

## American Heart Association Active Transportation Policy Statement July 2017

### Introduction

The current prevalence and global reach of physical inactivity has been described as a pandemic with far-reaching health, economic, and social consequences.<sup>1</sup> The American Heart Association prioritizes increasing physical activity and physical fitness across the population as an important opportunity to improve cardiovascular health in the United States; decreasing the likelihood of chronic disease (i.e., primordial and primary prevention) and treating chronic disease if a diagnosis has occurred (i.e., secondary prevention). Physical activity, and more broadly, physical movement of any kind, is a vital medicine for everyone in the United States.<sup>2</sup> Promoting active transportation -- the opportunity to bike, walk, or roll to work, school, or around the community -- through policy, systems and environmental change is one of the leading evidence-based strategies to increase physical activity across the lifespan.<sup>3</sup> In this context, daily participation in physical activity replaces the concept of a lifespan with the concept of a healthspan, the latter of which is defined as the number of years an individual is generally healthy and free of debilitating disease.<sup>4</sup>

Active transportation engages the public health, municipal planning, and transportation communities that often speak different languages and have different values and priorities, but translational resources have been developed<sup>5</sup> and recently more common ground is being found.<sup>6,7,8</sup> Embedding health within transportation policy can be challenging and requires purposefully convening a wide range of stakeholders to address community planning, street scale-design, health equity, crime, and safety. Recently, the American Heart Association, in collaboration with the European Society of Cardiology, European Association for Cardiovascular Prevention and Rehabilitation, and American College of Preventive Medicine, outlined a framework for stakeholders from various sectors to follow in order to create impactful healthy living initiatives.<sup>9</sup> The development of mixed-use, walkable, bikeable and transit served communities depends on coordinated land use planning and multimodal transportation investments and collaborative partnerships. For optimal implementation, infrastructure improvements must be accompanied by education, worksite, school and community policies, and a supportive culture that promotes biking, walking, and rolling. For example, relaxed dress codes, bicycle storage, showers in office buildings, and workplace policies incentivizing active transport, may encourage adults to bike or walk to work.<sup>10</sup> Additionally, Safe Routes to School partnerships and programs support active commuting to schools and improvements in school commute safety.

Unfortunately, vulnerable populations including people with low income, racial/ethnic minorities, immigrants, LGBTQ people, older adults, children and people with disabilities often do not live in connected communities, making it harder to access jobs and other economic and social opportunities.<sup>11,12</sup> Many low-income people who do not own cars also do not have the needed infrastructure to get safely to jobs or essential destinations as they walk or roll through their communities. Prioritizing equity within Complete Streets policies, Safe Routes to School, and biking and walking infrastructure is challenging but essential for providing opportunities for active transit. The

***Policy Research: Linking scientists, clinicians and policymakers to help improve cardiovascular health and decrease heart disease and stroke mortality.***

American Heart Association supports equitable, evidence-based strategies to improve active transportation for all Americans.

Community Preventive Services Task Force Recommendations on Built Environment to Increase Physical Activity<sup>13</sup>

**Recommendation:** Built environment strategies should combine one or more interventions to improve pedestrian or bicycle transportation systems with one or more land use and environmental design interventions to increase physical activity.

**Intervention:** Built environment interventions to increase physical activity of all kinds, create or modify environmental characteristics in a community to make physical activity easier or more accessible. Coordinated approaches must combine new or enhanced elements of transportation systems with new or enhanced land use and environmental design features. Intervention approaches must be designed to enhance opportunities for active transportation, leisure-time physical activity, or both.

**Transportation system interventions include:**

- Street connectivity
- Sidewalk and trail infrastructure
- Bicycle infrastructure
- Public transit infrastructure and access
- Traffic calming and safety measures

**Land use and environmental design interventions include one or more policies, designs or projects to create or enhance the following:**

- Mixed land use environments to increase the diversity and proximity of local destinations where people live, work, shop, learn and spend their recreation and leisure time.
- Access to parks and other public or private recreational facilities

Additional activities may be implemented to promote physical activity and use of new resources in the community (e.g. Safe Routes to School)

