Building a Bicycle Friendly La Crosse

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ABSTRACT

Four years ago, the City of La Crosse, Wisconsin was awarded Silver Status as a bicycle friendly community by the League of American Bicyclists. As the renewal date of the status approaches, community leaders are concerned that new League guidelines combined with the lack of sufficient change in bicycle accommodations that have occurred in the past four years will result in the city either being downgraded, receiving Honorable Mention Status, or failing to be awarded any status at all. Focusing on the League of American Bicyclists' five essential elements of engineering, education, encouragement, enforcement, and evaluation/planning, a plan was put before the local steering committee. Considerations included ties between the health benefits of bicycling, Safe Routes to School, the economic benefits of walkable and bicycle friendly retail areas, and the economic benefits businesses enjoy from having bicycle friendly policies for their employees. Following that meeting, plans to identify a police liaison, create a community resources website template for the city, and make strategic business connections were developed and executed.

INTRODUCTION

The City of La Crosse is worried. Worried that they may not be able to keep their Silver Status from the League of American Bicyclists (the League) as a bicycle friendly community. When La Crosse received its status four years ago, the guidelines were not as stringent. With this renewal, invested members of the community planned to increase that level to gold. As the application was reviewed, it was looking more likely that the status would slip to bronze rather than be increased. A research project was designed to look at specific solutions focused on maintaining the Silver Status, but possibly stretching for the Gold Status. Following a meeting with the steering committee responsible for directing the work on the renewal application, the research group focused on a few goals to support the committee's efforts. These foci included the identification of a police liaison, the creation of a website with key information targeted to the community and businesses, and the preparation of resources designed to encourage businesses in submitting their own applications to achieve a status.

Healthy Communities

The research and results are not groundbreaking. According to Davis Rojas-Rueda et al. (2011), for years health officials and international organizations have called for the increase in physical activity motivated by "the growing challenges of global obesity." However, it was not until the last decade, that there has been new and intense interest "in promoting cycling as a mode of transportation" and physical exercise, in the United States (Teschke et. al., 2012). Despite this recommendation and the many motivations toward the promotion of bicycling, there is controversy. For many vehicle users, according to Kay Teschke et al. (2012), losing road space to bicyclists is a concern, and bike lanes have been a "prominent issue in municipal elections" within North America. So, what are the potential health benefits of cycling and what must be done to increase appeal?

Using data from numerous scholars (Frank et. al., 2007; Davison et al., 2008; Frank et al., 2010; Oja et al., 2011; Foley et al., 2002; Frank et al., 2004), this article supports the argument that bicycling has a positive impact on overall health and helps lower obesity rates. This article also seeks to suggest that factors such as built environment (Frank et al., 2010), community design (Frank et al., 2007; Frank et al., 2010; Frank et al. 2004), travel preferences and commuting (Frank et al., 2007; Davison et al., 2008), and overall level of health as measured by Body Mass Index (BMI) have a direct impact on the amount of time, within a given community, people spend bicycling. In support of these arguments, this article also suggests that the implementation of bike infrastructure produces a positive correlation toward overall health of the city's population. The causality of the amount of physical activity one partakes in has an overall health benefit is definitively established within the utilized research, and the findings of this article lend support for the argument that: bicycling regularly has a positive correlation on individual health and individuals that are within their "neighborhood preference[s]" and a neighborhood with high walkability,

have higher aptitudes to bike and become a primary-stakeholders in the advocacy of bicycling and overall health (Frank et al., 2007).

The hypotheses this article tests are as follows:

H1: A positive correlation between consistent biking and levels of health, both individually and within a community.

If this is true, then there is reason to further investigate what biking does specifically, to benefit one's overall health and a community's health as well. Is improved health the causal direction of the level of biking, or do individuals or communities that have a higher tendency to bike, exercise more in general? Research supports general physical activity having a causal relationship with overall health and correlational findings suggest that biking will have the same effect, but to what extent?

H2: Factors such as built environment, also called community design, neighborhood preferences, and walkability will have a positive correlative relationship with overall levels of health and physical activity within a given community/neighborhood.

