COMMUNITY SPEED REDUCTION AND PUBLIC HEALTH: A TECHNICAL REPORT

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Health Resources in Action
Advancing Public Health and Medical Research

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TABLE OF CONTENTS

I. VEHICLE SPEED IS AN OVERLOOKED PUBLIC HEALTH PROBLEM

Introduction

Motor vehicle crashes, which are the leading cause of unintentional injury deaths in the United States each year, killed over 30,000 people in 2010.[1, 2] Vehicle speed is a major factor in many of these collisions, and higher speeds are especially dangerous for pedestrians and cyclists when collisions occur. In 2010 approximately 4,280 pedestrians and 620 bicyclists were killed in traffic collisions, and over 120,000 pedestrians and bicyclists were injured.[3] Serious pedestrian crashes involving speeding are twice as likely to result in a fatality as other such crashes.[4] Even small increases in traffic speeds produce disproportionately larger threats to unprotected road users like cyclists and pedestrians.[5]

Multiple factors contribute to the problem of unsafe traffic speed. Among the most common are road designs that encourage higher speeds, speed limits that are set too high, and speeding (people driving faster than the speed limit or too fast for road conditions). Speeding is the most studied of the three factors. Police reports indicate that speeding played a role in nearly 1 in 3 crash deaths (9,944 people in 2011).[6] In fact, almost 9 out of 10 speeding-related deaths took place on non-Interstate highways, most of which have speed limits of 55 mph or less.[6]
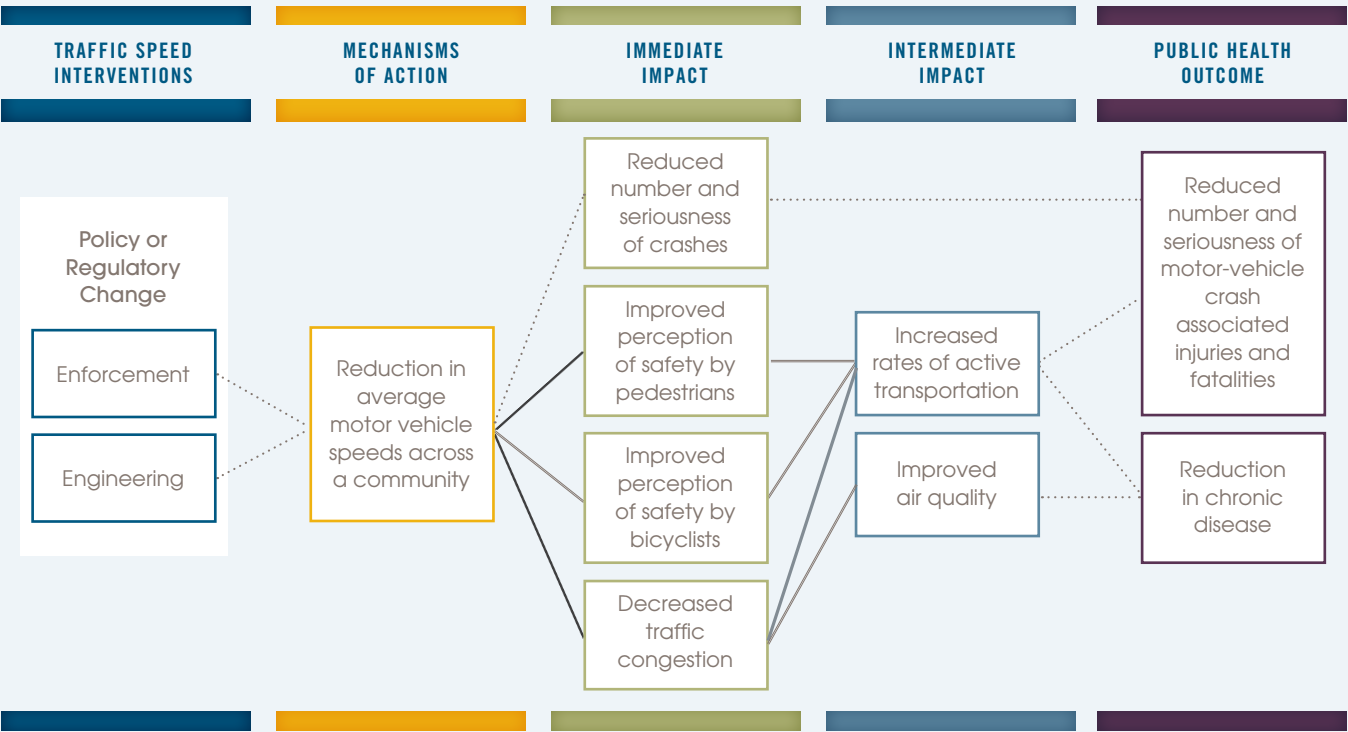
Project Background

This document explores the public health concerns related to high motor vehicle speeds. It describes the problem for public health and transportation professionals and offers evidence-based options for reducing speed in communities, providing technical detail from literature review, policy and practice scan and key informant interviews. The report discusses speed reduction strategies local, state, and federal levels. Readers are encouraged to visit http://hria.org/uploads/catalogerfiles/2013-speed-reduction-resources/ to review the other documents produced as part of this project.