**Effects of Built Environment and Walkability on Active Transportation and Recreational Physical Activity**

Communities that have a low-density of land development, high rates of crime, no public transit and disconnected street networks tend to be auto-centric and do not encourage walking or other active transport.<sup>14</sup> In contrast, walkable and bikeable communities with street connectivity, residential density, mixed land use, and retail centers are health-promoting as they tend to have better air quality, and promote community engagement and active transportation.<sup>6,15,16,17,18,19,20</sup> Planning and transportation agencies play a vital role in determining community design, travel modes and travel behavior, influencing walkability, connectedness, and air pollution levels.<sup>21</sup> A 'walkability' index typically consists of measures that assess perceived residential density, land use mix access, proximity of destinations, functional features, and aesthetics.<sup>22</sup> Walk Score is a nationally and publicly available metric of neighborhood walkability based on proximity to destinations (e.g., retail, food, schools, public transit) that provides a score of 0-100 for individual addresses in every community across the United States. (<https://www.walkscore.com/about.shtml>) Research has demonstrated that for each 10 point increase in Walk Score for a particular community, there is a 19% increase in the likelihood of purposeful walking and a 26% increase in the likelihood of meeting the Physical Activity Guidelines by walking.<sup>23</sup> Another

study found that a 5% increase in walkability in a community was associated with a per capita 32.1% increase in time spent in physically active travel, a .23 point reduction in body mass index, 6.5% fewer vehicles miles traveled, and 5.5% fewer grams of volatile organic compounds emitted.<sup>4</sup>

Systematic reviews demonstrate that purposeful exercise including cycling and walking on a regular basis increases physical fitness<sup>24</sup>, aerobic capacity, flexibility and leads to greater energy expenditure and lower risk of all-cause mortality, cardiovascular risk factors and some types of cancer.<sup>25</sup> Generally, active transport is associated with more total physical activity, lower rates of obesity and diabetes, and may decrease disparities in meeting the Physical Activity Guidelines for Americans.<sup>26,27,28,29,30,31,32</sup>

Unfortunately, one study using the American Time Use Survey found that only 13% of adults spend some time in active transportation on a weekly basis, while 84% of adults used predominantly sedentary transportation.<sup>33</sup> Cross-sectional data show that on a typical day, about 1% of residents in the United States report traveling by bicycle.<sup>34</sup> More often, these persons were white, male, in more densely populated areas, more educated, and younger in age.<sup>35</sup> Forty percent of all trips in the US are within easy bicycling range of two miles or less.<sup>36</sup> Several demographic and health-related factors are associated with participating in active transport overall including age, level of education, sociodemographic factors<sup>37</sup>, seasonality, urbanization, number of chronic diseases, weight status, eco-friendly attitudes<sup>38</sup> and beliefs about being physically active.<sup>39</sup>

#### *Aspects of the Built Environment that contribute to Walkability and Bikeability*

It is important to advocate to municipal authorities to integrate physical activity into community design and infrastructure, to increase communication and collaboration across relevant planning, public works, public health and transportation departments and find resources to overcome staffing constraints for active transportation coordinators.<sup>40,41</sup> Several aspects of the built environment contribute to active transport. Planners should focus on community walkability, crime prevention and traffic safety as key components.<sup>42,43</sup> Reviews support community-scale and street-scale urban design and land use policies and practices as key strategies to promote physical activity and should be a priority for community decision makers.<sup>44</sup>

Specific street-level design attributes that promote active transport include: the presence of sidewalks, cross walks, and bike paths, traffic abatement, speed tables, general upkeep, evenness of path or sidewalk, vegetation, separation of motorized traffic from bike/pedestrian corridors, and adequate width of the path or walkway.<sup>45,46</sup> Designing community environments to include open spaces/parks/trails, mixed land use, trees/greenery, bike/pedestrian accessibility and street connectivity, attractive and pedestrian-friendly building design with easy access for those with disabilities, and workplace physical activity policies/programs have demonstrated significant co-benefits.<sup>47</sup> These include physical health, mental health, safety/injury prevention, social benefits, economic benefits, and environmental sustainability focusing on carbon emissions and reduced air pollution.<sup>17</sup>

Some studies have significant heterogeneity, cross-sectional design, or use crude measures for physical activity, so this area of research may benefit from future studies quantifying the impact of the built environment on active transport and population-level physical activity.<sup>15, 48,49,50</sup> Additionally, further research should develop consistent international measures that capture “walkability” and “bikeability.”<sup>30</sup>

#### *Trails*

Trails are important for facilitating active commuting and recreational physical activity especially if they are accessible, convenient, and aesthetically pleasing.<sup>51,52</sup> Compared with people who rarely or never use trails, people who report using trails at least once a week are twice as likely to meet the recommended amounts of moderate-vigorous physical activity.<sup>53</sup> Even those who do not use trails support expanded public spaces for exercise and are willing to pay more taxes to build and maintain these types of infrastructure improvements that contribute to people's decisions to live in a particular community.<sup>41</sup> Further evaluation and policy development should focus on ways to sustain increased physical activity on these trails over time and explore the efficacy of trails as connectors to main street hubs in rural settings.<sup>54</sup>

Specifically, it is important to consider the benefits of trails in Indian Country where there are specific challenges related to land tenure, economic and health disparities and transportation safety.<sup>55</sup> In Indian country trails help strengthen and preserve cultural identity and natural heritage, directly address the most pervasive social challenges and help spur constructive partnerships.

