How Transportation Choices Impact Health & Wellness

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2018 ITE Annual Meeting
Minneapolis, MN
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All over the world, in response to growing concerns over the global environment, quality of life and health, people are working together to build a sustainable future. Transportation professionals play an important role in this discussion, as transportation systems that incorporate active mobility choices are a fundamental building block for a sustainable community.

In most developed countries, participation in physical activity has declined over the last number of decades, partly due to fewer manual jobs, fewer journeys are taken by bike or on foot, an increase in the number of young people driven to school, and the physical elements of housework, shopping and other activities, have significantly diminished.

Community planning and infrastructure exerts a powerful influence over people’s access to healthy foods and ability to be physically active in their daily routines. The built environment has a direct impact and correlation to physical activity behaviours and health.

Providing active transportation infrastructure have become increasingly important to meet the needs and demands of an aging population and the millennial generation who are less likely to learn to drive, own cars or drive as much as earlier generations.
The design of communities and provision of active transportation mobility choices that promote walkability, cycling and transit play a key role in the overall health of our society. Adults are 2.5 times more likely to engage in active transportation when living in compact and well-connected neighborhoods. They are also more likely to get the recommended amounts of daily physical activity. Neighborhoods that support active transportation are associated with reduced risk for obesity and reduced air pollution.

Physical activity has been well-documented to reduce the risk factor of chronic diseases such as obesity, mental illness, heart diseases, colorectal cancer, and hypertension. The lack of physical activity has a direct impact on health care costs and it has been shown that moderately active people spend 2.4% to 9.6% more than active people on healthcare services.

The built environment or the neighborhood designs affects human lifestyle, and ultimately human wellbeing. Physical activity which plays a major role in determining the health and wellbeing is influenced by the built environment which is referred to as walkability. Research in transportation, urban design, and planning show relationships between physical environment variables and individuals' walking and cycling for transportation. Current neighborhood designs can be correlated with physical activity to improve understanding of environmental influences on physical activity.

**How Sidewalks & Walkability Impact Health**

There are a number of benefits associated with walking and promoting a walkable community that is safe, comfortable, and well connected for all residents and visitors. These include significant quality of life and positive health benefits. A brief example of each is provided below:

- **Livable Community.** A pedestrian-friendly community can encourage a more livable and enjoyable place to be, with a stronger sense of place and freedom of mobility. Communities that support walking can contribute to safer streets and improved social interactions.

- **Health Benefits.** Walking is also associated with promoting healthier communities by supporting and improving mental and physical health. The World Health Organization has identified physical inactivity as one of the main leading risk factors for global mortality and as an underlying factor for many chronic diseases.

When streets are designed only for cars, they deny people the opportunity to choose more active ways to get around, such as walking and biking. Even where sidewalks exist, large intersections and speeding traffic may make walking unpleasant or even unsafe - discouraging any nonmotorized travel.

Obesity in America has reached epidemic proportions in recent years. The latest data show that 32% of adults are obese, the number of overweight or obese American children nearly tripled between 1980 and 2004. Health experts agree that a big factor is inactivity – 55% of the U.S. adult population falls short of recommended activity guidelines, and approximately 25% report being completely inactive. Inactivity is a factor in many other diseases, including diabetes, heart disease, and stroke. Streets without sidewalks which
do not promote walking mean many people lack opportunities to be active as part of daily life.

Post-World War II growth patterns and street designs tend to favor the automobile over walking and bicycling. The health impacts are clear – one study found that, on a daily basis, each additional hour spent driving is associated with a 6% increase in the likelihood of obesity, while each additional kilometer walked is associated with a 5% reduction in this likelihood.

