

It's Like Riding a Bike –  
How American Cities Can Increase Bicycling by  
Building Better Bicycle Infrastructure!

Patrick T. Gooch  
Environmental Advocacy  
December 13, 2011

“FIRST WE SHAPE OUR CITIES AND THEN THEY SHAPE US” – WINSTON CHURCHILL

Many people remember their first bike and learning how to ride it. Although riding may have been challenging at first, most of us soon mastered our bikes and were pedaling down the street. Riding a bike is simple, enjoyable, and carefree - or so we thought as kids. For those of us who continue to ride into adulthood, we soon found that riding a bike amongst cars is dangerous, scary, and anything but enjoyable.

We ventured farther and farther afield on our bikes. These travels required us to ride on the road next to cars. As we rode we realized the danger of sharing the road with a two-ton car, a distracted driver, and a selfish driver. We continue to ride because bicycling is fun, healthy, cheaper, and environmentally friendly. It is for these reasons and many more that the United States needs to enhance bicycle facilities and infrastructure.

Bicycle facilities is a broad term used to express a need for more bike infrastructure, including a coordinated network of lanes, bike racks, public and private buildings with a shower for bicyclists and other active transportation users in addition to other infrastructure upgrades used to improve the safety and convenience of bicycling.

This paper explores the benefits of regular bicycling for transportation. The emphasis is on bicycling for your daily commute to replace greenhouse gas spewing cars with active transportation options. The first section identifies benefits of bicycling. Looking at the environmental, health, and economic benefits to regular bicycling. The second section looks at the challenges to regular commuting including safety and practicality. The third section explores the built environment and its affect on bicycling. This section attempts to understand how the choices we make are influenced by our physical surroundings. The fourth section looks at the psychological barriers that prevent individuals from even considering bicycling as a viable transportation option. The fifth section looks at changing the built environment by building

complete streets and identifies several jurisdictions that have already required complete streets by law. The sixth section identifies what Buffalo, New York and New York State can learn from these jurisdictions to improve local implementation of complete streets. The paper concludes with the seventh section, identifying that many of these challenges can be eliminated if complete streets are implemented in Buffalo and New York State.

## **I. Bicycling Benefits**

### A. Environmental Benefits

Greenhouse gases have increased dramatically since the Industrial Revolution. Greenland and Antarctica ice core records show that carbon dioxide historically ranged from 190 parts per million by volume (“ppmv”) to 280 ppmv.<sup>1</sup> Yet when systematic testing began in 1958, Carbon Dioxide had already reached 315 ppmv, and in 2001 Carbon dioxide was at 370 ppmv.<sup>2</sup> Most scientists agree that human induced climate change is responsible. The main source, fossil fuel burning, has released roughly twice as much carbon dioxide as is currently recorded in the atmosphere.<sup>3</sup> Most of the observed warming in the last 50 years is the result of an increase in greenhouse gases.<sup>4</sup> One solution to stem the rise in greenhouse gases is riding a bike. Riding a bike is environmentally friendly, mechanically efficient, and spews no exhaust, particulates, and does not contribute greenhouse gases into the environment.

Riding a bike is simple. It is one, if not the most efficient self-powered way for a human being to move.<sup>5</sup> A human being can expend the same amount of energy to pedal a bike at 10-12

---

<sup>1</sup> Committee on the Science of Climate Change, National Research Council, *Climate Change Science: An Analysis of Some Key Questions* 2 (2001).

<sup>2</sup> *Id.* at 2.

<sup>3</sup> *Id.* at 2.

<sup>4</sup> *Id.* at 2.

<sup>5</sup> S.S. Wilson, *Bicycle Technology*, *Scientific American*, March 82 (1973).

mph as someone who is walking.<sup>6</sup> “To travel one kilometer by bike requires approximately 5-15 hours (w-h) of energy, while the same distance requires 15-20 w-h by foot, 30-40 w-h by train, and over 400 w-h in a car” containing only the driver.<sup>7</sup> From a mechanical perspective, a bicycle is also efficient. In fact up to 99 percent of the energy derived from the pedaling rider is transmitted to the wheels.<sup>8</sup> This two level efficiency makes the bike a viable transportation option in a post-peak oil world.

### B. Health Benefits

Bicycling also benefits the health of the rider. Regular bicycling, like an exercise, can reduce the risk of heart disease, cancer, diabetes, high blood pressure, and obesity.<sup>9</sup> It can cause weight loss and enhance emotional and mental wellbeing.<sup>10</sup> Additionally cyclists breathe in significantly lower amounts of air pollution than motorists and bus passengers.<sup>11</sup> A report by the Thunderhead Alliance concludes, that governments are making a wise public health investment when they invest in bicycle facilities.<sup>12</sup> Bicycle facilities are an important part of an active living lifestyle - a lifestyle that incorporates exercise in daily life. Building the proper infrastructure can facilitate not only active living for recreational living but can create transportation routes that allow people to commute to work and get exercise. Bicycling has numerous health benefits, however none of those matter if you cannot ride safely.

---

<sup>6</sup> Frank R. Whitt & David G. Wilson, *Bicycling Science* 277-300 Massachusetts Institute of Technology, (2nd ed. 1982).

<sup>7</sup> Mirjan E. Bouwman, *An Environmental Assessment of the Bicycle and Other Transport Systems*, 2 (2000).

<sup>8</sup> Whitt & Wilson at 277-300.

<sup>9</sup> Ryan Seher, Comment, *I Want to Ride my Bike: Why and How Cities Plan for Bicycle Infrastructure*, 59 BUFF. L. REV. 585, 589 (2011) citing Kristen Steele, Thunderhead Alliance, *Bicycling and Walking in the U.S.: Benchmarking Report 2007 93-98* (Debbie Stewart ed., 2007) Nick Cavill, *Health on Wheels*, Primary Health Care, Dec., at 12 (2007).

