

INCREASING THE PREVALENCE AND SAFETY
OF CYCLING IN SAN MARCOS

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Abstract

Bicycling has been proven to be beneficial for mental health, physical health, and the green environment, but is considered one of the most unsafe modes of transportation. Existing research proves that cyclists are twelve times more likely to be killed in a crash than an in-car occupant, especially in Southern states. This research focuses on two main problems: (1) The attitude and relationship between driver and cyclist and (2) the dangers of cycling in the South and the need for a safe biking infrastructure. San Marcos is an up and coming city that needs improvement in both. By better understating how drivers and cyclists behave on the rode, and creating better-connected biking networks, San Marcos can become a safe city for cyclists, and can integrate a more sustainable mode of transportation.

Introduction

I've known how to ride a bike since I was a child, but my enthusiasm for the activity did not begin until I went to college. The summer before my freshman year at Texas State University, a family friend bought me a Trek mountain bike, which I named after "Spock" from Star Trek because it was a light royal blue like his shirt. I would ride around town with my best friend, and together we would go ride at Purgatory Creek and Spring Lake Preserve, a few of the local trail systems in San Marcos.

I am now a senior at Texas State and over the past four years, my bicycling experiences have shaped me into a safe and cautious cyclist, due to the reckless drivers on the road. Frequently, I commute to class and cross Aquarena Drive, one of the busiest roads that lead into campus. There is no bike lane on my commute, so I use short cuts around town to avoid traffic and the dangers of the road. Each time I am headed to or from campus, impatient drivers pass me in no-passing zones, narrow lanes, and they do not consider how close they are to me when passing. This is not to say everyone does this, but from my own personal experiences, the majority of drivers do. If you have ever stood on the edge of the sidewalk, and a car whizzes past, you have felt the gush of wind throws off your balance. Now, imagine how this feels when you are trying to balance on two skinny wheels. This is an everyday feeling for a cyclist.

I consider myself to be a very safe cyclist. I obey the rules of the road, use lights, wear bright colors, and wait my turn. I have experienced drivers "giving me the bird", cussing at me, almost hitting me, and threatening me, and it is no shock when I hear a cyclist friend say, "A car almost hit me today." Biking is dangerous for cyclists in San Marcos, and it needs to change.

Biking is a great way to stay healthy while offering a non-polluting form of transportation, which is why the bike infrastructure in San Marcos should be improved. It will provide safety for cyclists and also ease the flow of traffic in areas where cyclists have no choice but to ride in the main lane on the road. Places like Portland, Chicago, and Boulder, are the pioneers, creating bike friendly cities. By recognizing how these cities treat cyclists and the improvements they have done to enhance their bike networks, San Marcos can also launch itself into a the new era of the biking revolution and experience the many benefits of cycling, which are presented here.

The Benefits of Cycling

It is believed that H. G. Wells stated, “ Every time I see an adult on a bicycle, I no longer despair for the future of the human race.” Cycling has many benefits both to individuals, the community and the environment. It is a way of improving physical and mental health, as well as the health of the planet. Economic benefits will also be discussed.

Physical and Mental Health Benefits

Dr. Clare Safron-Norton (2016), a physical therapist at Harvard affiliated-Brigham and Women’s Hospital reports that cycling is socially oriented and has a variety of health benefits. It takes the pressure off your joints, unlike other physical activities like walking or jogging, making it a great exercise for those with joint pain or age-related stiffness. The aerobic workout triggers endorphins, and is great for heart and brain health. Cycling also builds muscles in the quadriceps in thighs, the gluteus, hamstrings, and the calves. Cycling is great for the abdominals, arms, shoulders, and can increases bone density (Safron-Norton, 2016). Cycling also improves mental health by elevating mood.

A study conducted in 2007 by Charles showed that exercise boosts brainpower and can sharpen memory skills, increase concentration levels, and allows greater problem solving ability than those who do not exercise (Hillman, Erickson, & Kramer, 2007). Cycling also boosts the production of endorphins, like serotonin and dopamine, the chemicals that make you feel-good and lift your mood (Yeager, 2014). It is no wonder cycling has grown tremendously over the past decade.