This project, a winner of the Centers for Disease Control and Prevention's (CDC) annual policy innovation competition, is part of CDC's cooperative agreement with the National Network of Public Health Institutes (NNPHI). It was conducted by Health Resources in Action (HRiA) and the Metropolitan Area Planning Council (MAPC), both Boston-based nonprofit organizations, with collaborators from CDC and NNPHI. A group of technical experts from across the country also contributed to the project. For a complete list of those partners, please visit http://hria.org/uploads/catalogerfiles/2013-speed-reduction-resources/.

The purpose of the project is to articulate the connection between community speed reduction, road traffic injuries and fatalities, and physical activity levels. To this end, the team drew on published literature and case studies of current U.S. efforts in speed reduction. The published literature review built on, rather than duplicated, a literature review completed in 2010 by Canada's National Collaborating Centre for Healthy Public Policy (NCCHPP) called Urban Traffic Calming and Health which is a comprehensive review of 103 scientific and professional publications that addressed the effects of traffic calming on health.

The team reviewed a body of both peer-reviewed and grey literature, in both the transportation and public health fields, to better understand community speed reduction policy interventions and their effectiveness, focusing on policies that support environmental and enforcement interventions. A subsequent policy and practice scan identified environmental and enforcement speed reduction strategies implemented in the United States. The team conducted twelve key informant interviews to inform six case studies highlighting successful speed reduction interventions in the United States. A policy impact brief highlights important community speed reduction issues, offers clear policy options and can be easily disseminated through and accessed on websites or at meetings by a wide audience.

TRAFFIC SPEED INTERVENTIONS	MECHANISMS OF ACTION	IMMEDIATE IMPACT	INTERMEDIATE IMPACT	PUBLIC HEALTH OUTCOME

Policy or Regulatory Change

Enforcement

Engineering

Reduction in average motor vehicle speeds across a community

Reduced number and seriousness of crashes

Improved perception of safety by pedestrians

Improved perception of safety by bicyclists

Decreased traffic congestion

Increased rates of active transportation

Improved air quality

Reduced number and seriousness of motor-vehicle crash associated injuries and fatalities

Reduction in chronic disease

········ Evidence is strong and conclusive

———— Some evidence, additional research needed

———— Strong evidence, dependent on intervention

———— Not examined in this research project, but the relationship likely exists

Connections between traffic speed reduction interventions and public health

The diagram on the previous page illustrates the pathways from traffic speed interventions to the immediate, intermediate, and long-term public health outcomes associated with engineering and enforcement interventions. Community-wide engineering and enforcement strategies that require motorists to drive at safe speeds can be used in conjunction with education campaigns that have also been shown to reduce speeds. However, this report and the associated documents focus on engineering and enforcement strategies. The determination of evidence was based on the literature review, with the following evidence definitions:

Strong: There is significant published literature that provides evidence of the efficacy of the various area-wide traffic calming measures.

Some evidence: There is limited evidence in published and grey literature showing the efficacy of the intervention. Additional research is needed.

For this analysis, community speed reduction strategies met the following criteria:

- It has a (measureable) public health impact

- It is a community-wide policy intervention or a promising intervention that is implemented on a smaller, more targeted scale

- There is adequate information about the intervention online

- It was identified as a recommended strategy through review of published and grey literature or recommended through the key informant interview process

Policy and regulatory changes are valuable; in fact, they are necessary prerequisites to implementing engineering and enforcement interventions that impact speed and environmental conditions and result in improved population health. Often policies do not directly lower the speeds of motor vehicles but rather create the conditions or impetus to implement engineering or enforcement interventions that directly reduce motor vehicle speeds, like area-wide traffic calming and speed enforcement programs.

The available research on the interventions' efficacy at reducing speeds has focused on the specific design and engineering approaches that reduce speeds (curb extensions, narrowing lanes, raised crosswalks, etc.). There have been limited evaluations conducted on policies' direct impact on public health outcomes and speed reduction.

The immediate and intermediate impacts are changes to the environment that ultimately result in a change in public health outcomes. However, the pathway from the policy and regulatory change to the public health impact is indirect, and thus, is difficult to evaluate.

Benefits of slower speeds

Small traffic speed reductions can lead to fewer motor vehicle crashes, injuries, and deaths. Slower speeds may also promote physical activity by making roads safer and more inviting for pedestrians and cyclists — especially when combined with specific accommodations for those road users. There are proven measures that can reduce vehicle speeds to levels that are safer for everyone on the road.