<sup>10</sup> *Id.*

<sup>11</sup> *Id.*

<sup>12</sup> *Id.*

### C. Economic Benefits

Bicycling can often have significant economic benefits on a community. Several studies and reports have looked at the benefits of bicycling. The benefits can be broken down into benefits to the community and benefits to the individual.

#### i. Community Benefits

The benefits to a community can be derived from built infrastructure. The League of American Bicyclists report that, “relatively modest investments in paths, expanded shoulders, and trails can have’ a significant impact on “local economies by attracting visitors, residents, and businesses.”<sup>13</sup> The report cites a project in the Outer Banks of North Carolina. The Outer Banks spent \$6.7 million on bicycle infrastructure and saw an annual return on that one-time investment of nine to one.<sup>14</sup> A conservative estimate places the economic return around \$60 million dollars in bicycle tourism. The \$60 million dollar return comes from tourists, who tend to be affluent, educated, and willing to spend money in local businesses.<sup>15</sup> Similar economic success stories can be told about Quebec, Canada; Portland, Oregon; and Maine.<sup>16</sup>

Bicycling is also good for business. Studies of merchants on Bloor Street in Toronto, Ontario and Valencia Street in San Francisco, California noted that since adding bicycle facilities the streets are safer and more attractive.<sup>17</sup> Further, the Bloor Street Study found that those who walked and biked to the area spent more money in the area than those who drove there.<sup>18</sup> Three-

---

<sup>13</sup> Darren Flusche, LEAGUE OF AMERICAN BICYCLISTS, *The Economic Benefits of Bicycle Infrastructure Investments*, June 2009.

<sup>14</sup> *Id.*

<sup>15</sup> *Id.*

<sup>16</sup> *Id.*

<sup>17</sup> *Id.*

<sup>18</sup> *Id.*

quarters of the merchants believed that business activity would improve or stay the same if a bike lane replaced half of the on-street parking.<sup>19</sup>

Businesses can also benefit when their employees bike to work. “A study of 30,604 people in Copenhagen, Denmark showed that people who commuted to work by bike had 40 percent lower risk of dying over the course of the study period than those who did [not]” and bike commuters average one less sick day each year than non-bike commuters.<sup>20</sup> Thus not only does bicycling have the potential to bring money into businesses, it can also save money.

Housing costs also rise when bicycle facilities are located nearby. Rising property values can be a double-edged sword, positively affecting the current homeowner but negatively affecting those looking to buy in the area. A study conducted in Indianapolis found that houses with identical features: same number of square feet, bathrooms, bedrooms, and comparable garages and porches had an 11 percent increase in value when near a recreational trail.<sup>21</sup> Rising property values benefit the community and the individual who owns the house.<sup>22</sup> Many of the aforementioned community benefits also accrue to an individual, who owns a business or a home.

## ii. Individual Benefits

A report by Todd Litman of the Victoria Transport Policy Institute stated that replacing a trip by car with a bike trip saves approximately \$2.73 per mile for both the individual and society.<sup>23</sup> Litman’s calculations take into account congestion reduction, energy savings, vehicle cost savings, parking cost savings, air pollution reduction, energy conservation, and traffic safety

---

<sup>19</sup> Flusche, supra note 13.

<sup>20</sup> *Id.*

<sup>21</sup> Flusche, supra note 13, Citing Lindsey et al, *Property Values, Recreation Values, and Urban Greenways*, 22 *Journal of Park and Recreation Administration* 3, 69-60 (2004).

<sup>22</sup> Seher, supra note 9, at 593.

<sup>23</sup> Flusche, supra note 13, Citing Todd Litman, *Quantifying the Benefits of Nonmotorized Transportation for Achieving Mobility Management Objectives*, Victoria Transport Policy Institute, November 30 (2004).

improvements.<sup>24</sup> He went on further in his report to say that if 100 people switched from driving to bicycling for their daily commute, each person would save \$8.75 per day or \$43.75 per week. Nearly \$100 for a household with two bicycle commuters per week. Some reports have also monetized the health benefits that accrue to someone getting daily exercise. The benefits of an active life per year, like commuting to work by bicycle, ranged up to \$1,175 per person.<sup>25</sup> Using your bike as your daily transportation can save you gas money, parking fees, and money spent at the doctors.

The economic benefits of bicycling also have social justice implications. A bicycle is more affordable than a car and requires no license to operate. Although bicycles do require basic maintenance and sometimes repair, the cost of parts is minimal and most labor can be done by the owner. Further many communities are establishing workshops that teach individuals how to do everything from basic bike repair to a complete strip and rebuild. In addition to educational services, the workshops have tools necessary to do most of the work and volunteers eager to help or share knowledge. The Community Bicycle Workshop in Buffalo, New York has several rooms stocked with old bikes, recycled parts, and accessories that are sold at a very low cost. For those who chose not to get their hands dirty, volunteers also repair bikes and sell them to the public at a low cost. Workshops, like the Community Bicycle Workshop, keep older bicycles out of landfills, create more capable bicyclists with safer bicycles, and keep the cost of bicycle ownership low.

Riding a bicycle on a daily basis is good for the environment, has positive impacts on your health, and numerous personal and collective economic benefits. Yet commuting by bicycle or riding your bike in general is not without challenges.