Environmental Benefits

Not only is cycling great for physical and mental health, but also it is great for the environment and community! Cycling uses minimal fossil fuels and is proven to be a pollution-free mode of transportation, meaning cyclists do not contribute to the environmental damage that is caused by cars. San Marcos is an environmentally conscious city. The San Marcos River is spring fed from Edwards Aquifer, that is home to many endangered species of aquatic life. River samples are collected four times a month to protect the river from contamination. The San Marcos River has been closed many times due to contamination by storm water runoff. The Washington Department of Ecology (2016) estimates that one-third of polluted waters are from storm water runoff. Vehicles contribute to drizzling out various oils, greases, metals, coolants, and soaps that are leftover from car washing, all of which become runoff when it rains (Washington Department of Ecology, 2016). This pollution contaminates the river, which closes local businesses like the tube rentals at Lions Club, or equipment rental at the Texas State University outdoor recreational center. Storm water runoff is also dangerous to the habitat because it can harm or kill the aquatic life in the water (Nelson, 2016). Cycling can help reduce contamination, keep the river clean, and keep the aquatic life safe.

Economic Benefits of Cycling

Though bicycling was one of the most popular forms of transportation in the early 1800's and 1900's, the mass production of automobiles in the early twentieth century pushed them aside. A clean, healthy form of transportation was given up for the convenience and speed of a personal car. Bikes were pushed aside as a new form of transportation took over. Today, cars are more expensive and require a greater deal of upkeep. According to the Bureau of Labor Statistics, in 2009 the average cost per year is \$8,689 to own and operate a vehicle, which includes fuel, maintenance, insurance, and other required fees (Gilderbloom, Grooms, Mog, & Mearers, 2015).

On a personal note, I've commuted on my bike throughout college, but in early March I saved up and bought my own car. My bills went from paying my utilities and buying groceries, to having to pay \$100 a month for car insurance, and about \$15 a week for gas. This may not seem like much, but for a college student it's a jump. My bike requires regular maintenance and occasionally fixing a flat. According to the AAA, a bike is estimated to cost \$120 per year (Gilderbloom et al., 2015). As a result, the bicycle has regained a lot of attention.

Not only is a bike cheap, but also it is a green economic development strategy in certain bike-friendly cities. It cuts down the amount of congestion on the road, which can account for a total of 1.9 billion gallons of extra fuel that had to be purchased due to traffic delays (Gilderbloom et al., 2015). By encouraging and increasing biking, this could reduce the costs of road congestion by \$7.2 billion (Gilderbloom et al., 2015). San Marcos is a hub for congestion, with roughly 40,000 students attending Texas State

University, and an estimated population of 60, 684 (United States Census Bureau, 2015) the town can get backed up.

Community Benefits

Finally, cycling is great for local businesses and communities. A report from People For Bikes and Alliance for Biking and Walking stated, “As cities across the country build better biking systems, it’s becoming clear to more businesses and politicians that, when used right, these networks are part of the path to prosperity” (Anderson & Hall, 2017, p. 6). The protected bike lane promotes economic growth by boosting real estate value, increasing local jobs, and increasing the amount of healthy workers (Anderson & Hall, 2017). Real estate values increase because cycling allows for connectivity and comfort between work and home. The protected bike lane allows for a safe way to get to work. David Baker and Partners Architects from San Francisco, California, design green buildings and innovative housing complexes, state that the reason they support the bike lane is because, “I’d like to have my employees safe on the way to work” (Anderson & Hall, 2017, p. 10). As traffic slows down, there is room for landscaping, retail, and room for more people to walk and enjoy their neighborhood and city (Anderson & Hall, 2017). The appeal of a safe commute to work brings competition between skilled workers, while also ensuring that the workers are healthy. Local businesses have to worry less about their employee’s health, because they are getting daily exercise (Anderson & Hall, 2017). Biking to work lengthens lives, and makes workers happy and productive throughout the day.