#### *Public Transportation and Active Commuting*

Active commuting and public transit use depend on a complex range of interactions including demographics (age, number of children), interpersonal (spouse active commuting), worksite policies that support or subsidize active commuting, community (perceived distance to work) and environmental factors (weather, lack of on-street bike lanes).<sup>44</sup> Research supports a link between use of public transportation, more physical activity throughout the day, and lower BMI.<sup>56,57,58,59,60,61,62,63</sup> However, further evaluation is needed to assess whether use of public transportation increases active commuting.<sup>64</sup> Research has found that people are more likely to walk to public transit if they are from lower income households, live in urban centers with access to public transportation, and are non-white.<sup>65</sup> Some research shows that employer-subsidized public transportation facilitates use of public transportation and increases physical activity levels in employees.<sup>66</sup> Walking to public transit stops is more common than biking.<sup>67</sup> Although there is increasingly better integration between cycling and public transport, there are still significant deficits in facilities that support biking to public transportation such as sheltered bike parking at rail stations, bike-carrying capacity on buses or trains, and bike racks on buses.<sup>68</sup> More appropriations are needed to increase this capacity. For both men and women, bicycling to work is more likely if car parking and travel costs are a concern, but less likely if there is a general need for a car at work or travel convenience is paramount.<sup>69</sup>

#### *First/Last Mile Approach*

The First/Last Mile challenge describes the challenge in getting people from their original location to a public transportation hub (or from a transit stop to their final destination.) First Mile/Last Mile approaches face considerable challenges in the United States because of current land use patterns where people are living in lower-density areas further out from public transportation or there is a lack of adequate connectivity between transit stops and trip origin or termination points.<sup>70</sup> Transit use becomes less practical unless there are greater uses of feeder buses, pedestrian and bicycle infrastructure and better urban planning.<sup>71, 72</sup> Biking and walking can be important connections to public transportation and transit funds can help support this connectivity.<sup>73</sup> Other issues contributing to walking/biking to public transportation hubs include crime levels, lack of adequate street lighting, traffic patterns, sidewalk availability, law and immigration enforcement, gender and sociodemographic variables.<sup>74</sup> Bicycle infrastructure such as parking racks, increased lineal miles of bike paths and bike

boulevards, especially those that are protected or buffered<sup>75</sup>, increase biking to and from rail and bus stations.<sup>76</sup> Public bike sharing programs have increased in many major cities and can increase active transport both independent of, and in support of public transportation use.<sup>77,78</sup> Bicycle/transit integration is an important way to alleviate the first/last mile issue and increase the catchment area of public transit.<sup>79</sup>

### **The Importance of Health Equity and Active Transportation**

In the United States, much of our built environment does not support safe and enjoyable bicycling, walking, or rolling and there are significant disparities in access especially for low-income and vulnerable communities, in rural and urban environments, persons with a disability, for older individuals and in people of color.<sup>80,81,82, 83</sup> Additionally, there is often a greater need in low-income communities for safe active transport to get to destinations and jobs without cars where there is often the least infrastructure support.<sup>84</sup> A recent report from Smart Growth America summarized the epidemic of pedestrian fatalities across the country due to poor infrastructure and compared states and municipalities on their walkability.<sup>85</sup> People of color and older Americans disproportionately suffer from pedestrian fatalities due to poor street scale design.<sup>80</sup> Low-income communities with higher pedestrian fatalities have lower property values, greater levels of disinvestment, worse air quality and lack the political power to attract community resources for active transport, safety and crime reduction. Poor built environment and street scale design diminish access to jobs, health care, open spaces, places of worship, and public transportation, negatively affecting social cohesion, health, and well-being.<sup>86</sup> Longitudinal research has shown that new bike and walking infrastructure may attract those who are already active and those with more socioeconomic advantage, so it is important that there is purposeful planning and community engagement with vulnerable populations to avoid perpetuating inequity and health disparities with infrastructure investments.<sup>87</sup>