---

<sup>24</sup> *Id.*

<sup>25</sup> *Id.*

## II. Challenges

### A. Safety

One of the greatest challenges to bicycling is safety. Bicycling can be dangerous; any regular rider can share at least one story of nearly being hit by a car and a smaller number can tell the story of actually being hit. Although statistics differ it appears that bicycling is about three times as dangerous as riding in a car.<sup>26</sup> However this figure is premised on the current state of bicycling in the United States, which often lacks bicycle infrastructure. Statistics from Germany and the Netherlands, two countries with superior bicycle infrastructure to the United States, show a dramatically lower number of fatalities and are dropping; all while bicycle use is growing.<sup>27</sup>

One of the main reasons bicycle fatalities are high in the United States is because we share facilities with cars on the road. A collision between a two-ton car and a bicycle is clearly going to favor the car. However, simple improvements to bicycle infrastructure can reduce injuries involving motorists by as much as 50 percent over unimproved roadways.<sup>28</sup> This dramatic reduction in injuries is due in large part by separating bicycles from cars and increased awareness that results from bicycle facilities, such as lanes, chevrons, and curb bumpouts.<sup>29</sup>

---

<sup>26</sup> John Pucher & Lewis Dijkstra, *Making Walking and Cycling Safer: Lessons from Europe*, 54 *Transportation Quarterly* 3 Summer 14 (2000).

<sup>27</sup> *Id.* at 14 – 15.

<sup>28</sup> Seher, *Supra* note 9 at 590.

<sup>29</sup> Curb bumpouts are a traffic calming measure that extend or bumps the curb out into the end of the street narrowing the intersection. The narrowed intersection creates a shorter distance for pedestrians to walk. Also, this design eliminates the ability for cars to swerve to the right hand side of the road, when they are slowed or stopped by a car waiting to turn left in front of them or turning a one-lane road into a two-lane road at an intersection.

## B. Practicality

Practical challenges to bicycling exist as well. First is the weather, commuting by bicycle has the benefits and drawbacks of being outside. In the winter bicyclists face freezing temperatures, snow, and ice. Cyclists must wear layers to keep warm and learn how to moderate their temperature appropriately. The appropriate protective clothing can be quite expensive. In the summer, bicyclists are challenged by temperatures that make it enjoyable to bicycle, but can also cause you to perspire. Spring and fall bring weather variability, it can be raining and cold on your way to work and brilliantly sunny day by the time you leave. Just planning what to wear for a bicycle commute can be challenging. Additionally, the need to look presentable at work can be a challenge to the bicycle commuter, who was sweating or got caught in a rainstorm without a raincoat on his or her way into work. Weather will always be a challenge, but incorporating showers into workplaces can make active transportation a viable option for all work environments.

Although there are significant challenges to using a bicycle as a means of transportation the benefits far outweigh the challenges. The greatest challenge is a paucity of bicycle infrastructure in the United States. Many cities do not have bicycle infrastructure and can learn from cities with legislation that promotes bicycling. A look at the current American city and how it has come to affect our choices is necessary to understand what we should do to encourage bicycle infrastructure.

### **III. The Built Environment: Do We Control It Or Does It Control Us?**

Although bicycling has many benefits, its challenges often keep it from being a practical daily transportation option. Challenges to bicycling can be broken down into barriers, there are two distinct barriers to bicycling: physical infrastructure and psychological.

### A. The Built Environment

In the last hundred years land use and transportation policy has heavily favored automobile use and infrastructure at the expense of pedestrian and bicycle infrastructure. After World War II, the United States witnessed a dramatic expansion of the American suburbs. In conjunction with the development of the American Highway System under President Dwight D. Eisenhower America began to build away from its city centers. In doing, so the country established a society that encouraged “sprawling development of isolated, single-use areas” that foster[ed] automobile reliance[.]”<sup>30</sup> The focus on a suburban lifestyle dependent on the automobile influenced the shape of old and new cities alike.

In the pursuit to rationalize and sterilize the city, planners, politicians, and industries spent large amounts of money building expressways and highways into and through cities. The ability to easily and conveniently travel from one city to another was not enough; instead expressways cut through neighborhoods so you could go from one side of the city to another just as quickly as you could drive. Transportation planners successfully found a way to move people quickly and comfortably. As the suburbs grew, so did the highways. This logic was eventually applied to local city streets as well. Street design adapted to encompass widened, straight streets to accommodate ever-larger cars and more lanes, and discouraged walking and bicycling.<sup>31</sup>

For many years, these activities were viewed as progress, a march towards an ever better city. Eventually, people like Jane Jacobs raised concerns about highways cutting through cities, and changing the urban fabric. These projects changed the character of many cities. Fast

---

<sup>30</sup> Patricia E. Salkin & Amy Lavine, *Current Issues in Public Policy: Land Use Law and Active Living: Opportunities for States to Assume a Leadership Role in Promoting and Incentivizing Local Options*, 5 RUTGERS J. L. & PUB. POL’Y 317, 317 (2008).

<sup>31</sup> Lawrence D. Frank & Peter Engelke, *How Land Use and Transportation Systems Impact Public Health: A Literature Review of the Relationship Between Physical Activity and Built Form*, Active Community Environments Initiative Working Paper #1 at 14.

transportation routes allowed people to live in cheap suburban homes, commute into the city for work and return to their homes in the suburbs. They lived near roads designed to move cars quickly and efficiently. Completely eliminating the ability to walk to work, a restaurant, and the grocery store – replaced by a trip in your car to a shopping plaza.

The effect from this focus on the car and sprawl was a dramatic change in the built environment. The built environment is the physical environment that is man made.<sup>32</sup> The built environment encompasses land-use patterns, urban-design characteristics, and transportation systems.<sup>33</sup> Scholars in several fields have arrived at similar conclusions; the built environment impacts our choices.<sup>34</sup> The built environment impacts two interwoven choices; transportation and physical activity levels.<sup>35</sup>

The idea that human behavior and physical surroundings are connected is not new. In her pioneering work on public spaces, Jane Jacobs', "observed that some parks and public spaces feel welcoming and safe and draw people in, while other spaces because of their design have the

---

<sup>32</sup> Wendy C. Perdue, *Obesity, Poverty, and the Built Environment: Challenges and Opportunities*. 15 GEO. J. ON POVERTY L. & POL'Y 821 (2008) See Susan L. Handy et al., *How the Built Environment Affects Physical Activity: Views from Urban Planning*, 23 AM. J. PREV. MED. 64, 65 (2002).