Reduced injuries and fatalities
All road users, including motorists, cyclists and pedestrians, benefit from the slower speeds and safer designs that result from traffic calming interventions. Two meta-analyses demonstrate 15 percent reductions in personal injury collisions after traffic calming measures.[7, 8] In 2010, Canada's National Collaborating Centre for Healthy Public Policy (NCCHPP) published Urban Traffic Calming and Health, a comprehensive review of 103 scientific and professional publications, published between January 2000 and October 2010 that addressed the effects of traffic calming on health. All studies examining specific area-wide interventions in Urban Traffic Calming and Health revealed overall reductions in collisions, personal injury collisions, and collisions causing serious injury or death.[9, 10, 11]

Higher speeds are associated with more severe injuries and higher rates of fatalities, which is particularly concerning for unprotected road users like cyclists and pedestrians. Data show that reducing motor vehicle speeds benefits unprotected road users. While bicycle and pedestrian fatalities rates have been decreasing in the U.S., they are significantly higher here compared to similar countries in Europe.[12]

- Cyclists struck by vehicles travelling between 20-30 mph have a 92 percent higher probability of dying compared to those struck by vehicles travelling less than 20 mph. Those struck at 30-40 mph have three times the risk of dying, and those struck at 40-50 mph experience greater than a 10-fold increase in the probability of dying compared to those injured by a vehicle going less than 20 mph.[13]

- The average risk of severe injury for a pedestrian struck by a vehicle is just 10 percent at an impact speed of 16 mph, but quickly reaches 50 percent at only 31 mph.[5] In this example, a doubling of speed results in five times the risk of serious injuries. Small increases in traffic speeds produce disproportionately larger threats to road users. Similarly, a pedestrian struck at 23 mph has just a 10 percent risk of death, while the risk of dying rises to 25 percent at 32 mph. Pedestrians face injury rates above 90 percent and fatality rates around 75 percent when struck by vehicles travelling 50 mph.[5]

SMALL INCREASES in vehicle speed put pedestrians at much GREATER RISK OF DEATH[5]

PEDESTRIAN DEATHS / 100 AUTOMOBILE-PEDESTRIAN COLLISIONS

20mph

AT 20 MPH, THE RISK OF DEATH IS 6%

30mph

THE RISK OF DEATH AT 30 MPH IS 19% 3 TIMES GREATER THAN 20 MPH

45mph

THE RISK OF DEATH AT 45 MPH IS 65% 11 TIMES GREATER THAN 20 MPH

Active transportation and vehicle speed

A community's walkability levels — indicating a community where it is easy and safe to walk to goods and services (i.e., grocery stores, post offices, health clinics, etc.) and one that encourages pedestrian activity, expands transportation options, and has safe and inviting streets that serve people with different ranges of mobility[14] — and bikeability levels – indicating bicycle friendly environments that encourage bicycling for fun, transportation or fitness — are associated with levels of physical activity in that community.[15] There is evidence connecting lower levels of walking and biking and higher levels of several public health concerns like obesity, diabetes, hypertension, and asthma.[16, 17] States with high levels of bicycling and walking also have a greater percentage of adults who get 30 minutes of physical activity a day, an indicator which correlates with lower overweight and obesity rates.[12] There is some evidence that community-wide speed reduction interventions may increase walking and cycling rates, which could ultimately lead to a reduction in the incidence of obesity and related health outcomes in communities.[18]

Perceptions of safety are often cited as barriers to walking and biking.[19] Traffic safety is a significant reason that many parents do not allow their children to walk or bike to school,[20] and complete streets policies and Safe Routes to Schools programs reduce the danger of traffic to people walking and bicycling and thus encourage these travel modes.[18, 21, 22, 23, 24, 25] If slower speeds lead to more pedestrians and cyclists on roads, this could contribute to the concept of "safety in numbers." The more cyclists and pedestrians that are on the streets, the safer roads are for all users.[26, 27, 28, 29]

Speed reduction interventions often occur in tandem with other infrastructure changes, such as the installation of bicycle parking facilities. This creates a methodological issue in isolating the specific impact of traffic calming measures on active transportation independent from these other approaches.[30] As such, there is insufficient research to conclude that lowered motor vehicle speeds directly increase active transportation in a community.

However, there is ample evidence that design changes, like road diets, slow cars, reduce injuries and increase the number of bicyclists and pedestrians using the road. In Orlando, for example, the Edgewater Drive Before & After Re-Striping (2002) increased pedestrian count by 23 percent and increased cyclist count by 30 percent after a road diet was implemented on a four-lane road. Study results also documented lower speeds at three points along the road, a 34 percent reduction in crashes, and a 68 percent reduction in injuries.[31] According to the Federal Highway Administration, a Neighborhood Greenway in Seattle, WA, developed in coordination with the community residents and the U.S. DOT, increased pedestrian and bicycle activity but also reduced speed and traffic volumes.[32] Forsyth et al. found statistically significant positive associations between percentage of street blocks with calming measures and daily walking distances and daily utilitarian walking distances among adults in Minneapolis-St. Paul, Minnesota.[33] In Bristol, England, two 20 mph zones increased cycling and walking up to 12 percent.[34] Studies from Melbourne, Australia, showed that adolescent boys and girls living near speed humps had higher levels of accelerometer-measured moderate-to-vigorous physical activity, although these findings were not consistent across other age groups.[35, 36] Litman indicates that speed reduction interventions can improve health and fitness, if implemented in places where there is an underlying demand for active transportation.[15]