For older community members, walking is considered an important means of physical activity. Perceived barriers, especially in older ethnic minority women are safety and pain, however the desire to stay out of nursing homes and weight control can be motivators.<sup>88</sup> Overall, older men tend to participate more in walking and active commuting than older women, but in low SES neighborhoods, black women tend to walk more than white women.<sup>89</sup> In high SES neighborhoods rates are about the same.<sup>89</sup> Overall, active transportation rates for work are higher in low-income and urban populations and in terms of regional variation, are lowest in the South.<sup>89</sup> Greater neighborhood cohesion and mental health and well-being can foster more walking in older adults, however overall, active transport does tend to decrease with age.<sup>90,91,92</sup> It is important to understand the impact of retirement on active transport and physical activity levels. Early research has shown that recently retired adults are prone to more computer use and television watching, especially in adults with less education.<sup>93</sup> Future interventions for older adults should focus on retirement as an important time for programing and other initiatives to encourage physical activity and active transport. One concept that has gained momentum in both the U.S. and elsewhere is the 8-80 city concept, where the built environment is designed to support and protect those 8 and younger and 80 and older. If done, the belief is that the needs of everyone else are more than adequately addressed.<sup>94</sup>

### *Affordable Housing, Urban Design, and Compact Development for Active Transportation*

The construction of higher density, affordable housing along major transit corridors can provide access to public and active transportation options, retail outlets, parks, and job opportunities.<sup>95</sup> Considering the low rates of active transportation opportunities in low-income and racial/ethnic neighborhoods, it is more important than ever to assure that affordable housing is provided in areas of population growth

where there is purposeful planning for connected, walkable communities and access to public transit.<sup>96,97</sup> Unfortunately, the number of communities considered affordable drops dramatically in most regions of the country when transportation and housing costs are considered together.<sup>98</sup> Families often have to live further out from municipal centers to find affordable housing and then have to absorb significant transportation costs associated with owning a vehicle.<sup>98,99</sup> The Center for Neighborhood Technology (CNT) is an organization that is focused on promoting more livable and sustainable communities, and has developed the Housing + Transportation (H+T<sup>®</sup>) Affordability Index which provides a measure of affordability calculated at the neighborhood level that takes into account both housing and transportation, two of the largest components of the regional cost-of-living.<sup>100</sup> Longer distances between housing and municipal centers are associated with sprawl, more traffic congestion, higher greenhouse gas emissions, less leisure time that could be spent in active recreation, and more sedentary time in cars.<sup>98</sup> Major metro centers could save billions of dollars by creating more location efficient places as they accommodate population growth.<sup>98</sup> Ideally, residents assist in the community's planning and design to assure alignment between residents' values and the goals of the municipality. There is a need to consistently apply performance measures that assess the balance of growth with the maintenance of affordable housing to provide access to public and active transport, recreational spaces, and walkable communities.<sup>98</sup>

### *Gentrification*

It is important to understand the interaction between walkability, gentrification, and vulnerable populations. There is concern that as neighborhoods within major metropolitan areas develop more walkability features, they become more desirable, housing values (and thus taxes) rise, an area becomes gentrified, and it becomes harder for low-income residents to continue to reside in those communities.<sup>97,101</sup> Some research does not support this, however, showing that as higher income homeowners move in, there is relative stability in racial make-up, a selective departure of low-income residents, some new sources of income and greater satisfaction with the neighborhood.<sup>102,103,104,105</sup> The degree of choice and distance options for mobility contribute to relocation decisions. Other research shows that incoming middle class residents in gentrified neighborhoods tend to self-segregate leading to greater social polarization in the community.<sup>106</sup> Community networks and services that are resources for vulnerable populations are often dismantled.<sup>107</sup>

Communities need to be constantly vigilant. Rent stabilization policies, affordable public housing, and access to affordable public transportation are buffers against displacement, however, these are often rejected by policy makers and residents especially as neighborhoods become more polarized.<sup>108,109</sup> Other tactics worthy of further study include inclusionary zoning requirements; development codes that dictate mixes of housing sizes (e.g. using floor to area ratios) and types (rent and own, single and multi-family); and accessory dwelling by-laws, often with owner occupancy requirements to allow for units such as over-garage, garden bungalows, and in-law apartments. Transit-oriented housing is in high demand so is often priced out of reach for low-income populations.<sup>110</sup>

In summary, there is high variability in different metro regions around how gentrification and displacement are unfolding, depending on the intensity of the residential markets and of development pressures. The research is relatively nascent. More study is needed to guide planners, policy makers and community based organizers who are addressing street-scale design, walkability, and connectedness to assure that there is socially-responsible urban design, equitable access to green space and transit-oriented housing, and vulnerable populations have the opportunity to remain in communities where economic development is happening and active transportation is promoted.<sup>111,112,113,114</sup>

### **Priority Policy Approaches to Achieve Active Transportation**

There are numerous policy approaches to increasing active transportation in communities. For example, Change Lab Solutions has developed a publication with over 60 policy approaches to increase bicycling in communities available at:

[http://www.changelabsolutions.org/sites/default/files/Getting\\_the\\_Wheels\\_Rolling\\_Toolkit-FINAL\\_20130823\\_0.pdf](http://www.changelabsolutions.org/sites/default/files/Getting_the_Wheels_Rolling_Toolkit-FINAL_20130823_0.pdf)).