<sup>33</sup> Lawerance D. Frank, Peter Engelke, and Thomas L. Schmidt, *Health and Community Design: The Impact of the Built Environment on Physical Activity*. Washington, DC: Island Press (2003).

<sup>34</sup> Id.

<sup>35</sup> Perdue, supra at 822, See also Brian Saelens, *Environmental Correlates of Walking and Cycling: Findings From the Transportation, Urban Design, and Planning Literatures*, 25 ANNALS BEHAV. MED. 80 (2003); Patricia E. Salkin & Amy Lavine, *Current Issues in Public Policy: Land Use Law and Active Living: Opportunities for States to Assume a Leadership Role in Promoting and Incentivizing Local Options*, 5 RUTGERS J. L. & PUB. POL'Y 317 (2008), Andrew J. Tracy, *Assessing the Impact of the Built Environment on Travel Behavior: A Case Study of Buffalo, New York*. (A thesis submitted to the Faculty of the Graduate School of The State University of New York at Buffalo); Dr. Indrasen Singh, *Issues Concerning the Geometric Design of Roads and Highways*. NBM & CW, September 1, 2010; Manual J. Aboelata, MPH, et al. *The Built Environment and Health: 11 Profiles of Neighborhood Transformation*. Prevention Institute. July 2004; Sara Kureshi, MD, MPH, Kim Bullock, MD. *The Role of Clinicians to Empower Communities through Utilization of the Built Environment*. 22 Journal of Health Care for the Poor and Underserved 3, August (2011).

opposite effect.”<sup>36</sup> This insight applies to more than parks and public spaces. It applies to roads, streets, and everything else we encounter in an urbanized area.

## B. Public Health

Many scholars identify relationships between the built environment and our choices to do or not to do something.<sup>37</sup> “Specifically there is increasing evidence that the built environment can inhibit or enhance activity levels among all age groups.”<sup>38</sup> Public health has found a relationship between obesity and the built environment.<sup>39</sup>

Empirical studies suggest that proximity to stores stocking healthier food choices has measurable effects on health.<sup>40</sup> Studies show that less dense, automobile-dependent patterns of development correlate with lower levels of physical activity and an increased risk of being overweight.<sup>41</sup> Other authors agree that obesity and related diseases are on the rise and can be tied to lifestyle choices that are influenced by “our built and planned environments.”<sup>42</sup> Public health Public Health experts are coming to similar conclusions that the built environment is a major factor in shaping health and well being.

---

<sup>36</sup> Perdue, *supra* note 32, at 822, citing Jane Jacobs, *The Death and Life of Great American Cities*, Random House, 1961 (1961).

<sup>37</sup> Frank, Engelke, & Schmidt, *supra* note 32.

<sup>38</sup> Perdue, *supra* note 32, at 822, See also Goldberg, et al, *New Data for a New Era: A Summary of the SMARTRAQ Findings*, January 2007; Perdue, W., L. Gostin, and L. Stone *Public Health and the Built Environment: Historical, Empirical, and Theoretical Foundations for an Expanded Road*. 31 *Journal of Law, Medicine, and Ethics* 557, 557-567 (2003); Lawrence D. Frank & Peter Engelke, *The Built Environment and Human Activities Patterns: Exploring the Impacts of Urban Form on Public Health*, 16 *Journal of Planning Literature* 202-218 (2001); Handy et al., *How the Built Environment Affects Physical Activity: Views from Urban Planning*, 23 (suppl. 2) *American Journal of Preventive Medicine* 64-73 (2002); Ewing R., T. Schmid, A. Zlot, and S. Raudenbush, *Relationships between Urban Sprawl and Physical Activity, Obesity, and Morbidity*, *American Journal of Health Promotion* 47-57 (2003).

<sup>39</sup> Wendy C. Perdue, Lesley A. Stone & Lawrence O. Gostin, *The Built Environment and Its Relationship to the Public's Health: The Legal Framework*, 93 *Am. J. Pub. Health* 1390 (2003).

<sup>40</sup> Perdue, *supra* note 32, at 823.

<sup>41</sup> *Id.* at 824.

<sup>42</sup> Salkin, *supra* note 30, at 317.

### C. Transportation

Although there is literature showing a relationship between the built environment and transportation choices, it mostly looks at motorized transportation. Frank and Engelke conclude this “disparity reflects a research and cultural bias that conceptualizes travel as an automobile-dependent phenomenon.”<sup>43</sup> Yet several conclusions can be made from the transportation literature in general, and more specifically literature looking at nonmotorized transportation. Although Frank and Engelke point out this disparity they also conclude, “on balance the literature supports the hypothesis that urban form variables influence levels of walking and biking.”<sup>44</sup> Saelens, Sallis, and Frank support this and identify a connection between the built environment and choice of travel, concluding that transportation choice can be influenced by transportation options and urban design.<sup>45</sup>

Frank and Engelke state that transportation systems, one part of the built environment, influence travel in at least three ways. First, street networks influence mode choice and trip frequency through their connectivity and route options.<sup>46</sup> Streets in a grid pattern reduce trip distances and increase route choices, factors believed to increase walking and biking.<sup>47</sup> Second, it is possible to design streets to facilitate either automobile travel or nonmotorized travel. Wide, smooth, and straight streets encourage fast speeds by automobiles and discourage travel by foot or bicycle.<sup>48</sup> On the opposite end of the spectrum are narrow, irregular streets that discourage

---

<sup>43</sup> Frank & Engelke, *supra* note 31, at 14.

<sup>44</sup> Frank & Engelke, *supra* note 31, at 14.

<sup>45</sup> Brian Saelens, *Environmental Correlates of Walking and Cycling: Findings From the Transportation, Urban Design, and Planning Literatures*, 25 ANNALS BEHAV. MED. 80 (2003).

<sup>46</sup> Frank & Engelke, *supra* note 31, at 14.