In Portland, Oregon, where there is strong community support for walking and biking, the Neighborhood Greenways plan has resulted in increased biking. The Portland Bureau of Transportation's 2011 Bicycle Counts Report indicates that bicycle volume increased by approximately 6.4 percent between 2010 and 2011. Within the same timeframe, 61 percent more bicycles were counted at 11 locations on newly developed neighborhood greenways where the posted speed for cars was reduced to 20 mph.[37]

Economic benefits of speed reduction

Speed reduction may have co-benefits beyond health and safety. The economic cost to society of speeding-related crashes is enormous, estimated at $40.4 billion per year.[6] Using Federal Highway Administration data, a report prepared for AAA estimated the costs of a single fatality collision at $6 million.[39]

Some interventions that slow speed in residential and commercial areas can potentially have a positive effect on local businesses. Making areas with businesses more walkable can increase pedestrian traffic and, therefore, the numbers of customers. Pedestrians are more likely to see window displays, to go into more stores, and to stay longer.[40] In Los Angeles, walkable shopping districts had greater retail activity — up to four times greater — than strip shopping areas.[40] Customers who arrive by foot or bicycle in a neighborhood shopping area visit the most often and spend the most money, and modest increases in "Walk Scores" (based on the number of destinations within a short distance of a particular location) can raise home and commercial property values.[40]

Vehicle speed disproportionately impacts vulnerable populations and leads to disparities in injuries and fatalities

The most dangerous communities for pedestrians are those where the design of the road promotes high vehicle speeds and infrastructure does not promote pedestrian and bicyclist safety.

In low-income and minority neighborhoods there is often less investment in pedestrian and cycling infrastructure, less access to personal vehicles, and a greater reliance on public transit. These conditions contribute to higher collision rates.[4, 41, 42] Low-income and minority neighborhoods are less likely to have intact sidewalks, streetlights, safe pedestrian crossings, and other safety enhancing sidewalk and road features than higher income areas.[43, 44, 45] People who are economically, physically and socially disadvantaged drive less and rely more on walking and bicycling.[46, 47]

The consequence of speeding affects certain populations at much higher rates than others, including children and adolescents, older adults who no longer drive, people with disabilities and low-income individuals. Black, Hispanics, and older adults share a greater burden of all pedestrian deaths compared to the percentage of the whole population they represent.[45] Further, older pedestrians tend to be more at risk of serious injury or death if involved in a crash. In Seattle, more than 76 percent of all pedestrian fatalities from 2007 to 2010 were among people over age 50.[32] Twenty percent of collisions with a pedestrian over 75 years old result in death compared to just eight percent for pedestrians ages 15-24.[48] Improving safety through speed reduction efforts makes travel safer for these groups. Traffic calming, of which speed reduction is a facet, can improve health equity if implemented in low-socioeconomic status communities, by improving safety as well as other aspects of walking and bicycling.

Several GUIDANCE DOCUMENTS ARE AVAILABLE to assist local planners and engineers in choosing EFFECTIVE TRAFFIC CALMING and SPEED REDUCTION INTERVENTIONS.

II. DETERMINANTS OF SPEED

A number of factors, from road design to policy to enforcement and culture, play a role in the speed that vehicles travel on U.S. roads. This section will provide the reader with a historical understanding of road engineering to provide context to current practice.

Road design and engineering

Road engineering advancements in the last few decades have helped to create safer roads for some users and prevent some injuries and fatalities. However, certain common design and engineering practices encourage unsafe vehicle speed and put road users at risk.

The transportation safety movement of the 1960s espoused a 'passive safety paradigm,' which assumes that random driver error is the ultimate cause of automotive crashes (i.e., there is a constant rate of collisions regardless of environmental characteristics). There were fewer crashes on highways than on urban roadways, leading to the conclusion that "highways built with high speed design standards put the traveler in an environment that is fundamentally safer because it will more likely compensate for the driving errors he will eventually make."[49] These assumptions have heavily influenced the design of U.S. roads over the past 50 years.

The passive approach encourages engineering that will be forgiving of a driver's mistakes, particularly through the following characteristics often found in contemporary roadway design:

- Wide roads, which are thought to be more forgiving when random driver error occurs;

- Wide road curvature and turning radii, whose gentle turns are meant to prevent vehicle runaway; and,

- Removal of roadside fixed objects, including street trees and other structures that vehicles could potentially collide with in the case of vehicle runaway.

To mitigate the higher design speeds of roadways, traffic engineers relied on signs (e.g., posted speed limits, signs alerting the driver to the presence of children in the area) and pavement markings to control speed. In addition, stop signs and signals are installed to prevent road conflicts at intersections and to slow cars where pedestrians may cross.

The passive design approach assumes that drivers will drive at posted speed, as opposed to the speed for which roads were designed.[50] In practice, drivers use a wide range of information provided by their environment in judging how fast they should drive; that is, a road that is designed to be driven at high speeds will be driven at high speeds, despite posted speed limits. Because the signs and roadways are producing conflicting information, the result is that the majority of drivers disregard posted speed limits. Further, even when drivers deliberately attempt to obey speed limits, they instinctively increase their operating speed to their perception of the road's safe speed when not actively concentrating on the vehicle's speedometer.[51] The passive approach, therefore, exacerbates the problem by allowing speeds higher than intended.