The Safe Routes to School National Partnership has developed a local policy guide to support local communities and schools in creating, enacting, and implementing policies that support active, healthy community environments that encourage safe walking and bicycling. It can be accessed at:

<http://www.saferoutespartnership.org/resourcecenter/publications/local-policy-guide>.

All of these policies are important to consider and tailor to communities. The American Heart Association prioritizes the following three evidence-based approaches to increasing physical activity levels through active transport.

#### *Complete Streets*

Complete Streets policies integrate all modes of transportation, accounting for the needs of people and place in an equitable way in planning, design, operation, and maintenance of transportation networks.<sup>115</sup> The specific features that contribute to a complete street have been well described.<sup>116</sup> At its simplest level, a Complete Streets approach requires that all users of all ages, incomes, abilities and disabilities be considered in all roadway construction, repair, and even routine maintenance (such as paving and painting) and reconstruction after roadway disturbance (such as utility work). Complete Streets policy is now a formal part of federal policy, integrated in policies in all 50 states and in hundreds of individual municipalities.<sup>115</sup> Momentum is building across the country for a commitment to multi-modal transportation. Having a Complete Streets policy in place is associated with higher rates of walking, using public transit and better air quality.<sup>117,118</sup> These policies are also associated with fewer collisions and injuries between cars and bikers or pedestrians, averting \$18.1 million in collision and injury costs annually across the country.<sup>119</sup> There are significant regional differences in Complete Streets implementation with lower rates in the deep South, likely due to historical development patterns, urban sprawl, and lower levels of funding for active transportation.<sup>120</sup>

If Complete Streets policies are to be implemented optimally, research suggests that creating a mechanism to support implementation and fostering cooperation across the compartmentalized structure of local government is critical and typically under the purview of municipal agencies.<sup>121</sup> Resources that can support local governments in implementation have been created by national organizations and cited in the peer-reviewed literature and can be reinforced with participatory planning.<sup>122,123</sup>

#### *Bike/Pedestrian Infrastructure*

Several key strategies contribute to success in integrating active transportation within local planning efforts including developing broad, cross-sector partnerships that incorporate sustainability planning; identifying cultivating and celebrating champions; assuring that champions have political power; working closely with research partners to optimize data for planning and evaluation; and creating and building on short-term, achievable successes.<sup>124</sup> Achieving support within State Departments of Transportation for active transportation including bike/pedestrian infrastructure and spending is a long

process, where advocates need to reach a potentially reluctant management and state engineering staff and overcome significant fiscal constraints.<sup>125</sup> Trail development specifically, is a long process, typically taking many years to overcome opposition, acquire funding, influencers, property right-of-ways, standard design policies, and convene a multi-sector coalition that balances the different motives of the stakeholders to achieve the common goal.<sup>126</sup> Research has shown that municipal officials who represent constituents who participate in active commuting and live in the city where they work, are more likely to purposefully create land use policies that support active living.<sup>127</sup>

One analysis reviewed the physical activity-related legislation that has been passed in states over the last decade and found that successful enactment was more likely when public transportation and bike/pedestrian infrastructure were included together, there was Republican or bi-partisan sponsorship, and specific fiscal amounts were included.<sup>128</sup> Other research has shown that there are four primary factors that define settings where more active transportation will occur: a compact variety of land uses, with a mix of destinations in close proximity; a comprehensive network of biking, pedestrian and transit facilities, inviting and functional designs for those doing active transportation, and safety and access for all users.<sup>129</sup> And there are specific policy interventions that help guide communities to these active transportation outcomes: zoning and development policies that protect open space, contain sprawl, and focus on thriving, mixed downtowns, a transportation-oriented trail network, bicycle and transit-friendly infrastructure and incentives, procuring dedicated private/public funding for bike/pedestrian infrastructure, public support for shifting transportation funds to active transportation projects, and purposeful partnerships with design, planning, policy, and implementation stakeholders.<sup>129,130,131,132,133,134,135,136,137</sup> Several communities have successfully used the Active Living By Design Community Action Model (preparation, promotion, programs, policy, and physical projects) as a helpful framework to develop and design comprehensive bike and pedestrian infrastructure that can be funded.<sup>138</sup>