<sup>47</sup> *Id.* at 14.

<sup>48</sup> Frank & Engelke, *supra* note 31, at 14.

high speeds or streets that provide pedestrian and bicycle infrastructure.<sup>49</sup> “Third, transportation systems can increase walking and bicycling through separate, dedicated bicycle and pedestrian facilities, such as bike paths and walking paths. Frank and Engelke show that transportation systems strongly influence the form of transportation that people use.

Frank and Engelke state that land development has similar affects on our travel behavior. Many relationships are intuitive. Low density development increases distances between origins and destinations, forcing individuals to rely on motorized transportation.<sup>50</sup> In a similar vein, separation of uses into residential, commercial, and industrial zones increases travel distances, forcing individuals to rely on motorized transportation.<sup>51</sup> Motorized travel is also encouraged when jobs, housing, and retail are located across the regional level, forcing individuals to rely on motorized transportation.<sup>52</sup> Lastly, site design also impacts travel patterns in similar ways as street design.<sup>53</sup> As Jane Jacobs identified many years before, building design, orientation, setback and other aesthetic considerations create attractive or unattractive environments that will attract street traffic.<sup>54</sup>

#### **IV. Psychological Barriers to Bicycling**

Land use and the transportation network, with all their assorted features significantly affect transportation choice. Research points out that structural barriers such as climate averse-infrastructure prevent change, but “psychological barriers also impede behavioral choices that

---

<sup>49</sup> *Id.* at 14.

<sup>50</sup> *Id.* at 15.

<sup>51</sup> *Id.* at 15.

<sup>52</sup> *Id.* at 15.

<sup>53</sup> *Id.* at 15.

<sup>54</sup> *Id.* at 15.

would facilitate environmental sustainability.”<sup>55</sup> Barriers hamper our ability or desire to make changes that might help mitigate or adapt to climate change. Many of these barriers are relevant to infrastructure changes and lifestyle changes.

Gifford states that limited cognition is one such barrier. Limited cognition can lead to ignorance or uncertainty. Individuals may not be aware of a problem or they may be unsure about the problem and how “they” can make a difference.<sup>56</sup> Limited cognition can lead to a collective action problem in which individuals do not act because “they perceive that they have little behavioral control over the outcome” or that “their actions will not have much of an impact.”<sup>57</sup> This attitude prohibits individual action to bike more and policy makers may fail to recognize the problem and potential solutions.

Gifford also states that ideologies can also play a significant role in refusing to make changes. Gifford’s states that worldviews, a belief in technosalvation, and system justification can all influence us to resist change.<sup>58</sup> In the case of bicycling, this could mean a worldview that justifies the status quo of the suburban character of America and the automobile as the preeminent form of transportation. Research by Feygina et al. showed that if changes are portrayed as part of the system or status quo that lack of action on the part of justifiers could change.<sup>59</sup> The status quo can evolve - and increased bicycle signage, bicycle facilities, and bicyclists can hasten the evolution.

---

<sup>55</sup> Robert Gifford, *The Dragons of Inaction – Psychological Barriers That Limit Climate Change Mitigation and Adaptation*, *American Psychologist*, 290 May-June (2011).

<sup>56</sup> *Id.* at 292.

<sup>57</sup> *Id.* at 293.

<sup>58</sup> *Id.* at 293.

<sup>59</sup> *Id.* at 293, citing Feygina et al., *System Justification, the Denial of Global Warming, and the Possibility of “System-Sanctioned Change.”* 36 *Personality & Social Psychology Bulletin*, 326-338 (2010).

Related to status quo are comparisons of your self with other individuals.<sup>60</sup> Gifford states that social norms and networks and perceived inequity can be reasons for action and inaction.<sup>61</sup> Gifford states that social norms and networks can be a double-edged sword. Social norms and networks can reinforce resistance to change or facilitate change.<sup>62</sup> Additionally, perceived inequity can decrease levels of cooperation and offer individuals the ability to justify their inaction.<sup>63</sup> Social norms and networks are readily identifiable in cities with progressive bicycle agendas or pockets of individuals in cities. Bicycling can breed more bicycling when it becomes more popular for a variety of reasons.

Sunk costs or lost money can also cause inaction and resistance to change.<sup>64</sup> Financial investments, behavioral momentum, and conflicting values, goals, and aspirations can limit change.<sup>65</sup> Car ownership comes at a cost and not using a car is often viewed as lost return on investment instead of a money saving opportunity. Additionally, bicycling although cheaper is not free. Bicycles, protective clothing, and specialized accessories can be costly. Individuals want to ride at night but may lack reflective clothing and lights to attach to their bike. Therefore, they may be resistant to investment in these accessories, especially if they are unsure of the

---

<sup>60</sup> Gifford, *supra* note 59, at 294.

<sup>61</sup> *Id.* at 294.

<sup>62</sup> Gifford, *supra* note 59, at 294, Describing how after residents were informed of average home energy use of their community they increased or decreased their use to be the average. And how a few neighbors who installed photovoltaic panels on their homes influenced others to do the same.

<sup>63</sup> *Id.* at 294.

<sup>64</sup> *Id.* at 294.