Exploring the Barriers to Increasing the Safety and Prevalence of Cycling

Despite the proven benefits of cycling, there are two main problems that this thesis explores that have been identified as barriers to improving the safety and prevalence of cycling in San Marcos, Texas. They are: (1) The attitude and relationship between driver and cyclist and (2) the infrastructure that makes a city safe or unsafe for cyclists, particularly in the South. This section explores these problems in greater detail so that they can be effectively remedied.

Negative Attitudes Between Cyclists and Drivers

Stigma and stereotypes. One of the main barriers creating negative attitudes between cyclists and drivers are the negative social stigmas and stereotypes surrounding biking and cyclists. As mentioned, bicycling has many physical and mental health benefits, as well as benefits to the community and to the environment, yet even with all the benefits that cycling can give, the positive perception of biking and cyclists has decreased over the years. A study in the United Kingdom found that those who bike are more likely to have a positive view of other cyclists than those who do not ride a bike (Gatersleben & Haddad, 2010). When cyclists are asked why they bike, they usually say for the low cost, flexibility, enjoyment, fitness, and the relative speed (Gatersleben & Haadad, 2010). Gatersleben and Haadad (2010) also examined cycling attitudes and found that drivers placed cyclists at the bottom of the road hierarchy and associated cyclists with negative traits like irresponsibility, unpredictability, arrogance, and inconvenience. Drivers believe that cyclists are less likely to follow the rules of the road.

According to a survey from Portland State University conducted by researcher Tara Goddard and her colleges (2016), drivers and cyclists were asked to rate how well both groups “follow the rules of the road” and how predictable the other was. The survey

was conducted in five major U.S. metropolitan cities: Austin, Chicago, Portland, San Francisco, and Washington, D.C. It included roughly 2,300 people, including drivers and non-drivers. Most drivers saw other drivers as predictable, while non-drivers did not agree, but were still fine with how drivers were on the road (Goddard et al, 2016). However, only a third of both groups thought that cyclists were predictable on the road, leaving a very negative attitude toward cyclists. The survey also found that drivers who also rode a bike were more sympathetic than drivers who never rode a bike. Drivers not only perceived cyclists as unpredictable, but they also disagreed that cyclists followed the rules of the road. Interestingly enough, drivers were opposed to expanding bike infrastructure. Protected lanes allow cyclists their own path separate from vehicles, so it is shocking that drivers would not want more of them (Goddard et al, 2016).

A survey conducted in England by 244 cyclists and non-cyclists, showed that cyclists are categorized in three different categories: lifestyle, responsible, and commuter (Gatersleben & Haadad, 2010). People's perception of a responsible cyclist tended to be courteous on the road, abided by the rules, and wore reflective gear. They did not use sidewalks, listen to music, or perform bike tricks. The lifestyle cyclist owned bike equipment, like mirrors, shoes, and a helmet and biked to keep fit, or for environmental reasons. They were associated with helping charities and cycling clubs. And finally, the commuter cyclist used their bike for transport. They are typically young and commute no matter what the weather is, and tend to be considerate on the road. Despite what category a cyclist fell into, all were still considered unpredictable and overall irresponsible on the road (Gatersleben & Haadad, 2010). Cyclists felt flustered because despite how safe and responsible they were, they still had to face aggressive drivers (Gatersleben & Haadad,

2010). Without mutual respect and understanding, each side will view the other as problematic.

The Dangers of Cycling in the South: The Need for a Safe Biking Infrastructure

Addressing the social stigma that comes from negative stereotypes about cyclists is especially important in the South, where cycling is particularly dangerous. Take San Marcos, Texas, for example. San Marcos is a beautiful city with warm weather, and rolling hills, so the question comes to ask, why is bicycling not more prevalent?

According to a benchmark study conducted by the National Alliance for Biking and Walking (Reuben, 2014), the southern states in the United States are the most dangerous for bicyclists, and the most dangerous per bike mile traveled. If you bike in South Carolina you are on average 10 times more likely to be hit by a car than if you bike in Oregon. If you live in Louisiana, you are 7 times more likely, and 13 times more if you live in Mississippi (Reuben, 2014). The same is true for a city like San Marcos; the stakes are high every time a cyclist gets on their bike.