This hypothesis infers that a community with "ideal community design," that being biking infrastructure and safe biking/walking routes (i.e. high walkability), will promote higher physical activity within a community and as a result, increased levels of health. Whereas a community with less ideal community design and infrastructure, and neighborhoods in which the majority of residents do not live within their ideal neighborhood preference, will have less overall levels of physical activity and consequent lower levels of health.

H3: The design of programs that consider changes in or implementation of comprehensive community and neighborhood planning programs, with support from primary stakeholders (Davison, 2008), will lead to long-term increases in the rates of non-vehicular commuting rates and in positive health outcomes.

It seems apparent in the post-research process that changes in or the creation of planning programs such as integrating walking patterns or creating/adjusting zoning regulations, is a rigorous process and is unlikely to see short-term results. However, as these implementations and programs progress, their effects could be widely beneficial for a community's health, while also increasing changes in commuting habits; such as using alternative forms of transportation. For example, if a planning program within a school chooses to integrate new commuting patterns for students as well as implementing new commuting infrastructure and standards such as increased levels of crosswalks or a Walking School Bus (WSB) program such as that in Auckland, New Zealand, the district and community will see increased levels of students walking or biking to school and as a result in long-term, increased health benefits (Davison, 2008).

Businesses and Their Employees

Members of the steering committee stated that in their previous application that they would increase the number of businesses with active League statuses during the past four years. There have been some improvements to other areas of the city's application, but the number of businesses has remained stagnant. Presently there are only ten businesses with an award status, with eight Bronze, one Silver, and one Gold Status (Award, 2014). The city also has a major employer that has received Honorable Mention Status (Bicycle Friendly, 2015).These are impressive numbers when compared against larger cities in Wisconsin that also have a bicycle friendly status from the League. Madison at over four times the population only has three more businesses with Gold, Silver, or Bronze Status. Milwaukee which has twelve times the population has one less than La Crosse, with only nine businesses enjoying a status (Award, 2014). The businesses that have achieved a status in the City of La Crosse are as follows:

Gold:	Smith's Cycling and Fitness
Silver:	SAP Labs
Bronze:	Candlewood Suites
	Dairyland Power
	Gundersen Health
	La Crosse Area Family YMCA
	Mayo Clinic Health
	Michael's Engineering
	Three Sixty Real Estate
	Western Technical College
Honorable Mention:	Logistics Health, Inc.

Compared to the total number of businesses in La Crosse the list may appear short; however, it surprisingly represents 21% of the bicycle friendly businesses in the state. It is also important to note that Western Technical College (WTC) appears on this list. Typically, colleges would apply for university status. By applying as a business, the bicycle friendly aspects of WTC as a business in regards to employees was evaluated. The bicycling amenities and encouragements for students were not included in the evaluation (Award, 2014 & Bicycle Friendly, 2015).

Local Law Enforcement and the Economic Impact of Bicycles

The research has shown that focus on two specific areas, the economy and law enforcement, helps cities maintain or increase their bike friendly status. The improved economic conditions increase the tax base allowing for available revenue to be used on progressive projects, such as shared roads, educational programs, and law enforcement training. Both are shown to help provide a safer environment for bicyclists, pedestrians, and motorist. This project aims to show the economic impact that a healthy bicycling community can have on the City of La Crosse. The knowledge obtained from this research will help in the goal of increasing the level of Bicycle Friendly Businesses℠ in the La Crosse area, an important factor in the League's evaluation of the city.

Law enforcement involvement is an integral part of creating a Bicycle Friendly Community℠ through community engagement in programs like the Safe Routes program, Bike Rodeos, and properly enforcing traffic laws that allow for roads to be more bike accessible (Pucher et al., 1999).

Children: Bike Friendly Future

While not a great deal of literature is available on after school bike programs, there is an overwhelming number of publications that suggest a positive trend between children who bike to school and the health of the community. The goal of this research was to search for a different trend, not to find more evidence to support this correlation. Rebecca Zay-Lakowske, Health Educator/Physical Activity Coordinator with the Lacrosse County Health Department, believes that if children are encouraged to use bike riding as a main form of transportation, they will continue to hold that belief as they grow into their later years. The goal of this project is to set future scholars on the path to investigate the effects of programs that encourage children to continue to ride bikes as they grow into adults.