<sup>65</sup> *Id.* at 294

return on investment. Or they may consider other options more attractive because of prior investments and ensconced habits that result in behavioral momentum.<sup>66</sup>

Perceived risk is especially pertinent to individuals who consider behavioral changes like increased bicycle use. Perceived risk touches on many of the perceived psychological barriers, like functional risk, physical risk, financial risk, social risk, psychological risk, temporal risk.<sup>67</sup>

Functional risk is best understood as: “Will it work?” Physical risk is utmost concern to bicyclists, and especially individuals who are new to regular bicycle use. The current state of bicycle infrastructure is poor in many areas and cyclists must share the road with two-ton cars. For some, this is exhilarating, for others it can be intimidating or frightening. Financial Risk is a concern about financial investments and possible sunk costs.<sup>68</sup> Social risk and psychological risk are similar and best understood as a fear of being negatively judged by our choices, especially changes to the social norm.<sup>69</sup> Those looking to eschew their car and ride their bicycle may fear that they will be negatively judged and derided for refusing to conform to the status quo, potentially damaging their self-esteem and self-confidence. Lastly, temporal risk is also a large concern for an individual looking to regularly use his or her bike as transportation. A concern over the time spent researching and planning on making a change that fails can be viewed as a waste. Thus, a certain amount of time would be spent planning safe bicycle routes or selecting accessories. If the choice does not result in the desired benefit, a safe trip or a bad accessory, the time spent researching and purchasing items related to bicycling will have been wasted.<sup>70</sup> A fear

---

<sup>66</sup> Thus someone who desires to bike more may be torn between investing more in bicycle related safety items in a belief they will enhance their experience or safety, or simply using the car they already own (Viewing the car as a default form of transportation is behavioral momentum).

<sup>67</sup> *Id.* at 296.

<sup>68</sup> *Id.* at 296.

<sup>69</sup> *Id.* at 296.

<sup>70</sup> *Id.* at 296.

of one or all of these risks could potentially prohibit someone from changing their activity.

Gifford states that tokenism, or the desire to make a change but only make a token change also is a barrier. Token changes are often easily adopted and cost less. However, they may be easy to adopt but have little or no impact on the perceived problem.<sup>71</sup> A city may paint some bike lanes on a few streets to please those interested in bicycling, but this is often only a token gesture; in contrast to a systematic and coordinated plan to build bicycle infrastructure.

It is easy to resist change and stay within our comfort zone. This is especially true when we look at the built environment and its physical barriers to increased bicycling that often create perceived barriers to bicycling. It appears that the physical barriers shape the psychological barriers each limiting change, which in turn reinforces the barriers. In light of this cycle, how do we create change?

## **V. Creating Viable Transportation Options**

The United States went from an agrarian nation, to an urbanized nation, and now to a suburban nation. Changing our built environment is not only possible it is inevitable. We can control change, and use the change to move towards a sustainable and livable future.

### **A. Complete Streets**

The idea of complete streets is growing. Complete streets are streets designed for pedestrians, cyclists, and cars.<sup>72</sup> Complete streets are designed so that each form of activity has adequate facilities while considering the safety and interaction of all three. A typical complete street has wide sidewalks to enable people to walk safely apart from moving vehicles and

---

<sup>71</sup> *Id.* at 296.

<sup>72</sup> Fazal Khan, *Combating Obesity Through the Built Environment: Is There a Clear Path to Success?* 39 J.L. MED. & ETHICS 387, 389 (2011).

bicycles.<sup>73</sup> The street is typically wide enough to allow for a bike lane that is adjacent to the main lane for cars. Such a street allows a pedestrian, a cyclist, and a car to all safely traveling on the same road in their own space at their own pace. Complete Streets are able to change the built environment in a way that supports all transportation options, thus reducing the barriers to all forms of travel.

Complete streets are an especially important part of cycling awareness. Streets with obvious bike lanes, bike chevrons, and other markers to indicate that the road is shared by cars and bicycles begins to break down physical and psychological barriers to cycling. This is important because bicycling is a cheap, environmentally friendly, and healthy form of transportation.

The shift towards complete streets is needed, especially in light of research that shows how the built environment influences individuals' choices. Complete Streets are law in many cities and counties across the country and becoming law in many others. Making complete streets mandatory is a step towards changing the built environment to promote real transportation options. Are these laws effective at changing the built environment? Are these laws well designed or simply policy statements? It is important to understand how they work and what they should include to increase the effectiveness of the statute.

---

<sup>73</sup> *Id.* at 389.

## **B. Elements of an Ideal Complete Street Ordinance**

The National Complete Streets Coalition, a distinctly pro complete streets organization reviewed laws, statutes, and polices from across the country and identified ideal elements that should be in complete streets legislation. The elements are derived from their experience advocating for complete streets and the American Planning Association report, *Complete Streets:*

### **Elements of an Ideal Complete streets Policy**

1. Includes a vision for how and why the community wants to complete its streets.
2. Specifies that “all users” includes pedestrians, bicyclists, and transit passengers of all ages and abilities, as well as trucks, buses and automobiles.
3. Encourages street connectivity and aims to create a comprehensive, integrated, connected network for all modes.
4. Is understood by all agencies to cover all roads.
5. Applies to both new and retrofit projects, including design, planning, maintenance, and operations, for the entire right of way.
6. Makes any exceptions specific and sets a clear procedure that requires high-level approval.
7. Directs the use of the latest and best design criteria and guidelines while recognizing the need for flexibility in balancing user needs.
8. Directs that complete streets solutions will complement the context of the community.
9. Establishes performance standards with measurable outcomes.
10. Includes specific next steps for implementation of the policy.

*Best Policy and Implementation Practices.*<sup>74</sup> The elements, listed above, identify areas that should be addressed in good complete streets legislation. The analysis is based purely on the written policies and laws and does not reflect which cities have been successful at implementing

---

<sup>74</sup> The National Complete Streets Coalition, Complete Streets Policy Analysis 2010 (2010), <http://www.completestreets.org/webdocs/resources/cs-policyanalysis.pdf>.

complete streets. It is plausible that including all or most of these elements into legislation will create laws that take complete streets from idea to reality.