Year after year, cyclists in the south are hit and killed because of aggressive driving and a lack of proper bike route planning. Wood (2010) reported that there is an incident every 5.59 miles, which is a major reason why more people choose not to cycle. Of the crashes that happen between cyclists and vehicles, a very high proportion are reported as drivers not detecting the cyclist until it was too late, even though they had looked in the direction of the cyclist (Wood et al, 2010).

However, Peter Wilborn (2014), the founder of a bike advocacy group and legal practice, Bike Law, believes that it is not just the type of driver, but that the larger problem is the lack of a good bike infrastructure. He states, “Cycling fatalities are

inversely proportional to the amount of money spent on bike infrastructure,” he continues, “This is well documented. There is a number of what a state spends—and that number correlates almost exactly with its ranking on fatalities.” (Reuben, 2014, ¶ 15). Drivers and cyclists cannot improve their attitudes when a city does not have proper cycling lanes and infrastructure. According to Jennifer Dill and Theresa Carr’s (2003) survey research, one solution may include providing more bike lanes. The increase in concern for the environment and the overwhelming amount of vehicle pollution has led to an interest in bicycling infrastructure. In 1991, the U.S. congress funded pedestrian and bicycle projects, in hopes of doubling the trips made by foot or bicycle (Dill & Carr, 2013). Yet despite the fact that every four years the Department of Transportation budgets transportation funding around the nation, the percentage it spends on bike projects is miniscule. For example, in 2014, \$37.7 billion was spent on transportation projects, yet the Statewide Transportation Improvement Program, responsible for planning local and specific regions, reported that only \$422.3 million was spent on bicycle-only projects (McLeod, 2016, p. 5). This means that very few projects were created to improve or create bicycle infrastructure. Additionally, most of these projects were share-use projects, not standalone bicycle projects. Given the health and environmental benefits of cycling, it seems like there should be more projects and more money to fund them.

Yet despite a lack of resources, several U.S. cities stand out for their commitment to biking infrastructure. In order to learn from these cities innovative approaches, several case studies are presented.

Case Studies of Bike-Friendly Cities

If you frequently visit San Marcos or live here, you know it is constantly undergoing road construction. Currently, Aquarena Drive, the most popular street to get into downtown and to Texas State University, is getting a new face as an overpass is being built. This is supposed to do away with the frequent traffic caused by trains, but what does this mean for commuters and cyclists? I have yet to see a bicycle lane being constructed. As a student commuter, I face these difficulties, including continuous construction, few established bike lanes, and a momentous amount of student drivers. I don't blame people for being afraid to ride their bike. By improving bike infrastructure and bike education programs, San Marcos can increase the safety for their cyclists and improve the health of the city and its environment.

We can look to other cities for excellent examples that San Marcos could follow. Though it seems paradoxical that colder and snowier states in the north have a higher percent of bicyclists than the warmer southern states, the nation's most bicycle friendly cities include cities like Portland, Chicago, and Boulder (Price & Godwin, 2016). Unlike San Marcos, these bike-friendly cities have found ways to make it safe for cyclists, not only in times of construction, but in uninterrupted times. Researching and comparing major bike-friendly cities is the first step in improving the safety of cyclists.

Portland

Portland, Oregon is one of the most well known "bike-friendly" cities where the locals have learned how to share the road with a different form of traveler: cyclists. Portland has not always been this bike-friendly though. In June of 2009, the Bicycle Transportation Alliance took on the Oregon legislature to stiffen the penalties against careless drivers after the wake in cycling deaths (Hawkins, 2015). Oregon was one of the

few states without vehicle homicide laws for bicycle fatalities. This was later called the Vision Zero plan, which was adopted by Portland, New York, Chicago, Boston, and San Francisco (Hawkins, 2015). The BTA fought hard to pass a law that convicts a careless driver who kills or seriously injures a cyclist or “vulnerable” road user. The penalties include the possible suspension of drivers license and a \$12,500 fine. Now, Oregon takes the lives of cyclists and vulnerable road users more seriously, as Portland has become a hub for cyclists.

