federal Transit Administration. Retrieved from http://safety.fhwa.dot.gov/ped_bike/docs/livable.pdf

Anderson, Michael L. (2013). *SUBWAYS, STRIKES, AND SLOWDOWNS: THE IMPACTS OF PUBLIC TRANSIT ON TRAFFIC CONGESTION*. Paper presented at the NBER Working Paper.

APHA. (2010). The Hidden Health Costs of Transportation: American Public Health Association. Retrieved from http://www.apha.org/NR/rdonlyres/F84640FD-13CF-47EA-8267-E767A1099239/0/HiddenHealthCostsofTransportationShortFinal.pdf

APTA. (2003). The Benefits of Public Transporation: The Route to Better Personal Health: American Public Trasportation Association. Retrieved from http://www.apta.com/resources/reportsandpublications/Documents/better_health.pdf

APTA. (2007). Public Transportation: Benefits for the 21st Century: American Public Transportation Association. Retrieved from http://www.apta.com/resources/reportsandpublications/Documents/twenty_first_century.pdf

APTA. (2008). Public Transportation Reduces Greenhouse Gases and Conserves Energy: American Public Transportation Association. Retrieved from http://www.apta.com/resources/reportsandpublications/Documents/greenhouse_brochure.pdf

APTA. (2010). Public Transportation takes us there: American Public Transportation Association.

APTA. (2013). Transit Ridership Report: American Public Transportation Association.

Bartle, John & Wellman, Gerard (2010). Sustainbility Makes Dollars and Sense. Retrieved from http://www.omahabydesign.org/wp-content/uploads/2009/11/Sustainability.pdf

Bankrate. (2013). Bankrate Report. Retrieved from www.bankrate.com.

Bartle, J., & Wellman, G. (2010). *Sustainability Makes Dollars and Sense*. Omaha, Nebraska: Environment Omaha.

Becker, Sofia, & Young, Linda. (2013). *The New Real Estate Mantra: Location Near Public Transportation*: American Public Transportation Association. Retrieved from http://www.apta.com/resources/statistics/Documents/NewRealEstateMantra.pdf

BTS. (2008). National Transportation Statistics: Bureau of Transportation Statistics. Retrieved from http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/index.html

Cambridge Systematics. (1999). Public Transportation and the Nation's Economy: Economic Development Research Group. Retrieved from

http://www.apta.com/resources/reportsandpublications/Documents/vary.pdf

Cambridge Systematics. (2002). The Benefits of Public Transportation: An Overview: Reichman Frankle Inc. Retrieved from http://www.apta.com/resources/reportsandpublications/Documents/ben_overview.pdf

CEO for Cities. (2010, April). *New York City's Green Dividend*. Retrieved from: http://www.nyc.gov/html/dot/downloads/pdf/nyc_greendividend_april2010.pdf.

Cervero, R. (2002). Built environments and mode choice: toward a normative framework. *Transportation Research Part D*, 7, 265-284.

Chester, Mikhail, & Horvath, Arpad. (2008). Environmental Life-cycle Assessment of Passenger Tranportation: A Detailed Methodology for Energy, Greenhouse Gas and Criteria Pollutant Inventories of Automobiles, Buses, Light Rail, Heavy Rail and Air: UC Berkeley Center for Future Urban Transport. Retrieved from http://www.its.berkeley.edu/volvocenter/green_logistics.html

Currie, Graham, Delbosc, Alexa, & Mahmoud, Sarah. (2013). Factors Influencing Young Peoples' Perceptions of Personal Safety on Public Transport. *Journal of Public Transportation 16*(1), 1-19.

Davis, Benjamin, & Dutzik, Tony. (2013). Transportation and the New Generation: Why Young People Are Driving Less and What It Means for Transportation Policy: U.S. PIRG Education Fund Frontier Group. Retrieved from http://www.uspirg.org/sites/pirg/files/reports/Transportation%20%26%20the%20New%20Generation%20vUS_0.pdf

Davis, Todd, & Hale, Monica. (2007). Public Transportation's Constribution to U.S. Greenhouse Gas Reduction: From Science to Solutions. Retrieved from http://www.apta.com/resources/reportsandpublications/Documents/climate_change.pdf

Dutzik, Tony, & Baxandall, Phineas. (2013). A New Direction: Our Changing Relationsihp with Driving and the Implications for America's Future: U.S. PIRG Education Fund Frontier Group. Retrieved from http://www.uspirg.org/sites/pirg/files/reports/A%20New%20Direction%20vUS.pdf

Garrett-Peltier, Heidi. (2011, June). Pedestrian and Bicycle Infrastructure: A National Study Of Employment Impacts. Political Economy Research Institute, University of Massachusetts, Amherst. http://www.peri.umass.edu/fileadmin/pdf/published_study/PERI_ABikes_October2011.pdf.