ROAD PLANNING AHEAD

Recent evidence suggests that the standard practice for speed control is not effective in reducing crashes. Roadway design features once thought hazardous, including narrow lanes, sharp turns, and roadside tress, may actually encourage safer and slower driving. For example, one quasi-experimental study found that including trees and concrete planters significantly decreased the number of crashes between 5 and 20 percent.[52] Other researchers have found that wider road lanes and shoulders actually increased the number of crashes.[52] Finally, one five-year cross-sectional analysis compared two roads, one that followed the passive approach and a second that had similar attributes (length, traffic, posted speed limit) but was designed in a way counter to the passive safety approach (narrow lanes and shoulders, roadside objects, on-street parking). By every standard safety benchmark, including injuries, fatalities, and crashes, the second road was safer.[52]

Such data have allowed traffic engineers and planners to identify opportunities to continue to improve roadway design for safety. Existing roads can be retrofitted, while new roads can be designed using newer approaches that improve safety for all road users.

Federal and professional guidelines provide the tools and standards necessary to design roads for slower speeds.[53, 54, 55, 56] Given that drivers will often adjust their speed more readily based on the characteristics of the roadway rather than on the posted speed limit, some U.S. jurisdictions are increasingly using road engineering measures to slow traffic speeds.[50] This approach stands in contrast to historic practices which did not emphasize the role of road design in speed control but instead relied on enforcement of posted speed limits set at or near the 85th percentile speed of the roadway, i.e., the speed at which 85 percent of free-flowing traffic is traveling at or below.

Using federal and professional guidelines to encourage road design for slower speeds is common practice in Europe. For example, Sweden and the Netherlands employ an Injury Minimization/Safe System approach, in which speed limits are set according to crash types most likely to occur, the impact forces that result, and the tolerance of a person's body to withstand these forces.[57]

As the standards, tools, and guidelines have evolved, using design elements to create lower-speed roads has become more prevalent.

With such engineering in place, communities commonly use enforcement, or encouraging drivers to adhere to posted speed limits through police-issued citations or tickets, and education, or building public awareness, changing perceptions, and influencing driver behavior through communication efforts, to control speeds.


Posted speed limits

The speed limit of a road is commonly based on how fast drivers tend to travel on that road in uncongested conditions. Limits are typically set around the speed at which 85 percent of drivers are travelling at or below. Even when communities ask for a slower speed limit, many cities and states require that the 85th percentile speed be a major factor in establishing the legal limit.

Drivers typically base their speeds on cues from the roadway, such as lane widths and sight lines, rather than on what is safe and suportive of vibrant neighborhoods. Because many roads are designed to safely accommodate some degree of speeding, setting limits based on observed driver behavior can push speed limits higher than communities want.

When setting speed limits, cities and states could give more consideration to factors like road type and conditions, crash history, traffic volumes, pedestrian and cyclist activity, land use, and parking practices, among others. Use of such information can lead to speed limits that both keep traffic flowing and protect the safety of all road users. Some local and state governments have partnered to lower posted speed limits on roads that meet pre-determined criteria. Other states have legislated lower default speed limits (e.g. to 25 mph) on all residential roads, with some exemptions for major thoroughfares. Reducing speed limits alone may decrease vehicle speeds but is more effective when accompanied by engineering, enforcement, and education efforts.[58, 59]

A 2005 pilot project in Springfield, MO demonstrated lower average speeds on residential roads were achieved when the posted speed limit was reduced from 30 mph to 25 mph. Notably, in Springfield, researchers also observed speed reductions on adjacent streets, where the speed limit was not reduced.[58] Using the Springfield approach as a model, Columbia, MO piloted a similar effort, reducing posted speed from 30 mph to 25 mph. Speed data from two neighborhoods showed reductions in average speeds, ranging from roughly 1 mph (29 mph to 28 mph) to over 6 mph (37 mph to 31 mph), depending on the road.[58]

Some cities have created slow zones around schools and parks or in other neighborhood areas. A slow zone is a street or group of local streets designated for reduced speeds through signs, road markings, and traffic calming, engineering, and design measures.[28] In one city, the introduction of slow zones was associated with a 42 percent reduction in collision injuries.[29] To accomplish its injury and fatality prevention goals, the Chicago Department of Transportation started its Child Safety Zone Initiative, which designates the areas within 1/8 mile of all 1,500 schools and parks across the city as 'safe zones'. In New York City, the DOT has implemented Slow Zones across all five boroughs.