A second goal of this research project is to support the future creation of a volunteer coalition to encourage biking as a means of transportation for children on their way to school. Ms. Zay-Lakowske provided statistics that show that while nearly 20% of children in La Crosse still walk and bike to school, that number is shrinking as La Crosse grows as a city. The proposed organization would suggest that members of the Coulee Region RSVP group, a senior volunteer organization, would help to patrol heavily traveled roads both before and after school watching for children in need of assistance. This group would focus on the safety of children and would reassure parents that walking and biking to school are safe options.

Bicycling and Civic Engagement

Plans include redesigning the city's bike friendly website to consolidate bike related information. Therefore plans to identify weaknesses of the website that could be improved and made more user friendly with the addition of several key components including an easier to read map of the city's bike routes. Work has been done for a short period on a website that Lewis Kuhlman provided for editing. A meeting at Myric Park earlier in the semester shows La Crosse has a great deal of infrastructure improvements that the city is considering in order to increase the level bicycle friendliness in the community. Primarily research will focus on increasing civic engagement toward bike friendly initiative as part of the proposed infrastructure improvements.

MATERIALS AND METHODS

Healthy Communities

The primary data set was a list of articles provided by a local biking advisor within La Crosse, Dr. James Longhurst. Literature was compiled by searching *Social Science and Medicine, Preventing Chronic Disease: Public Health Research, Practice, and Policy*; *Journal of Physical Activity and Health, Scandinavian Journal of Medicine & Science In Sports, American Journal of Public Health, American Journal of Preventive Medicine, The BMJ, The University of British Columbic Medical Journal,* and *Bicycling Magazine*.

The articles provided on health and biking provided broad research on the overall positive benefits biking regularly has on health. Within these articles, a variety of terms such as physical activity, community structure, neighborhood preference, walkability, and travel preferences led the research project to further forms of academic resources. The first step taken in the research process for health and biking was to compile scholarly documents on

the importance of physical activity and its correlation biking has on overall health and levels of obesity. The focus of this project's research is toward the La Crosse community and advocating a bike friendly city; the factors that promote greater participation in biking and as a result, increased general health, serve as a helpful estimation for La Crosse and a correlative representation of what can be done to create a bike friendly community. The next step directed our research towards comparing bike friendly cities health levels, and the programs and policies they have carried out in order to achieve a bike friendly status ("Bicycling Magazine," May, 2012). Analysis of each city and its successes through alternate resources provided from "Bike Friendly Cities: America's Best Bike Cities: Bicycling's Top 50" (*Bicycling Magazine*, May 2012), provided information on each city's programs and community design and infrastructure that led them to bike friendly status.

Businesses and Their Employees

In designing materials that would appeal to businesses, it was important that they reflect not only the four key attributes that the League would be reviewing as part of the application process, but also provide economic data that could be an encouragement to businesses to participate. The four key attributes, also referred to by the League as being the "4 Es," that are considered when reviewing applications are encouragement, engineering, education, and evaluation & planning.

The 4 Es. The first is Encouragement which is all about leadership and incentives offered to employees. Examples of leadership activities would include management participating in staff rides or community bicycling events. Other opportunities for management to encourage employees would be promoting national or regional events, such as National Bike to Work Day. Some businesses offer a guaranteed ride home when illness, inclement weather, or a repair issue would make it difficult to return home via bicycle. Additionally, businesses can offer up to twenty dollars per month as an IRS-approved fringe benefit to promote commuting via bicycle (Attributes, 2014 & IRS, 2014).

The second is E is Engineering which refers to the physical amenities that are available. What each business can reasonably offer will vary widely, but includes items such as lockers, showers, changing areas, or a discounted gym membership that provides those as part of the services. Other businesses offer shared bikes or repair stations. Most importantly, employees need a safe and secure location to store their bicycles.

The third E is Education which can include bicycle safety skills, bicycle maintenance, and share the road training for motorists. There are many venues for training to be provided. A business could find local experts at bicycle shops, the city bike liaison, or refer employees to quality videos. Furthermore, the League also certifies cycling instructors.

The League's fourth E is evaluation and planning. Recognizing that many businesses are data driven, this fourth factor focuses on the individual business's metrics. This is an opportunity for businesses to track the transportation needs and preferences of their employees. It can also be used to discover barriers that are preventing employees from bicycling to work. Another criteria under this section would be the appointment of a bike coordinator responsible for many of the business activities listed within the 4 Es. The League wants to encourage businesses to use this data for benchmarking and for planning purposes.