The walkability of an area not only contributes to its pedestrian safety and property values, it also plays a part in a community's health. An emerging public health perspective links the inability of residents to easily walk or bike to a person's risk of becoming obese. In many parts of the country, rural roadways often do not have sidewalks or places where people can walk, jog or simply commute. People who live in neighborhoods with sidewalks tend to be more physically active. A 2009 study on neighborhood walkability found that in walkable neighborhoods – which are designed for people to walk from their homes to other places – people got 35 to 49 minutes more physical activity each week, according to James Sallis, a professor of psychology at San Diego State University and one of the study's authors. Adults in neighborhoods that weren't as walkable were more likely to be obese or overweight. "Decisions made by urban planners and local elected officials can have large effects on health, but health consequences of development decisions are rarely considered," Sallis said. "In the U.S., probably half the population lives in neighborhoods where it is not feasible to walk for transportation, thus putting them at risk for many diseases."
Children who walk or bicycle to school have better cardiovascular fitness than children who do not actively commute to school, according to a 2008 study by the federal Centers for Disease Control. How neighborhoods are designed influences people's walking, bicycling and jogging habits, according to a University of North Carolina-Chapel Hill study published in December. In rural areas, the more those long, country roads connect, the more people exercise outside, the study concluded. Efforts such as the federally funded Safe Routes to Schools are trying to make walking safer, though. The program works to improve safety and accessibility and reduce traffic and air pollution near schools by improving sidewalks and intersections; it also funds educational efforts. The goal is to make bicycling and walking to school safer and more appealing, encouraging kids to adopt healthy and active lifestyles from an early age.

Complete Streets are streets for everyone. They are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities. Complete Streets make it easy to cross the street, walk to shops and bicycle to work. Complete Streets provide opportunities for increased physical activity by incorporating features that promote regular walking, cycling and transit use into just about every street. A report prepared by the National Conference of State Legislators found that the most effective policy avenue for encouraging bicycling and walking is incorporating sidewalks and bike lanes into community design – essentially, creating Complete Streets.

The continuous network of safe sidewalks and bikeways provided by a Complete Streets policy is important for encouraging active travel. A comprehensive assessment by public health researchers of actions to encourage more physical activity recommended building more sidewalks, improving transit service, and shifting highway funds to create bike lanes. One study found that 43% of people with safe places to walk within 10 minutes of
home met recommended activity levels; among those without safe places to walk just 27% met the recommendation. Residents are 65% more likely to walk in a neighborhood with sidewalks.

Walkability has a direct and specific relation to the health of residents. A comprehensive study of walkability has found that people in walkable neighborhoods did about 35-45 more minutes of moderate intensity physical activity per week and were substantially less likely to be overweight or obese than similar people living in low-walkable neighborhoods.

One study found “a 5% increase in walkability to be associated with a per capita 32.1% increase in time spent in physically active travel, a 0.23-point reduction in body mass index, 6.5% fewer vehicle miles traveled, 5.6% fewer grams of oxides of nitrogen (NOx) emitted, and 5.5% fewer grams of volatile organic compounds (VOC) emitted.”

**How Bikeways and Cycling Impact Health**

Active transportation refers to any form of human-powered transportation – walking, cycling, using a wheelchair, in-line skating or skateboarding. There are many ways to engage in active transportation, whether it is walking to the bus stop, or cycling to school/work. The benefits of active transportation include:

- **Health** – Active transportation provides an opportunity to be physically active on a regular basis.
- **Social** – Active transportation is accessible and increases social interactions.
- **Transportation** – Active transportation reduces road congestion.
- **Environmental** – Active transportation is environmentally-friendly and can contribute to reductions in greenhouse gas emissions.
- **Economic** – Active transportation saves money on gas and parking.

Cycling is one of the primary active transportation modes. Cycling is mainly an aerobic activity, which means that your heart, blood vessels and lungs all get a workout. Cycling promotes you breathe deeper, perspire and experience increased body temperature, which will improve your overall fitness level.

The health benefits of regular cycling include:

- increased cardiovascular fitness
- increased muscle strength and flexibility
- improved joint mobility
- decreased stress levels
- improved posture and coordination
- strengthened bones
- decreased body fat levels
- prevention or management of disease
- reduced anxiety and depression.