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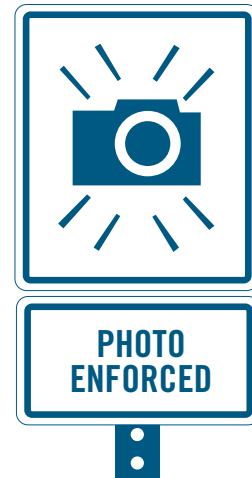
Enforcement

Traditional enforcement strategies are effective if drivers are convinced that operating over the posted speed will result in a detection of the violation and a penalty for breaking the law. Among the standard enforcement strategies are stationary patrols where marked or unmarked police vehicles park and monitor traffic speeds, mobile patrols which are marked or unmarked vehicles traveling with traffic to detect specific violators in the immediate vicinity of a moving patrol car, and highly visible signage to remind the public of a police presence to increase the actual and perceived risk of detection among the driving public.[60] Maintaining a robust traditional speed enforcement program though the use of police officers and police vehicles to enforce speed limits, can be costly to a community. At the same time, speed enforcement efforts that are inconsistent — such as the occasional posting of a police officer and vehicle in a problem area — can also contribute to higher speeds.

National guidelines offer comprehensive recommendations about how to use data to identify high priority areas for enforcement, among other key strategic questions. They include assessing historical data like traffic speed and volume studies, engineering studies focusing on road design and traffic operations, traffic accident files, traffic citation records, and citizen complaints.[60]

Automated technologies, to augment traditional enforcement strategies, present a more cost-efficient approach to speed enforcement, while also creating the consistency that can help to reduce speed. This approach uses speed cameras, radar speed displays, and red light cameras. Mobile cameras can be accompanied by enforcement personnel or fixed cameras can monitor speeds at specific locations without personnel.

Such enforcement strategies are widely implemented at the community level to reduce vehicle speeds. Speed cameras are used in 107 U.S. communities and 13 states, including Alabama, Arizona, Colorado, Illinois, Iowa, Louisiana, Maryland, Missouri, New Mexico, Ohio, Oregon, Tennessee, and Washington, as well as the District of Columbia. Colorado, Utah, Washington, and Maryland permit the use of cameras in school zones.[61] While effective, enforcement strategies alone are limited in their ability to reduce speeds.[62]

Washington, DC's Automated Enforcement Program has demonstrated significant public health and safety benefits. The District typically sees 60 to 80 percent reductions in speeding violations within a few months of cameras being deployed at a site. A 2003 study showed that there was a 14 percent decline in mean speed and an 82 percent decline in speeding vehicles six months after implementing mobile speed enforcement cameras in Washington, DC.[63] The number of traffic fatalities in DC has dropped from 68 in 2003 to 19 in 2012.[64] Average speeds among all vehicles in DC have been reduced, and the rate of aggressive speeding has dropped from one in three drivers to just one in 40.[65] A 2013 survey of District residents indicated strong community support for the program, with 76 percent of those surveyed favoring speed cameras.[66]

Average speed cameras, which capture speed at two points along a road and can issue automatic tickets based on the average that the car was traveling between the points, are being piloted in London and may be a promising new technology. The advantage of these cameras is that they smooth traffic flow rather than creating sudden stops and starts that often occur with fixed cameras.[67]

Among other issues, drivers may respond more to the probability of being caught speeding than to the severity of penalties associated with violations[68] but that citations have limited effects on deterring future speeding violations.[69]

Land use and transportation policies

Land use policies govern land development and redevelopment, and some of these policies can contribute to reduced speed. For example, Dumbaugh et al. reported that strip malls and 'big box' land uses are major crash risk factors for bikes and pedestrians, while pedestrian-scale retail was a protective factor for crashes overall.[70] Land use and zoning considerations may be effective and non-traditional ways to reduce vehicle speed.[71] Among the components of zoning and land use policy that might encourage active transportation and reduce vehicle speeds are prohibiting parking lots in front of retail between the buildings and the street, prioritizing improved connectivity for subdivisions and encouraging mixed use and multi-family development.

Furthermore, local departments of transportation can reduce vehicle speed through transportation policies that focus on retrofitting existing roads and building "complete streets." The complete streets approach aims to create and operate streets that are safe and accessible for all users of all ages and abilities. Complete streets improve safety indirectly, by encouraging non-motorized travel and increasing the number of people bicycling and walking. This helps to support the sense of "safety in numbers," demonstrated by one study that found as the number and portion of people bicycling and walking increases, deaths and injuries decline.[72]

According to Smart Growth America and the National Complete Streets Coalition, over 140 jurisdictions adopted a complete streets policy in 2011 alone, up over 40 percent from 2010. As of August, 2013, 500 regional and local jurisdictions, 27 states, the Commonwealth of Puerto Rico, and the District of Columbia have adopted policies or have made written commitment to do so.[73]

Culture

Data indicate that on average, more than 70 percent of drivers are exceeding the posted speed limit.[74] While many people may say that they do not approve of speeding, a substantial number of people report that they do speed. Speeding in residential areas is more frowned upon than speeding on freeways (89 vs 73 percent), yet nearly half of all people report that they have exceeded the speed limit by 10 mph in a residential area and 15 mph on a freeway.[75]

Speeding is pervasive in the United States. Wide, straight roads as well as cars built to be quiet and comfortable create a false sense of safety among drivers and passengers. The automobile industry designs and sells cars that have the ability to drive at speeds much higher than is legal, or safe. Speeding is glorified in movies, television and magazines, but the public is much less often exposed to the injuries and fatalities that too often are the consequence of our culture of high speeds.[76]

For drivers involved in fatal crashes, young males are the most likely to be speeding. The relative proportion of speeding-related crashes to all crashes decreases with increasing driver age. In 2008, 37 percent of male drivers in the 15 to 20-year-old and 21 to 24-year-old age groups who were involved in fatal crashes were speeding at the time of the crash.[77]

III. POLICIES AND PRACTICES TO REDUCE SPEEDS AND IMPROVE PUBLIC HEALTH

At the macro level, not specific to speed reduction but improving traffic safety and road accessibility, some communities have stated a commitment to promote walking/biking by instituting community-oriented traffic calming as part of an integrated plan to reduce traffic injuries and fatalities.