The Vision Zero law addresses how our society and judicial system perceive collisions. In order to get to zero deaths, whether by car crash, pedestrian casualty, or the death of a cyclist, things had to be changed. The Bicycle Transportation Alliance Executive Director Rob Sadowsky took this issue to heart and stated, “The first is everyone needs to take responsibility for their driving. All crashes are preventable. We tolerate one of the highest forms of death in the country. If this were a disease, we would have telethons. If falling down [in] bathtubs caused it, they would be redesigning bathtubs. Because the injuries and death are caused by crashes, we accept it” (Hawkins, 2015, ¶ 9). Sadowsky said that the next step is redesigning the roads for safety, rather than convenience, and that those who cause traffic fatalities face severe punishment (Hawkins, 2015).

These changes have had a positive influence on the safety and prevalence of cycling in Portland. Portland has seen an increase in commuting cyclists in recent years; about 6.1 percent of the population now chooses their bike when commuting to work (Hawkins, 2015). Vision Zero has implemented policies to reduce the amount of deaths by reducing the speed limit. Sadowsky explained, “We are hoping to reduce residential

speed limits from 25 mph to 20 mph, as we know that if you get hit by a car at 20 mph or less, there is an 80 percent chance of survival, when the speed limit increases, chance of survival decreases. At 35 mph, there is only a 15 percent chance of survival” (Hawkins, 2015, ¶15). Other ways to reduce overall speed are by adding speed bumps, roundabouts, and by narrowing roads (Hawkins, 2015). Like Portland, these features were also successful in Montreal, Canada after a survey was conducted that concluded the injury rate went down 28 percent on roads that had these features (Hawkins, 2015).

Chicago

Chicago also is taking part in making itself one of the safest and greatest cities for cycling. Not only has it improved its infrastructure, but also it is improving the citizen’s education and awareness about cyclists. In 2015, the Chicago Bicycling Ambassadors, a bike-safety and public-awareness outreach team, held four camps for children to improve their bike-riding skills, riding safety, map reading capabilities, and route selection. Pat Dowell, an ambassador, stated, “It is important to teach children the skills they need to ride their bikes safely and confidently so they have a lifetime of enjoyment on a bicycle” (City of Chicago, 2012, ¶4). The camp aimed to increase the number of citizens who use active transport and help children get back into cycling. This was just a small step in what Chicago has done to promote bike-safety in their city. From 2000 to 2015, Chicago initiated The Chicago 2015 bike plan. The plan was composed of three major parts, design a bike-friendly network, create bike-sharing kiosks that allow easy access to bikes, and create a place that is committed to making Chicago safe for bicyclists. Chicago

implemented a colored stripe for a shared bike lane, which brings attention to the bicyclist. The city also added over 100 miles of protected bike lanes, where the lane is separated from the street by a curb, to ensure even more safety (Chicago Department of Transportation, 2015). These steps that Chicago have made are what make it one of the most bike-friendly cities in the United States. While San Marcos is much smaller than Chicago, it can learn from the Chicago bike plan.

Boulder

Boulder is similar to San Marcos--hilly, hidden amongst nature, and very peaceful, but its differences in the bike world are tremendous. Boulder is one of the pioneers that embraced cycling, and calls itself, "Bike Capital USA" (Thomas, 2017). Boulder is one of five "Platinum" bike-friendly cities (League of American Bicyclists, 2012). Boulder earned its "platinum" status by investing heavily in sustainable transportation infrastructure over the past 30 years; it has become one of the best cities for non-auto travel (Krizek & Langegger, 2009). At least 95 percent of Boulders through roads have a trail or bike lane. While Boulder has a great biking infrastructure, that is not what makes it famous, it is how the community and people care for cyclists, something San Marcos can learn from. The city embraces cycling culture, as Steve Thomas (2017) states, "There is no ignoring it, and no hiding the shaved legs and Lycra here, it's something to be proud of- being a cyclist that is" (p. 69). In 2005, Boulder launched a pilot program called, Boulder Safe Routes to School, which encouraged kids to bike or walk to school. In one school, 75 percent of children walked or biked- a 620 percent increase from before the pilot program was initiated. Another community program is Bike to Work Day. The American Cyclist (2008) reported that over 4,000 people