### *Safe Routes to School*

Safe Routes to School is a cost-effective federally- and state-funded transportation program that facilitates active, safe commuting to and from school with street scale improvements or other support.<sup>139</sup> Safe Routes to School Programs are associated with significantly increased active transport to school<sup>140,141</sup> and an impactful reduction in pedestrian/bike injury risk and fatality.<sup>142,143</sup> Actively getting to and from school is an important source of physical activity for children and has been shown to improve their cardiorespiratory fitness and reduce body mass index (BMI).<sup>144</sup> Unfortunately, US school children have much lower rates of active transport to school than children in other countries around the world.<sup>145</sup> While 45 years ago almost half of students actively commuted to school, now less than 15% of children bike, walk, or roll to school on any given day and in many school districts across the country the rates are much lower.<sup>145,146</sup> However, active transport rates overall are higher in children and adolescents compared with adults, especially older adults.<sup>147</sup> Implementation and utilization of Safe Routes to School and other initiatives like walking school bus programs are an important means of increasing physical activity in school-aged children and adolescents.<sup>145</sup> Boys have higher rates of active transportation to school compared with girls and high schools students tend to walk more than elementary and middle school students.<sup>145,148</sup>

There is potential for school districts and families to reduce transportation expenditure with public sector investments in walking and biking infrastructure around schools.<sup>149</sup> Factors influencing active transportation to school include crime, street connectivity, residential density around the school, stray or aggressive animals, traffic speed, residential density, distance, pedestrian safety, parent modeling,

public transit infrastructure, acculturation, and community aesthetics.<sup>145,146, 150,151,152 153</sup> Land use and siting are important as the most cost-effective investments would benefit schools where large numbers of children live within walking distance.<sup>149</sup> Community partnerships and collaboration to mobilize knowledge and resources are also essential to effective implementation.<sup>154</sup> It is critical to ensure adequate funding for Safe Routes to School initiatives across the country and create ongoing policy support from schools and local governments. Continued tracking of implementation and health outcomes, reductions in traffic congestion and management needs, and reductions in overall transportation costs (e.g. through reduction in bus routes) associated with Safe Routes to School initiatives will help make these projects competitive within other transportation funding priorities and optimally sell the program to parents, policy makers and communities.

### **Traffic Safety**

Measuring the incidence of crashes, injuries or fatalities during active transport is another critical way to assure better infrastructure, support, education, and safety for those who want to walk, bike, or roll to their destinations. One typical measure used is the ratio of reported fatalities or crashes to trips.<sup>155,156</sup>

Vision Zero is a multi-national movement that originated in Sweden to achieve a highway system with no fatalities.<sup>157</sup> In 2015, the US Department of Transportation announced that the official target of the federal government transportation safety policy was zero deaths.<sup>158</sup> Although zero deaths may be unrealistic to attain, the goal is to reconceive and redesign the transportation system to prevent deaths, rather than accepting hundreds of thousands of deaths a year as a byproduct of the system. Examples of improvements in the US transportation system include reducing speed limits and design speeds, providing posted feedback when drivers are traveling over the speed limit<sup>159</sup>, enforcing bicycle helmet laws<sup>160</sup>, stronger regulation around safe driving, distracted driving, and driving under the influence<sup>161,162</sup>, improved infrastructure for active transport, better roadway design, awareness campaigns, improved signage and road markings, and appropriations for greater enforcement of traffic laws. Because Vision Zero proponents have sometimes led with enhanced surveillance and enforcement, the approach has not always received consistent public support, especially in racial/ethnic communities where there have historically been strained relationships with law enforcement.<sup>163,164</sup> Ultimately, if Vision Zero is going to be effectively and consistently implemented in communities across the country, it should use targeted education, effective engineering and data-driven enforcement, purposefully integrate social justice and health equity into its constructs, and focus on moving people safely with all modes of transport over roads that safely accommodate people who are biking, walking or rolling.<sup>165,166,167,168</sup>

### **Active Transportation and Economic Benefits**

The economic impact of active transportation on tax revenues, property values, consumer spending and employment is complex, just beginning to emerge and requires further research to better outline the return on investment.<sup>169,170</sup> Some research has shown that there is economic benefit with local active transportation investment: residential property values may rise with close proximity to a walking/biking trail, retail properties have higher property values when located in walkable communities (compared with non-walkable areas), retail revenues are higher, and active transportation projects can have a modest positive impact on job creation.<sup>97,155,171,172,173</sup> Other research has shown that walkability may increase accessibility to community resources, provide consumer and public cost savings, increase community livability, improve public health, and support strategic economic development, land use, and equity objectives.<sup>174</sup> Walkability specifically has been shown to increase office, retail, and apartment values.<sup>175</sup> However, evidence related to the economic impact of active transportation is still in its infancy, is in a variety of peer-reviewed and gray literature, and needs more robust research design and better cost benefit analysis.