Using these elements the National Complete Streets Coalition rated complete street legislation from around the country.<sup>75</sup> The elements were awarded points and weighted according to importance.<sup>76</sup> A high score indicates the legislation incorporated many aspects of the elements and are best practices. The complete street policies were separated according to jurisdiction: state, county, or city, and policy type: plan, policy, resolution, statute, ordinance, and design manual.<sup>77</sup> The policies were separated by jurisdiction and policy type to make fair comparisons between similar policies.<sup>78</sup>

The results of the National Complete Streets Coalition analysis indicate that Minnesota has the best state legislation scoring 64.4 points out of a total of 100 points.<sup>79</sup> The city with the best complete streets ordinance is Crystal City, Missouri.<sup>80</sup> Crystal City scored 80.0 points out of a total of 100 points.<sup>81</sup> Using these two examples of best complete streets legislation at different levels will be useful in crafting Complete Streets legislation elsewhere, which in turn will create a better built environment. Buffalo scored 49.2 points out of a total of 100 points and New York State Complete Streets Legislation is too recent to have been included.<sup>82</sup> New York State has the most to gain from the information; it has the opportunity to include all ten elements identified by the National Complete Streets Coalition into its legislation. Buffalo can improve its complete street ordinance by looking at the best practices of similar entities, and amending its

---

<sup>75</sup> The National Complete Streets Coalition, *supra* note 74.

<sup>76</sup> *Id.* at 10.

<sup>77</sup> *Id.* at 10.

<sup>78</sup> *Id.* at 10.

<sup>79</sup> *Id.* at Appendix 3.

<sup>80</sup> *Id.* at 6.

<sup>81</sup> *Id.* at Appendix 11.

<sup>82</sup> *Id.* at Appendix 11.

current complete streets ordinance. First, a look at the elements incorporated into Minnesota's complete streets statute.

### **C. Elements of Complete Streets in Practice**

#### **i. Minnesota**

On the state level, Minnesota's Complete Streets Statute<sup>83</sup> is the best in the nation because it incorporates more of the ten elements than any other state statute. Minnesota excelled at crafting a statute that was inclusive of users of every age, ability, and mode, including pedestrians, bicyclists, motorists and commercial and emergency vehicles.<sup>84</sup> Minnesota also excelled at mandating that complete streets be phased into all new construction, reconstruction, repair, and maintenance.<sup>85</sup> Minnesota's complete streets statute is also flexible, in terms of design and context. This allows appropriate designs for various contexts, which is especially important to state statutes because of the diverse jurisdictions they cover. In other words, what is appropriate in an urban area will not always be appropriate in a rural setting. At the same time the language is broad enough to allow creative implementation. Minnesota's statute sends the message that complete streets are a transportation priority across Minnesota, and not just in its cities.

Although Minnesota's Complete Streets Statute scored the highest it still fails to address several elements of complete streets. One or two complete streets are a start but a network of complete streets is essential to change the built environment and make alternative modes of transportation a viable option. Minnesota fails to state a need for a network or a cohesive plan to implement complete streets on a broader scale, this can be done by working across state, county,

---

<sup>83</sup> MINN. STAT. § 52 174.75, Chapter 351 (2010).

<sup>84</sup> MINN. STAT. § 52 174.75, Chapter 351 (2010).

<sup>85</sup> The National Complete Streets Coalition, *supra* note at 74, 17.

and local jurisdictions. Minnesota also failed to include performance measures into their statute. Performance measures can take many forms; from miles of bike lanes, miles of complete streets, an increase in users, or an increase in mass transit use; since measures are rarely included in most legislation, any measure is better than nothing at all. Minnesota's plan lacks specificity and leaves many of the details up to the commissioner of transportation. In contrast to this is the specificity of the Crystal City Missouri policy, which comes from a much smaller jurisdiction but hopes to work in unison with other large jurisdictions.

## **ii. Crystal City, Missouri**

Crystal City, Missouri created the best Complete Streets Ordinance of any city across the country. Crystal City's ordinance included language to implement complete streets for all users and modes, stating that complete streets are designed as transportation corridors for all users: pedestrians, cyclists, transit oriented users, and motorists.<sup>86</sup> Crystal City identified the need to work across jurisdictions and foster partnerships. The ordinance specifically mentions the partners the city will work with – including the State of Missouri, Jefferson County, neighboring communities, and Business Districts within Crystal City – to create a larger network of complete streets that extend beyond city borders.<sup>87</sup> Crystal City also strives to incorporate complete streets into all public transportation projects over time, through single elements or entire projects and networks.<sup>88</sup> Crystal City also recognizes the need to develop complete streets that fit within the local context and are visually appealing to all users.<sup>89</sup> Lastly, Crystal City recognizes that great complete streets require knowledge and hard work, to this end they commit to sending staff to

---

<sup>86</sup> CRYSTAL CITY, MO., CODE OF ORDINANCES ch. 23 art. iii, § 23-52(a) (2010).

<sup>87</sup> CRYSTAL CITY, MO., CODE OF ORDINANCES ch. 23 art. iii, § 23-52(d) (2010).

<sup>88</sup> CRYSTAL CITY, MO., CODE OF ORDINANCES ch. 23 art. iii, § 23-52(e) (2010).

<sup>89</sup> CRYSTAL CITY, MO., CODE OF ORDINANCES ch. 23 art. iii, § 23-52(f) (2010).

professional development and training, conferences, classes, seminars, and workshops on non-motorized transportation issues, when feasible.<sup>90</sup>

Crystal City's Ordinance scored 80 points out of 100, so clearly it is not perfect. Yet it makes positive strides towards changing the built environment and making complete streets every street. The only element that crystal city did not receive points for is *measures*. Crystal City fails to point to specific measures or metrics to judge the success of the ordinance.<sup>91</sup> They do not set specific goals in terms of roads converted, miles of complete streets finished, or anything else. With such strong intent and language throughout the ordinance it is surprising that Crystal City failed to set goals to achieve. This failing is minor when you look at the quality of the ordinance on a whole.