Within all 4 Es, another important activity that businesses can participate in is advocacy. They can work to improve bicycle friendly infrastructure to better the safety of their employees' commutes and work with local officials to improve enforcement of rules that protect bicyclists from aggressive or distracted drivers (Attributes, 2014).

Economics. The "E" of economics may be the best reason for a business to become involved in the process. The evidence to suggest that this would benefit businesses is overwhelming for one simple reason – rising health care costs. Starting with the basic wellness programs, the evidence suggests that the return on investments is staggering. In a meta-analysis of available research focusing on workplace wellness, Katherine Baicker and her associates determined that these programs saved $3.27 per dollar spent on medical costs on wellness. The return on investment when looking at reduced absenteeism was $2.73 for every dollar spent (2010).

Individual companies have publicly shared impressive results. Citibank Health Management, for example, calculated its return on investment to be approximately $4.50 per dollar spent in reduced medical expenses (Baicker et al, 2010). Quality Bicycle Products (QPB) is a Minnesota based company that has seen a great return on its investment in encouraging bicycle commuting among its employees. They provide secured bicycle parking, showers, and a $3.00 per day incentive to bicycle to work. From 2009 to 2011, when health care costs rose an average of 24.6%, QBP's costs fell 4.4%. They also compared their cycling to non-cycling employees and were able to quantify that their cycling employees had fewer health care issues than those that did not cycle in the amount of $200,000 (Kaye, 2013).

The estimates for communities and states is even more impressive. In a report prepared for Wisconsin State Representative Spencer Black, a group from the University of Wisconsin-Madison looked at the effects of using bicycling to move sedentary individuals to more active lifestyles that would result in them receiving the 150 minutes of the recommended weekly moderate-intensity exercise. The calculated results were impressive for diseases such as breast and colorectal cancer, stroke, heart disease, and diabetes. For all of these conditions, the expected medical expense savings for just Madison and Milwaukee topped $319 million annually (Grabow et al, 2010). While these numbers relate to everyone who is sedentary participating in an activity of some kind, not necessarily bicycling, the evidence points to a need of increased participation in health promoting activities. Savings of that magnitude could slash the rising cost of insurance, skyrocketing healthcare, and the bottom line for businesses. Improvements in mental health from decreased stress levels have been shown as an additional benefit from bicycling specifically. While there may be some concern over exposure to traffic pollutants or accidents, the overall health benefits seem to more than trump any negative consequences that may result from such exposures (Kaye, 2013).

As part of The Bicycle Friendly America℠ Program (BPFA), the League addresses several benefits that come from having a bicycle friendly status. These include demonstrating social responsibility and support for reliable transportation, both of which can assist with the recruitment of quality employees and sustainability-minded customers. It can aid in promoting the company's culture of wellness which would include increasing morale, reducing absenteeism, and increasing employee productivity (BPFA, 2015).

Local Law Enforcement and the Economic Impact of Bicycles

This research project was comprised of the analysis of qualitative and quantitative data obtained through research of scholarly journals, statistical information provided by governmental agencies, and interactions with local law enforcement and business organizations. Initially data was gathered from peer-reviewed research allowing for a comprehensive understanding of the impact that bicyclists have on local, state, and federal economies. Accurate statistical information was garnered from trusted governmental agencies allowed for a precise calculation on the use and distribution of funds provided from a bicycle friendly city. The next step focused on the community interactions with police, which began with contacting Lieutenant Patrick Hogan of the Professional Standards/Community Service Bureau. The feedback that was gathered provided information necessary to understand the role of the La Crosse police department's relation to civic engagement. Research data coupled with first-hand accounts allowed for a refinement of the ideas crucial to maintaining, or possibly building upon the current status, of City of La Crosse's Bicycle Friendly Community.

Children: Bike Friendly Future

Investigation began by contacting the La Crosse School District office. Community Outreach Director Susan Peterson directed this investigation to Rebecca Zay-Lakowske and Virginia Leohr. The interview with Rebecca provided a great deal of information that supported the programs that the County Health Department has developed over the years. She also provided facts and details that were unobtainable by other means, such as current efforts by the County Health Department to encourage the local children to utilize bikes for transportation with programs like the WSB. She also included statistics involved in recent polls of parents and children from schools involved in the Safe Routes to School program. Information on the after school program known as the Bike Rodeo was also obtained during this discussion.