participated in this event, helping to bring the community together. Boulder recognizes the benefits that come from cycling and embraces them. Steve Thomas from Road Bike Action (2017) said, “You’ll be amazed and politely dazed at the sheer number of cyclists in town. In Boulder, there is no escaping the power of cycling; it is a great place to feel normal if you’re a cyclists” (p. 70). For something that feels so natural, I do not feel normal riding my bike in San Marcos. Thomas continues to say that Boulder has, “. . . a superb cycling-friendly infrastructure, excellent rides, and is easily accessible to the rest of the world” (p.70).

Discussion

Portland, Chicago, and Boulder have taken many steps to improve the safety of cyclists in their cities. If San Marcos cared about its cyclists as much as these bike-friendly cities do, the safety and prevalence of cycling would increase. While the infrastructure does play a vital role, it is without cause if the community does not put forth effort as well. This includes increasing cycling safety precautions, along with reducing negative attitudes and creating safer infrastructure.

One of the main ways to improve cycling safety and culture in San Marcos is to teach cycling safety precautions to cyclists and drivers alike. Cyclists can improve their visibility aids in order for drivers to see them more clearly. Places like The Hub, Peddle Power, and The Bike Cave, all local bike shops of San Marcos, could provide safety pamphlets for new cyclists. Additionally, when a new owner purchases a bike, storeowners could inform them on safe cycling habits, and hold bike-safety classes. The Hub and Peddle Power both have lights, and other reflective gear that can be bought to improve visibility. However, research shows that cyclists generally know to wear high

visibility clothing, and are aware of the benefits of reflective aids (Wood, 2010).

Unfortunately, many cyclists reported not wearing their aids on a regular basis, and tend to overestimate their visibility (Wood, 2010). According to Wood, 95 percent of drivers agreed cyclists should wear more reflective clothing because “cyclists are difficult to see in traffic.” On the other hand, 88 percent of cyclists said, “drivers do not look for cyclists.” Cyclists in San Marcos should be well aware of the dangers of cycling and should be educated on the benefits of visibility aids, safe cycling habits, and should take action to be visible. Additionally, drivers of San Marcos should be educated on how to be more aware of cyclists.

Conclusion

Cycling is proven to be beneficial for physical and mental health, and can be a way to bring the community together, all while helping the environment; therefore, we should work to increase the prevalence and safety of cycling in San Marcos, Texas. San Marcos is a hub for active Texas State Students and the locals that reside here, many of which ride their bike, but before San Marcos can become a bike-friendly city, it has major work to do. San Marcos needs to improve attitudes between cyclists and drivers, improve the bike-infrastructure, and educate both cyclist and driver regarding cycling safety precautions in order to help them coexist together safely. San Marcos can follow cities like Portland, Chicago, and Boulder, to learn how to change for the better. By adding in bike lanes, and other methods that slow down traffic, cyclists will be safer, and drivers will be at ease. Additionally, by educating both cyclists and drivers of the rules of the road, each can be more aware of their self and the other while one the road. In order

to improve our health, our community, and our environment, we should take a step (or pedal) toward improving the safety and prevalence of cycling in San Marcos, Texas!

References

- Anderson, M., & Hall, L. (2017). Protected bike lanes mean business. Retrieved on April 29, 2017 from http://www.peoplepoweredmovement.org/site/images/uploads/Protected_Bike_Lanes_Mean_Business.pdf
- The City of Chicago (2012). *Children learn cycling skills through weeklong bike safety camp*. Retrieved on April 28, 2017 from https://www.cityofchicago.org/city/en/depts/cdot/provdrs/bike/news/2012/aug/children_learn_cyclingskillsthroughweeklongbikesafetycamp.html
- Chicago Department of Transportation. (2015). *2015 Bikeways - Year in review*. 1-7.
- City Warns of Elevated Bacteria Levels in San Marcos River. (2016). Retrieved April 30, 2017 on from <http://smmercury.com/2016/03/25/city-warns-of-elevatedbacteria-levels-in-san-marcos-river/>.
- Dill, J., & Carr, T. (2003). *Bicycle commuting and facilities in major U.S. cities: If you build them, commuters will use them*. Retrieved on April 20, 2016 from http://www.des.ucdavis.edu/faculty/handy/esp178/dill_bike_facilities.pdf
- Gatersleben, B. (2010). *Who is the typical cyclist?* Retrieved on April 30, 2017 from <https://www.journals.elsevier.com/transportation-research-part-traffic-psychology-and-behaviour>.