In Seattle, a 2007 complete streets ordinance commits the DOT to emphasize equity for all road users.[32, 79] Other communities have adopted complete streets policies, which can be applied to both new and retrofit projects from a planning, design, maintenance, and operational perspective.[80] Still other communities have created pedestrian and bicycle action plans to guide the implementation of their speed reduction work.[4, 81] Policies are adopted across multiple agencies and departments and help guide decision-making processes in current and future projects. Roadway design and engineering approaches commonly found in complete streets can create long-lasting speed reduction.[28, 73, 80]

The following approaches have been successful in communities across the United States and around the world in reducing motor vehicle speeds:

1. **Design and retrofit road networks to ensure safe speeds for all road users (motorists, cyclists, and pedestrians).** Regardless of the posted speed, road engineering can make drivers feel comfortable traveling at higher or lower speeds.

- *Install traffic calming measures that protect vulnerable road users.* Physically changing the road with traffic calming measures slows down drivers and reduces injuries and fatalities.[23] These measures include lane-narrowing, raised crosswalks, speed bumps, and road diets. Many of these traffic calming features are also positively associated with increased walking and bicycling.[24, 25, 26]

- *Create designated slow zones.*[27] A slow zone is a street or group of local streets designated for reduced speeds through signs, road markings, and traffic calming, engineering and design measures (28). In one city, the introduction of slow zones was associated with a 42 percent reduction in traffic crash injuries (29). Some cities have created slow zones around schools and parks or in other neighborhood areas.

2. **Use automated technologies to enforce speed limits.** Enforcing speed limits is an important tool for discouraging drivers from speeding. Many studies have shown that using speed cameras to document speed and to issue tickets to violators reduces crashes, injuries, and fatalities.[30] Automated speed enforcement programs use mobile or fixed speed cameras and radar speed displays to measure vehicle speed and, in some cases, automatically issue tickets. In one county, in the first year of use, injury and fatality collisions were reduced by almost 40 percent.[31] Automated enforcement technologies are a cost-effective way to augment traditional traffic enforcement and further reduce speed-related injuries and fatalities.[61]

3. **Set speed limits for the safety of all road users.**[57] Sometimes, speed limits are set at speeds that are unsafe for the context (for example, a 40 mph speed limit in a high pedestrian area). Some local and state governments have partnered to lower posted speed limits on roads that meet certain criteria. Other states have legislated lower default speed limits (e.g., to 25 mph) on all residential roads, with some exemptions for major thoroughfares. Reducing speed limits alone may decrease vehicle speeds, but doing so is more effective when accompanied by engineering, design, enforcement, and education.[35, 36]

A community-wide effort to reduce speed is recommended for the greatest impact; rather than focusing on hot spot intersections or streets, these strategies are implemented in:

- Large areas, such as a neighborhood,

- Networks of residential or high volume/high capacity arterial roads,

- Densely populated areas where pedestrians and cyclists are often present.

Communities that implement a comprehensive set of strategies see the most significant reductions in speed. These strategies include those mentioned above, as well as educating drivers about speed risks and speed limits so they will voluntarily slow down, thereby normalizing slower driving.[82, 83, 84, 85]

New Opportunities for Improved Practice

Some common transportation engineering practices can contribute to high traffic speeds, putting pedestrians, cyclists, and motor vehicle occupants at increased risk of collisions, injuries, and deaths. There are, however, opportunities to modify standard practices in ways that may better support community speed reduction efforts. One such opportunity is improved data collection. Current data on road user safety and behavior paint an incomplete picture of speed-related injuries, especially among cyclists and pedestrians. Many vehicle collisions with cyclists and pedestrians go unreported to the police, and the role of speed, road design, and engineering factors is often unclear in events that are recorded. Few studies have assessed the impact of motor vehicle speed on preferences for driving over walking or cycling, or on parental willingness to let children walk or bike. More speed data are needed to allow an assessment of how well new and innovative speed-reduction interventions work.

Cities and states can adopt practices that encourage better data collection on road user safety and behavior, and to use these data to inform decision-making. For example, the Portland Police Bureau is notified of, and investigates, all crashes in which a cyclist must be taken to the hospital in an ambulance. The incorporation of transportation-related questions into continuous health surveys can provide much-needed information about how people decide when to drive, walk, or bike. Finally, new technologies, such as those for automated speed monitoring or "safe driving" insurance discounts, can make data collection cheaper, easier, and smarter. For information about this and other ways to improve current practice, read the Other Opportunities Fact Sheet.