Goetz, G. Edward, Ko, Kate, Hagar, Aaron, Ton, Hoang, & Matson, Jeff. (2010). The Hiawatha Line: Impacts on Land Useand Residential Housing Value (pp. 1-107): Humphrey Institue of Public Affairs. Retrieved from http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0CDUQFjAB&url=http%3A%2F%2Fwww.cts.umn.edu%2FPublications%2FResearchReports%2Fpdfdownload.pl%3Fid%3D1390&ei=hSRSUr2dC-jyiAeXsIGgCQ&usg=AFQjCNH8ifRyY-5d-zliFsh0ilIzgoMnXg&sig2=mZbZPWY2zvSPi0bpnUTrSQ&bvm=bv.53537100,d.aGc&cad=rjt

Giuliano, Genevieve, & Golog, Jacqueline. (1998). Impact of the Northridge Earthquake on Transit and Highway Use. *Journal of Transportation Statistics, 1*(2), 1-20.

Health Matters in Douglas County Nebraska. (2013). Adults Who Are Obese. Retrieved from: http://www.douglascohealth.org/modules.php?op=modload&name=NS-Indicator&file=indicator&iid=733660.

Hess, Daniel Baldwin, & Almeida, Tangerine Maria. (2007). Impact of Proximity to Light Rail

Rapid Transit on Station-area Property Values in Buffalo, New York. *Urban Studies (Routledge), 44*(5/6), 1041-1068. doi: 10.1080/00420980701256005

Jaffe, Eric (Producer). (2013). Living Near Good Transit May Make You Happier. Retrieved from http://www.theatlanticcities.com/commute/2013/09/living-near-good-transit-may-make-you-happier/6867/

Jaffe, Eric (Producer). (2012). Even American Drivers Like Mass Transit More Than They Think. Retrieved from http://m.theatlanticcities.com/commute/2012/12/even-american-drivers-mass-transit-more-they-think/4142/%20-%20.UM6BDOi9S55.email

Jaffe, Eric (Producer). (2013). Why People Choose Cars, Even When Mass Transit Would Serve Tem Better. Retrieved from http://www.theatlanticcities.com/commute/2013/02/why-people-chose-cars-even-when-metro-would-be-faster/4566/

Krueger, Skip, & Walker, Robert W. (2010). Management Practices and State Bond Ratings. *Public Budgeting & Finance, 30*(4), 47-70. doi: 10.1111/j.1540-5850.2010.00968.x

Litman, Todd. (2010). Evaluating Public Transportation Health Benefits: Victoria Transport Policy Institute. Retrieved from http://www.apta.com/resources/reportsandpublications/Documents/APTA_Health_Benefits_Litman.pdf

Litman, Todd. (2012). Evaluating Public Transportation Health Benefits: Victoria Transport Policy Institute Retrieved from http://www.vtpi.org/tran_health.pdf

Litman, Todd. (2013a). Critical Analysis of Conventional Transport Economic Evaluation: Victoria Transport Policy Institute. Retrieved from http://www.vtpi.org/crit_econ_eval.pdf

Litman, Todd. (2013b). Evaluating Active Transport Benefits and Costs: Guide to Valuing Walking and Cycling Improvements and Encouragement Programs: Victoria Transport Policy Institute. Retrieved from http://www.vtpi.org/nmt-tdm.pdf

Litman, Todd. (2013c). Evaluating Public Transit Benfits and Costs: Best Practices Guidebook (pp. 1-130): Victoria Transport Policy Institute. Retrieved from http://www.vtpi.org/tranben.pdf

Lomax, Tim, Schrank, David, & Eisele, Bill. (2012). 2012 Urban Mobility Report: Texas Transportation Institute. Retrieved from http://d2dtl5nnlpfr0r.cloudfront.net/tti.tamu.edu/documents/mobility-report-2012.pdf

MAPA. (2013a). Omaha Metro Annual Budget: Omaha Metropolitan Planning Agency.

MAPA. (2013b). Omaha Metro Ridership and Revenue 2013: Omaha Metropolitan Planning Agency.

NCIPC. (2009). Web-based Injury Statistics Query and Reporting System: Years of Potential Life Lost (YPLL): National Center for Injury Prevention and Control. Retrieved from http://www.cdc.gov/injury/wisqars/index.html

NDOR. (2013). I-80 Six-Lane Expansion, N-370 – US-77. Retrieved from: http://www.transportation.nebraska.gov/news/news%20releases/current-month/11-7-13-i80-6-lane-opening.pdf.