It is a healthy, low-impact exercise that can be enjoyed by people of all ages, from young children to older adults. It only takes two to four hours a week to achieve a general improvement to your health.
Cycling is time-efficient as a mode of transportation as it replaces sedentary (sitting) time spent driving motor vehicles or using trams, trains or buses with healthy exercise. Riding to work or the shops is one of the most time-efficient ways to combine regular exercise with your everyday routine.

An estimated one billion people ride bicycles every day – for transport, recreation and sport. Cycling for transportation is one such “three-in-one” solution, where time spent travelling from A to B is also conveniently spent getting physical activity, as well as reducing stress levels.

For example, the British Medical Journal studied the commuting patterns of workers over a five-year period, and in 2017, published a number of results: regularly cycling to work reduced their overall risk of death by 41%, while reducing their risk of heart disease by 46%, and cancer by 45%.

Policy makers should recognize cycling as a healthy and convenient means of transport and recreation that could easily be incorporated into the ordinary day-to-day activity of millions of adults and children.
How Transit Availability Impacts Health

Americans walk the least of any industrialized nation, averaging 5,117 steps per day, nearly half of the “recommended” 10,000 steps per day. Whether or not this correlates to some of the highest obesity rates in the world, one may never know for certain. However, there is much circumstantial evidence that may suggest a correlation exists. Numerous studies have shown that cities/countries with active transit ridership experience lower obesity rates than those without. Transit rides often involve a “first mile/last mile” component. That is to say: riders often must travel from their origin to their initial transit stop and from their last transit stop to their final destination. These trips often involve walking or biking. These walking/biking trips are often very short (a half mile or less). However even modest increases in physical activity can benefit one’s health. Heart disease, hypertension, stroke, diabetes, obesity, osteoporosis, and depression are just a handful of health problems that can be helped by physical activity and exercise. How can people be encouraged to do more walking? One solution is to increase the amount of transit people have access to. Studies have shown that people who live in communities with quality public transportation systems live healthier, more active lives. Commuters who don’t have access to public transit often live more sedentary lifestyles. We often think of transit as moving people to and from their homes to their workplace. But there are other numerous trips that don’t just include work commutes. Trips to the grocery store, a restaurant, or a mall are all ancillary trips that are often made by car but could easily be made via transit if ridership was convenient enough. Additionally, those using transit often don’t even have access to a car and thus are more likely to walk when making these ancillary trips. The walking that’s incorporated with these trips can have just as big of an impact on a person’s health as a daily work commute via transit.
Income disparities also play a big part in the amount of activity in a person’s life. With a larger income comes more access to private gyms and workout equipment. With additional access to exercise, these people can afford to travel via transportation that doesn’t include a walking/biking component. However, to the low-income population who may not have the same access, transportation choice can become increasingly important in their physical activity. Statistics show that obesity and diabetes rates are higher at the poverty level than amongst the rest of the income spectrum. Along the same lines, diet is an important component in one’s overall health. Eating healthy is becoming increasingly more expensive and for those that can afford to exercise and eat healthy on their own time, transportation choice plays a smaller role in their overall health. But once again, for those who can’t afford a healthy diet, transportation choice can play a large part in staying healthy and fit. Providing adequate access to transit to those at the bottom of the income scale can play an even bigger part in the physical health of those people.

When speaking of health and well-being, we often think of physical health in terms of our body. But mental health is another equally important component that’s often neglected. Having reliable transportation can play a big part in a person’s mental health. Not being able to count on transportation to work or the grocery store can be very stressful. Having access to transit service can play a big part in easing these concerns. Transit rides often operate on a fixed schedule, making it easier to plan for trips to work or elsewhere. And transit rides do not require an engaged user. Unlike a vehicle that requires constant attention of the driver throughout the trip, transit riders are free to engage in other business during their commute without compromising their safety. Working, responding to email, texting, or even reading allow a rider to be more productive during their commute and make better use of their time throughout the day. This improved time management can have a direct correlation to stress levels and anxiety. Additionally, transit access gives people the availability to connect to others around their community. Social isolation is another mental health component that can be alleviated through transit by giving people opportunity to travel around their community and experience people/events/areas that may not have been available without reliable transportation.