### iii. Buffalo, New York

The City of Buffalo, New York passed a complete streets ordinance in June of 2008.<sup>92</sup> Buffalo's Ordinance scored 49.2 points out of 100, almost half of the top rated ordinance.<sup>93</sup> Obviously Buffalo's ordinance has a long way to go. Buffalo received high scores for the ordinance's intent and its focus on users of all ages and abilities and all modes, including persons with disabilities, pedestrians, bicyclists, motorists and transit riders.<sup>94</sup> Buffalo's ordinance also received high scores for phases, exceptions, and design. Complete streets are mandated on all new street construction, street reconstruction, street maintenance, public works and park projects

---

<sup>90</sup> CRYSTAL CITY, MO., CODE OF ORDINANCES ch. 23 art. iii, § 23-54(c) (2010), (A local bicycle advocate told me that one of the largest hurdles to implementing complete streets locally, is a lack of knowledge on complete streets in the Department of Public Works. He stated that the current planners and engineers were taught how to move cars efficiently, not how to build roads for pedestrians, cyclists, and motorists of all ages and abilities).

<sup>91</sup> CRYSTAL CITY, MO., CODE OF ORDINANCES ch. 23 art. iii, § 23-53 (2010).

<sup>92</sup> BUFFALO, NY., CODE ch. 413, art. XIV, § 413 (2008).

<sup>93</sup> *Id.* at Appendix 11.

<sup>94</sup> BUFFALO, NY., CODE ch. 413, art. XIV, §413-68 (A) (2008).

undertaken by the City of Buffalo.<sup>95</sup> This strong language is followed by a caveat that certain exceptions do apply, “subject to the exceptions contained herein.”<sup>96</sup>

The exceptions make up the majority of the amendment. The ordinance reads, Complete Streets shall be mandated . . . unless one of the following conditions exists: (1) Bicyclists and pedestrians are prohibited by law from using the facility,<sup>97</sup> (2) costs would be disproportionate to the probable use, the cost of including bicycle and pedestrian facilities is disproportionate if the cost of such facilities exceeds twenty percent of the cost of the larger project,<sup>98</sup> (3) where the existing right of way does not allow for sidewalks, bike lanes, paths or other improvements.<sup>99</sup> Although, these exceptions appear to halt a great deal of complete streets from occurring, similar language is found in the high scoring Crystal City Ordinance. Therefore this language is not a hindrance to an ideal complete streets policy according to the National Complete Streets Coalition.

## **VI. Lessons for New York State and Buffalo**

The City of Buffalo and the State of New York can learn from other municipalities existing policies and the work of the National Complete Streets Coalition. New York State should include all ten elements of ideal complete streets in its complete streets regulations. Making sure that streets are made for all users and all modes, and creating a comprehensive plan that creates a network of complete streets. New York State should implement a strong performance standard, annually setting goals for streets to be converted and make all new streets complete streets.

---

<sup>95</sup> BUFFALO, NY., CODE ch. 413, art. XIV, § 413-69 (A) & (C) (2008).

<sup>96</sup> BUFFALO, NY., CODE ch. 413, art. XIV, § 413-69 (C) (1-4) (2008).

<sup>97</sup> BUFFALO, NY., CODE ch. 413, art. XIV, § 413-69 (C) (1) (2008).

<sup>98</sup> BUFFALO, NY., CODE ch. 413, art. XIV, § 413-69 (C) (2) (2008).

<sup>99</sup> BUFFALO, NY., CODE ch. 413, art. XIV, § 413-69 (C) (3) (2008).

The City of Buffalo, should add performance standards into the complete street ordinance. The City should set a goal to convert a certain percentage of streets every year with a long-term goal of converting all city streets into complete streets. As the city embarks on this long-term process it should focus first on networks, so that connectivity is achieved well before all streets are converted. One such network could be transforming the cities east-west<sup>100</sup> streets that contain a Niagara-Frontier Transportation Authority Metro Rail station. Not all of these streets need to or are ideal for converting into complete streets, however many of these streets are ripe for change. Changing these few streets will have a positive impact on the built environment of Buffalo and should reduce the risks of bicycling by providing appropriate facilities that in turn increase bicycle use. Public perception could change in two ways. Seeing streets designed for all users will make motorists, bicyclists, and pedestrians more aware of their interactions and will make all three more aware of other users. Second, appropriate facilities can change the perceptions of the general public, changing bicycling from a fun time to a serious transportation method. Changing the built environment, will in turn change public perception and increase active transportation, improve health and reduce greenhouse gas emissions.

## **VII. Conclusion**

Complete streets will reduce or eliminate the barriers to the built environment. Providing adequate infrastructure for bicycling will improve safety, access, and ease of use. A simple network of streets will eliminate the need for someone to plan a safe route, instead relying on a comprehensive network of complete streets and appropriate signage. In time all of these improvements, can change the way Americans transport themselves. Just like expressways and

---

<sup>100</sup> The Streets that have a Metro Rail station are: Kenmore, Lasalle, Hertel, Amherst, Humboldt Parkway, Delavan, Utica, Summer-Best, High, Allen, Tupper, Chippewa, Lafayette, Seneca, Scott, and Perry.

highways changed how we traveled networked complete streets can transform the next generations travel choices.

Additionally a network of complete streets can reduce the psychologically barriers that prevent individuals from bicycling. Complete streets can separate bicycles from cars and give both forms of transportation necessary space. Further, a comprehensive network of complete streets can shift momentum towards bicycling. By implementing and institutionalizing complete streets we are sending a message that bicycling is a viable and legitimate form of transportation, equally entitled to road-space, just like motorists and pedestrians. These changes, along with added use will shift social norms to include bicycling as a socially acceptable form of transportation.

Challenges to bicycling will always exist. Many of these challenges are related to the physical structure of our roads and cities. The first step is to eliminate these challenges by providing safe roads for all users so that users have true transportation options. By building the appropriate infrastructure for bicyclists and pedestrians, we legitimize and acknowledge that bicyclists, pedestrians, and motorists have equal rights to the road. Until we reach this fair playing field we cannot expect bicycling to be a viable transportation method for many Americans.