NPA. (2010). Parking in America: The Third Ammual Review of Parking Rates in North America: National Parking Association. Retrieved from http://www.npapark.org/pdfs/2010_Parking_in_America_Report.pdf

NSC. (2001). Injury Facts. Washington DC: National Safety Council. Retrieved from http://www.mhi.org/downloads/industrygroups/ease/technicalpapers/2013-National-Safety-Council-Injury-Facts.pdf

Omaha Mass Transit. (2012). Policy Study: Platte Institute. Retrieved from http://www.platteinstitute.org/research/page/policy-study-archive

Reconnecting America. (2012). *Locating Affordable Housing Near Transit: A Strategic Economic*

Decision Policy Brief: Reconnecting America. Retrieved from http://www.reconnectingamerica.org/assets/Uploads/20120904AHpolicybrief.pdf

Reconnecting America. (2013). *Featured Topic: Transit Supportive Density*. Retrieved from: http://www.reconnectingamerica.org/resource-center/transit-supportive-density/.

RITA. (2011). Annual Roadway Congestion Index: Research and Innovative Technology Administration. Retrieved from ttp://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_01_71.html

Sanchez, Thomas W. (1999). The Connection Between Public Trans it and Employment The Cases of Portland and Atlanta. *Journal of the American Planning Association, 65*(3), 284.

Schmitt, Angie. (2013, Sep. 13, 2013). *Roundup: How Bus Rapid Transit Spurs Development*. Retrieved from http://streetsblog.net/2013/09/13/roundup-how-bus-rapid-transit-spurs-development/.

Shapiro, Robert J., Hassett, Kevin A., & Arnold, Frank S. (2002). Conserving Energy and Preserving the Envoronment: The Role of Public Transit: American Public Transportation Association. Retrieved from http://www.gobrt.org/aptaenergyreport.pdf

Sheller, Mimi (Producer). (2013). Taking on America's Car Culture. Retrieved from http://en.forumviesmobiles.org/video/2013/06/24/taking-americas-car-culture-955

Smart Growth America. (2013). Builiding Better Budgets: A National Examination of the Fiscal Benefits of Smart Growth Development: Smart Growth America. Retrieved from http://www.smartgrowthamerica.org/documents/building-better-budgets.pdf

Stanford University Parking & Transportation Services. (2013, August 17). *Transportation demand managaement at Stanford University: A Brief Overview*. Retrieved from: http://www.slideshare.net/slideshow/embed_code/25827750.

Taylor, Brian, Iseki, Hiroyuki, Miller, Mark, & Smart, Michael. (2009). Thinking Outside the Bus: Understanding User Perceptions of Waiting and Transferring in Order to Increase Transit Use: Institute of Transportation Studies. Retrieved from http://www.its.berkeley.edu/publications/UCB/2009/PRR/UCB-ITS-PRR-2009-8.pdf

Texas Transportation Institute. (2010). *Omaha 2010 Traffic Report*. Retrieved from: http://traffic.findthedata.org/l/1856/Omaha.

Tomer, Adie. (2012). Where the Jobs Are: Employer Access to Labor by Transit *Metropolitan Infrastructure Initiative Series and Metropolitan Opportunity Series*: Brookings. Retrieved from http://www.brookings.edu/~/media/research/files/papers/2012/7/transit%20labor%20tomer/11%20transit%20labor%20tomer%20full%20paper.pdf

Trans Link. (2010). Transit-Oriented Communities: A Literature Review on the Relationship between the Built Environment and Transit Ridership: Trans Link. Retrieved from http://www.translink.ca/~/media/documents/plans_and_projects/transit_oriented_communities/transit_oriented_communities_literature_review.ashx

USDT. (2010). Public Transportation's Role in Responding to Climate Change: Federal Transit Administration. Retrieved from http://www.fta.dot.gov/documents/PublicTransportationsRoleInRespondingToClimateChange2010.pdf

Verdis. (2012, August 20). Metro Transit Ridership is Reaching a Milestone: 4,000,000. Retrieved from: http://verdisgroup.com/blog/2012/08/metro-transit-ridership-is-reaching-a-milestone-4000000/.

Volinski, Joel. (2012). TCRP Synthesis 101: Implementation and Outcomes of Fare-Free Transit Systems: Transportation Research Board of the National Academics. Retrieved from http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_syn_101.pdf

Walker Parking Consultants. (2011, November). *Parking Management Plan Omaha Downtown Improvement District Omaha, Nebraska*. Retrieved from: http://www.mapacog.org/images/stories/SSH_Publications/Final_Parking_Management_Plan_MAPA010712_Final.pdf.

Wardrip, Keith. (2011). *Insights from Housing Policy Research*: Center for Housing Policy.

Weinberger, R. et. al. (2008, October). Guaranteed Parking – Guaranteed Driving. Retrieved from: http://transalt.org/files/news/reports/guaranteed_parking.pdf.

Weisbrod, Glen, & Reno, Arlee. (2009). Economic Imapact of Public Transportation Investment: American Public Transportation Association. Retrieved from http://www.apta.com/resources/reportsandpublications/Documents/economic_impact_of_public_transportation_investment.pdf