Yet another major benefit to transit is its benefit to the environment. Eliminating the number of cars on the road can help decrease the amount of pollutants released into the
air by internal combustion engines. These pollutants contribute to a warming of the planet which has been linked to major natural disasters like flooding, drought, and hurricanes. Aside from the physical threats of getting caught up in a major incident like this, the constant threat of severe weather takes a constant toll on the mental health of residents. Increasing the availability and amount of transit can help decrease the amount of vehicle emissions that lead to these severe weather occurrences.

Aside from the environmental impacts caused by these increased pollutants in the air, vehicle emissions can also have a direct health impact on travelers in terms of respiratory disease. Vehicle emissions add harmful components to the particulate matter in the atmosphere, all of which is breathed in by residents of that community. Long-term exposure to air pollutants increases the risk of respiratory illnesses such as allergies, asthma, chronic obstructive pulmonary disease, and lung cancer. Increasing transit availability contributes to the reduction of these emissions and to cleaner air in the atmosphere.

A myriad of evidence suggests that transit access can have a positive effect on the health of the community at large. That information alone should be reason enough to invest in infrastructure improvements that would expand the reach of transit and provide access to a greater number of people. However, if transit does in fact improve the health of its riders, there’s also a financial benefit to this increased spending. Healthcare cost savings could be realized amongst these same individuals, meaning that the money spent in expanding transportation could be saved in healthcare related expenditures. Healthcare costs in the United States have risen every single year since 1960. If a percentage of the money spent on healthcare could be saved by investing in our transportation infrastructure, it would help make the funding decisions that much easier. A transportation plan that improves the health of its community is a plan worth investing in. But a transportation plan that improves the health of its community AND pays for itself is a plan too good to pass up.
How the Design of Neighborhoods Impacts Health

Neighborhood design influences the amount of physical activity, stress levels, access to resources and consequently the health and wellbeing of people. According to literature, the built environment design factors that contribute to human health are street layout and accessibility of neighborhoods, interactions among buildings and public spaces, the amount of green spaces and trees, and the pedestrian and cycling infrastructure. No matter if the neighborhood is urban, suburban, or rural, its design affects residents’ health.

Suburban Neighborhood Design

This section focuses on suburban neighborhoods and how several aspects of their design affect human health. Suburban neighborhoods mainly consist of single-family housing with yards, driveways, sidewalks, and streets, and try to maintain contact with nature providing recreational opportunities and good air quality. Their design help towards recreational walking or jogging but usually it is not possible to walk or bike for utilitarian purposes such as shopping, work, entertainment, and others. This is due to the single land use (residential) of these neighborhoods. Services and commercial destinations are generally located to driving distance from the neighborhoods. Suburban development is the most common and considered the normality in the U.S. since 1950s even though that
type of development is responsible for traffic congestion, car-centered societies and extensive use of natural spaces.

Research studies do not always agree when it comes to the impact of suburban communities on health and wellbeing. For example, Zuniga-Teran et al, which assessed how four types of neighborhood designs, with one of them being suburban, impact physical activity and level of walkability, found that suburban neighborhoods had the highest average in terms of mental health and wellbeing but the lowest average in terms of walking for recreation. However, Montgomery claims that these types of neighborhoods cause high levels of stress due to car dependency and this negatively affects mental health. On the other hand, a study from Rodriguez et al. showed that recreation walking is increased in those communities.

Moving forward, suburban neighborhood design should consider human health, and wellbeing should be of upmost importance. Local governments, planners, engineers, organization, and the public should come together to revise zoning regulations, engineering standards, planning division ordinances, transportation plans, and positively transform communities. The single-use buildings in suburban or rural development is difficult to be maintained due to tight capital budgets and overuse of natural resources. Design should focus on multifunctional area to maximize land efficiency.
The Urban Land Institute (ULI) conducted two studies to provide strategic principles to guide suburban developers and planners to build healthy places and to reinvent suburban development. The principles for building healthy places are:

- Put People First
- Recognize the Economic Value
- Empower Champions for Health
- Energize Shared Spaces
- Make Healthy Choices Easy
- Ensure Equitable Access
- Mix It Up
- Embrace Unique Character
- Promote Access to Healthy Food
- Make It Active

The principles for reinventing the suburban development are:

- Ignite Leadership and Nurture Partnership
- Anticipate Evolution
- Know the Market
- Prune Back Retail-Zoned Land
- Establish Pulse Nodes of Development
- Tame the Traffic
- Create the Place
- Diversify the Character
- Eradicate the Ugliness
- Put Your Money (and Regulations) Where Your Policy Is

The development standards should look into landscaping, signage, pedestrian linkages, architectural quality and others to have a healthy community.