### Funding Active Transportation

The federal government has made funds available for active transportation in several successive federal transportation laws, with funds increasing significantly since the 1970s, however there is competition with other multimodal transportation projects. In the past several years, while federal funding has been sustained, it has come under threat.<sup>176</sup> It is worth noting that the lion's share of federal transportation funding, historically called the Surface Transportation Program (STP), *may* be used for pedestrian, bicycle, and transit infrastructure. So, one of the most promising ways to increase that infrastructure is to include it routinely, as part of all surface transportation projects. For example, the Nashville Metropolitan Planning Organization (MPO) has increased the importance of pedestrian, bicycle, and pedestrian accommodation in scoring their priority transportation projects.<sup>177</sup> The result has been a dramatic increase in, for example, road and bridge projects that automatically include pedestrian, bicycle, and transit facilities. Increasingly, state and local governments will have to amplify funding coming from the federal level.<sup>178</sup>

There are several potential funding sources for active transportation projects at the state and local level. These include county sales tax measures, transportation impact fees, gas taxes, a congestion road tax, and user fees including for vehicle use, recreational vehicles, tolls, and congestion pricing.<sup>179,180,181,182</sup> The state of Washington has authorized local jurisdictions to impose an impact fee to mitigate the impact of housing and industry development on the transportation system.<sup>183</sup> From this authorizing legislation Seattle created multimodal development impact mitigation programs, which can serve as models for other jurisdictions, generating needed funds for street-scale design projects, non-motorized facilities, and active transport infrastructure. Portland, Oregon has developed and utilized similar programs.<sup>169</sup> More and more, local governments are implementing taxes, issuing bonds, providing general fund allocations, seeking private/public partnerships, or levying impact fees on developers to shift financial burden from taxpayers to pay for the infrastructure that supports development.<sup>184,185,186</sup> One focus of the funding should be to assure that resources are directed to vulnerable communities and states and municipalities should have multimodal transportation masterplans to guide infrastructure investment.<sup>187</sup> Public buy-in on funding for active transportation is paramount.<sup>188</sup>

#### Five Potential Sources of Revenue for State and Local Active Transportation Projects<sup>189</sup>

|                                       |                                                                                                                                                                                                                                                                |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Traditional Revenue Sources           | <ul style="list-style-type: none"><li>• General revenues</li><li>• Sales taxes</li><li>• Gas taxes</li><li>• Property taxes</li><li>• Lease revenues</li><li>• Vehicle registration fees</li><li>• Advertising revenue</li><li>• Concessions revenue</li></ul> |
| Business and Activity-Related Funding | <ul style="list-style-type: none"><li>• Employer payroll taxes for specific service areas</li><li>• Rental car fees</li><li>• Parking fees</li><li>• Realty transfer taxes and fees</li><li>• Room occupancy taxes</li></ul>                                   |
| Revenue Streams from Projects         | <ul style="list-style-type: none"><li>• Transit-oriented development revenues dedicated to specific improvements</li></ul>                                                                                                                                     |

|                           |                                                                                                                                                                                                                                         |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           | <ul style="list-style-type: none"> <li>• Special assessment districts</li> <li>• Business improvement districts</li> <li>• Impact fees</li> <li>• Tax increment financing districts</li> <li>• Right-of-way leasing revenues</li> </ul> |
| User or Market-Based Fees | <ul style="list-style-type: none"> <li>• Fees for vehicle use on a vehicle miles traveled basis</li> <li>• Tolling</li> <li>• Congestion pricing</li> <li>• Traffic fines</li> </ul>                                                    |
| Financing                 | <ul style="list-style-type: none"> <li>• General obligation bonds</li> <li>• Private activity bonds</li> <li>• Tax credit bonds</li> <li>• Grant anticipation notes</li> <li>• State infrastructure bank loans</li> </ul>               |

### Consistent Measures for Active Transportation that Embed Equity

The importance of developing consistent measures for active transportation and its impact on population health is paramount. Correlating measures of active transport with census data on socioeconomic status, crime rates, education levels, affordable housing, geography, community economic viability, cultural relevance, race/ethnicity and other demographics related to social determinants of health allows for the assessment of active transportation's role in reducing health disparity and increasing physical activity across the entire population.<sup>190,191</sup> Incorporating a health-in-all-policies approach<sup>192</sup> and taking into account more qualitative data on how people understand their environment and address competing demands for their time and resources may also provide an important window into equitable active transportation.<sup>193</sup> Also, incorporating equity measures from the beginning of projects allows communities to assess whether implementation provides active transport for all or perpetuates patterns of disparity.<sup>194</sup> Equity measures should incorporate funding sources for active transportation.<sup>195</sup>

### Potential Measures for Active Transportation and its Impact on Population Health<sup>196</sup>

The following table summarizes potential measures in eight different areas.