- Gilderbloom, J., Grooms, W., Mog, J., & Mears, W. (2015). The green divined of urban biking? Evidence of improved community and sustainable development, *Local Environment*, 991-995.
- Goddard, T. (2016). *National Institute for Transportation and Communities*. Retrieved on April 28, 2017 from <http://nrtc.trec.pdx.edu/research/project/989>
- Hawkins, K. (2015). Oregon and Portland strike up Vision Zero plans. *Bicycle Paper*, 44(5), 1-7.
- Hillman, C. H., Erickson, K. I., & Kramer, A. F. (2008). Be smart, exercise your heart: Exercise effects on brain and cognition. *Nature Reviews Neuroscience*, 9(1), 58-65.
- McLeod, K. (2016). *Lifting the veil on bicycle & pedestrian spending: An analysis of problems & priorities in transportation planning and what to do about it*. Retrieved on April 20, 2017 from http://www.advocacyadvance.org/docs/LiftingTheVeil_Report.pdf
- Safron-Norton, C. (2016) The top 5 benefits of cycling. *Harvard Health Letter*, 41(11). 4. Retrieved on April 28, 2017 from <http://www.health.harvard.edu>
- League of American Bicyclists. (2012). *League of American Bicyclists*, Retrieved on April 30, 2017 from <http://www.bikeleague.org/programs/bicyclefriendlyamerica>
- Price, A., Godwin, A. (2016). Bicycling and walking in the central Deep South states: Why is it rare and risky? *The Journal of Transport and Health*. Retrieved on April 28, 2017 from

http://www.academia.edu/19775017/Bicycling_and_Walking_in_the_Central_Deep_South_States_Why_is_it_Rare_and_Risky

Krizek, J., Langedger, J., (2009). *Bicycling in Boulder, Colorado: Researching initiatives worth replicating*. Proceedings of the 88th Annual Transportation Research Board Meeting. Washington, D.C.

Reuben, A. (2014). *Braving the deep, Deadly South on a bicycle*. Retrieved on April 20, 2017 from <https://www.theatlantic.com/national/archive/2014/03/braving-the-deep-deadly-south-on-a-bicycle/284293/>.

Nelson, D. (2016). *Storm water runoff pollution and how to reduce it*. Retrieved on April 28, 2017 from <http://www.kingcounty.gov/services/environment/water-andland/stormwater/introduction/stormwater-runoff.aspx>

Thomas, S. (2017). The mile-high cycling city. *Road Bike Action*, 11(2), 68-73.

United States Census Bureau. (2016). *Population estimates*. Retrieved on April 30, 2017 from <https://www.census.gov/quickfacts/table/PST045216/4865600>

Thomas C. (2017). Assessing the bicycle network in St. Louis: A place based user-centered approach. *Sustainability* 9(2), 241.

Yeager, S. (2015). *How cycling makes you smarter and happier*. Retrieved on April 28, 2017 from <http://www.bicycling.com/training/fitness/your-brain-bicycling>

Washington Department of Ecology. (2007). *Protecting Washington's waters from storm water pollution*. Retrieved on April 30, 2017 from

<https://fortress.wa.gov/ecy/publications/documents/0710058.pdf>

Wood, J., Lacherez P., Marszalek R., King, M. (2010, January 10). Drivers' and cyclists' experiences of sharing the road: Incidents, attitudes, and perceptions of visibility. *Accident Analysis and Prevention*. 41(4). 772-

776. Retrieved from <http://eprints.qut.edu.au/29579/>