**Urban Neighborhood Design**

Research identifies many design factors contributing to human and social health when it comes to the urban design of the neighborhoods. Specifically, factors such as walkability, physical activity, wellbeing, perceived crime, the effects of trees, and the social interactions with neighbors. Urban neighborhood design provides compact housing (to include closely spaced single-family houses and the multi-family houses in a high-rise setup), retail and offices within walking distance, and a small recreational facility in some cases. This neighborhood design usually follows a grid street network with short blocks, and a mixture of land uses (residential and commercial), to encourage walking. The design is thought to cater a variety of energy levels with commercial streets providing the services that generate lively activity, while nearby residential streets remain quiet and peaceful.
Several factors were identified to improve urban neighborhood design. Research provides potential relations between urban neighborhood design and health. These relationships have been summarized in key points as listed below:

- Urban form characteristics most associated with physical activity
- Mixed land use and density, footpaths, cycle ways and facilities for physical activity
- Street connectivity and design
- Transportation infrastructure that links residential, commercial and business areas

Therefore, urban neighborhood design and its relationship to physical activity should be promoted to provide awareness in public. Community and street scale urban design; land use policies and practices will be more effective path at promoting physical activity.

On a broader perspective, physical activity and walkability factors include: physical activity facilities, access to destinations, high residential density, land use and urban walkability scores.

Overall, urban neighborhood design contributes to good health tends to involve:

- Higher density of residents to include mixed residential and commercial developments with amenities; and good street design that maximizes connectivity for walkers and cyclists
- Good urban neighborhood design for physical activity can synergistically address other transportation – related health risks, generating double or triple health benefits.
Higher urban densities are also strongly associated with reduced transportation relying more on public transportation – primarily from private motor vehicle travel.

- Claiming measures will help in the absence of clean and efficient public transportation and traffic.
  - However, higher urban densities may also increase exposures and risks from air-pollution, noise and road traffic injury, due to greater concentrations of traffic.

- The presence of green and open spaces, parks and sports grounds is associated with range of improved health outcomes in a large number of studies.
  - Similarly, the presence of more green spaces and better aesthetic features in urban neighborhoods is associated with higher levels of physical activity.

- Studies have indicated that new urban routes offered greater traffic safety, accessibility, and crime safety, and diversity.
  - Parents and children perceived new urban routes to be more walkable and children walked more when they lived on more walkable routes.

Moving forward urban neighborhood design should consider:

- One land use strategy for reducing the health impacts of air pollution by reducing the proximity of motor vehicles to people.
  - This can be done by limiting traffic in areas of high population density, or where vulnerable road users are present.
  - Since heavy traffic also tends to discourage walking and cycling due to safety concerns, separation of motor vehicles may indirectly facilitate a shift from car use towards walking and cycling, by making residential areas safer.

- Studies indicates that non-motorized travel is associated with more physical activity and therefore, reduced obesity. Public transportation users have the lowest, on average, risk of injury as compared to other mode of travel. Facilitating healthy transportation modes will have a direct impact on physical activity.

- Improving Vehicles and Fuel: improved vehicle efficiency and other technologies that reduce pollutant emissions can improve population health. Emerging electric vehicle technologies offer the promise of even more substantial pollution and gas emission reduction.

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Special Thanks to Our Mentors
• Walter Okitsu, PE, PTOE, PTP, Principal, KOA Corporation
• Einah Reza M. Pelaez, PE, Deputy Traffic Section Manager/Associate, HDR