| Category          | Specific Measures                                                                                                                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Health and Safety | <ul style="list-style-type: none"> <li>• Number of collisions</li> <li>• Crime rate</li> <li>• Number of on-duty police officers</li> <li>• Air quality</li> <li>• Individual physical activity levels</li> </ul> |
| Multimodal        | <ul style="list-style-type: none"> <li>• Travel time</li> <li>• Delay</li> <li>• Network connectivity</li> <li>• Access</li> </ul>                                                                                |
| Equity            | <ul style="list-style-type: none"> <li>• Geography</li> <li>• Diversity of area covered</li> </ul>                                                                                                                |

|                      |                                                                                                                                                                                                                                                    |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      | <ul style="list-style-type: none"> <li>• Relative investment in communities of concern</li> <li>• Compliance with the Americans with Disabilities Act</li> </ul>                                                                                   |
| Education            | <ul style="list-style-type: none"> <li>• Availability of education programs</li> <li>• Participation in these programs</li> <li>• Level of staff training</li> <li>• Success of these programs in shifting to active modes of transport</li> </ul> |
| Access               | <ul style="list-style-type: none"> <li>• Intersection density</li> <li>• Trail connections</li> <li>• Gap closures</li> </ul>                                                                                                                      |
| Infrastructure       | <ul style="list-style-type: none"> <li>• The quality and quantity of active transportation facilities</li> <li>• Bike and pedestrian enhancements</li> <li>• Provision of supporting facilities</li> <li>• Maintenance</li> </ul>                  |
| Economic Development | <ul style="list-style-type: none"> <li>• Influence of active transport on local/regional economic performance such as sales records and property values</li> </ul>                                                                                 |
| Placemaking          | <ul style="list-style-type: none"> <li>• Number of art and community events</li> <li>• Quality and quantity of landscaping</li> <li>• Presence of wayfinding</li> </ul>                                                                            |

Additionally, there are auditing tools that allow community leaders or researchers to measure the actual recreational/active transportation spaces with metrics.<sup>197,198,199</sup> Specific metrics might include environmental indicators such as some measures of connectivity and accessibility, the amount of open space, the number of sports facilities, the number of trails, a count of physical activity facilities, and a measure of the quality of physical activity facilities.<sup>200,201</sup> They also might include policy indicators such as the percentage of schools with a Safe Routes to School program, existence of a Complete Streets policy, percentage of commute trips by walking, bicycling, and public transit and self-reported municipal commitment to land use policy that supports active transportation.<sup>202,203</sup> Additional research is needed to refine the measures of walkability and bikeability so they are accurate and can be applied across all settings.<sup>204</sup> There is a Rural Active Living Assessment Tool that assesses town-wide, street-segment, and program and policy measures that is easy to use and important for facilitating active transport in rural settings.<sup>205</sup>

Public health officials and urban planners need to work together to agree on and use consistent measures to assess the impact of active transportation projects.<sup>206</sup> Composite measures for active transport may be more consistent predictors of physical activity and walking/biking behavior than single component measures.<sup>207</sup> Objectively-measured data may be more accurate than self-reported information, even though they are typically more costly and time-consuming to collect.<sup>208,209, 210</sup> Newer technologies like Webcams, GPS devices, mobile technologies, wearable activity tracking devices, wearable cameras and crowd-sourced data may offer additional, locally-relevant information that is more cost effective, however additional research is needed to refine these data collection techniques.<sup>211,212,213,214</sup> Most importantly, integrating measures for active transportation will help assure that biking, walking and rolling infrastructure gets the attention it deserves in municipal budgets and

funding. Agencies have to adopt these measures as a normal course of business to assure that communities become less auto-centric and purposefully direct investments for equitable active transport.<sup>215</sup> The environmental and policy variables shown to be important for physical activity and health are generally not collected by transportation departments and this lack of measurement can be a major barrier to increased funding since transportation departments are very data oriented. Methodological standardization and consistent use of measures will be critical for tracking the effectiveness of projects over time and across different communities.<sup>182</sup>

## Conclusion

Active transportation is an important means to increase physical activity across the population, while promoting mobility, healthy lifestyles, reduced traffic congestion and environmental impacts, and generating economic benefit. The American Heart Association supports safe, equitable active transportation policy in communities across the country that incorporates consistent implementation evaluation. Ideally, active transportation policy should operate at three levels: the macro-scale of mixed and compact land use; the meso-scale of pedestrian and bicycle networks and infrastructure such as Complete Streets policies, Safe Routes to School initiatives, and trail development; and the micro-scale of design interventions and placemaking such as building orientation and access, street furnishings, and safety and traffic calming measures. Active transportation projects should provide connectivity to public transportation, affordable housing, education, jobs, schools, services, retail environments, recreation, and other critical destinations.

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