Many factors, from ROAD DESIGN to POLICY to ENFORCEMENT AND CULTURE, play a role in the speed that vehicles travel on U.S. roads.

IV. RESOURCES

There are a number of resources to assist in choosing the most effective traffic calming and speed reduction interventions.

National Resources:

- *The U.S. Department of Transportation's Manual on Uniform Traffic Control Devices and USLIMITS2 tool* provide guidance to state and local agencies for setting safe, reasonable speed limits, taking multiple factors into account.[53, 54] http://mutcd.fhwa.dot.gov/ and http://safety.fhwa.dot.gov/uslimits/

- *Federal Highway Administration Safety Program, Methods and Practices for Setting Speed Limits: An Informational Report:* http://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa12004/

- *ITE's 2009 Traffic Engineering Handbook* includes a chapter on traffic calming which details specific engineering measures and offers guidelines for application of measures, among other things. The publisher's description of the resource can be found here: http://www.ite.org/emodules/scriptcontent/orders/ProductDetail.cfm?pc=TB-010B

- *The American Planning Association 2009 U.S Traffic Calming Manual* is meant to standardize the initiation, planning, design and implementation of traffic calming measures: http://www.planning.org/media/trafficcalming/

- *The National Cooperative Highway Research Program* offers guidelines for the selection of speed reduction treatments: http://www.trb.org/main/blurbs/160046.aspx

- American Association of State Highway and Transportation Officials (AASHTO) *A Policy on the Geometric Design of Highways and Streets (The Green Book)* is often used when designing a roadway. The Green Book offers a set of guidelines on geometric design but allows room for flexibility within those guidelines. http://www.fhwa.dot.gov/environment/publications/flexibility/ch02.cfm

- *Federal Highway Administration (FHWA):* The FHWA Bicycle & Pedestrian Program issues guidance and is responsible for overseeing that requirements in legislation are understood and met by the States and other implementing agencies: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/index.cfm

State Resources:

- *State DOT Manuals:* Many State Departments of Transportation have developed guidance for implementing traffic calming, with tools and recommendations specific to the roads in each state.

- *State Bicycle and Pedestrian Coordinators,* responsible for promoting and facilitating the increased use of non-motorized transportation, are located in each State Department of Transportation: http://www.walkinginfo.org/states/#states[86]

Other resources:

- In 2010, Canada's National Collaborating Centre for Healthy Public Policy (NCCHPP) published *Urban Traffic Calming and Health*, a comprehensive review of 103 scientific and professional publications that addressed the effects of traffic calming on health. The review drew on studies published between January 2000 and October 2010. http://www.ncchpp.ca/175/publications.ccnpps?id_article=686

- *Transport Research International Documentation (TRID)* is a database provided by the National Academies Transportation Research Board (TRB). It integrates TRB's Transportation Research Information Services (TRIS) Database and the OECD's Joint Transport Research Centre's International Transport Research Documentation (ITRD) Database to provide the world's largest bibliographic resource on transportation-related research. http://trid.trb.org/

- *A Cal Trans report Effective Application of Traffic Calming Techniques*, summarizes guidance documents available for engineering and design measures and itself provides a description of many of types of horizontal, vertical, and road diet treatment measures: http://www.dot.ca.gov/research/researchreports/preliminary_investigations/docs/traffic_calming_preliminary_investigation_9-28-11.pdf

- *Pedestrian and Bicycle Information website:* http://www.walkinginfo.org/engineering/calming.cfm

- *Victoria Transport Policy Institute's Traffic Calming website:* http://www.vtpi.org/tdm/tdm4.htm

- *World Health Organization manual on speed management:* http://www.who.int/roadsafety/projects/manuals/speed_manual/en/

- *NYC active design guidelines* and accompanying Active Design for Promoting Safety make recommendations related to traffic calming and pedestrian and bicycle safety strategies: http://centerforactivedesign.org/guidelines/

- *The SAFE SYSTEMS model* is meant to develop a road transport system that better accommodates human error, by managing crash energy to reduce the likelihood of death or serious injury: http://www.internationaltransportforum.org/jtrc/safety/targets/targets.html and http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTTRANSPORT/EXTTOPGLOROASAF/0,,contentMDK:22533841~menuPK:2582241~pagePK:64168445~piPK:64168309~theSitePK:2582213,00.html

- *United Nations and the World Health Organization Decade of Action:* http://www.who.int/roadsafety/en/

- *Health Resources in Action Community Speed Reduction materials:* http://hria.org/uploads/catalogerfiles/2013-speed-reduction-resources/

  – Public Health Impact: Community Speed Reduction
  – Speed Reduction Fact Sheet: Opportunities to Improve Current Practice

  Case Studies:
  – Chicago, Illinois: Child Safety Zones
  – Columbia, Missouri: Lowering The Posted Speed Limit On Residential Streets
  – New York City: Neighborhood Slow Zones
  – Portland, Oregon: Neighborhood Greenway Initiative
  – Seattle, Washington: A Multi-Faceted Approach To Speed Reduction
  – Washington, DC: Automated Speed Enforcement

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