Ms. Zay-Lakowske made it clear that there was much more work to be done. She highlighted many of the issues that surround the existing programs and providing information on the infrastructure required to incorporate more schools in the area. She went on to encourage this team to formulate and submit a plan to make the engineering changes, such as sidewalks and crosswalks, particularly near schools, which are necessary to the Safe Routes to School program as it continues to expand in both prevalence and size.

Bicycling and Civic Engagement

The first research conduct was the built environment's effect on transportation. It has a tremendous effect on how many people will ride their bikes around. The effect is greater than any other kind of civic outreach to the population to encourage bicycling. The built environment has so much of an impact on how people commute that the most significant obstacle is convincing the city planning office to implement a more complete bike friendly design for this city. This has created difficulties in finding any other conclusive information as to what was possible with regards to making the community more bike friendly.

One article was titled "5 Essentials of a Bicycle Friendly Community." The five essentials are: Engineering, Education, Encouragement, Enforcement, Evaluation and Planning. The Engineering essential further restates the

importance of the built environment and the need for bike enthusiast groups to be more civically engaged in the planning of infrastructure.

Another article was about a dog park and the civic groups that shaped the policies of the park. It asked if there was a difference between whether people are more likely to get involved individually or in groups. The concluding solution is that people are only going to try to change and become engaged if something they become personally invested in becomes a debatable issue. In the article, people became more engaged as the issue became more important. Clearly as the issue begins to become more prevalent in the community there will be more groups that become engaged in advocating for the necessary improvements in engineering and infrastructure.

RESULTS

Healthy Communities

Results show that there is a large overall health benefit of increased cycling. According to Kay Teschke et al., "conclusions of all studies supported...a large net benefit of increased cycling, since the risk of fatal injury is greatly outweighed by the reductions in mortality afforded by increased physical activity." This research was based on synthesized evidence on North America and four European settings in which benefits and risks were calculated and combined into a benefit to risk ratio which ranged between 9 to 1 -in that order- and 96 to 1 (Teschke et al., 2013). Despite the extensive span between each aforementioned ratio, evidence still supports that the health benefits of bicycling, such as bike-related mortality and air pollution risks, significantly outweigh the risks. Notably however, only one of the studies considered the risks of traffic injuries whereas all considered the impact of air pollution (Teschke et al., 2013).

The health benefits of physical activity from cycling in comparison to the risks are corroborated by Davis Rojas-Rueda et al., in Barcelona, Spain in which the research compared the benefits with the risks from air pollution and road traffic accidents in which statistical analysis concluded a benefit to risk ratio of 77 to 1. It is Davis Rojas-Rueda et al. that also compares the findings with two other published assessments of the risks and benefits of active transportation, one from *Environmental Health Perspectives* (2010) and the other from *Lancet* (2009). Not only does the research conclude that the health benefits of biking and physical activity have lasting impact on health which far outweigh the risks, it also shows that bicycle sharing systems and other policies are worth implementing, especially with the additional benefits such as the potential reduction in air pollution and greenhouse gases which promotes long-term benefits.

An alternate study researched the relationship between travel mode to school and cardiovascular fitness among approximately 900 Danish school children from the ages of nine to fifteen. Overall, the cyclist groups were nearly "five times as likely as the walkers and the passive commuters to be in the top quartile of fitness" (Oja et al., 2011). Another study reinforcing Oja's argument studied the relationship between modes of transport to school and different aspects of fitness. Overall, the cyclist groups within this study had "up to 6% higher maximal aerobic power...up to 16% higher isometric back muscle endurance, 10% higher abdominal muscle endurance, and 6% better flexibility than the walkers and the passive travelers" (Oja et al., 2011). Oja concludes that research supported that there is a positive relationship between cycling and health benefits as well as improvements in cardiorespiratory fitness and disease risk factors as well as a "significant risk reduction for all-cause and cancer mortality and for cardiovascular disease, cancer, and obesity morbidity in middle-aged and elderly men and women" (Oja et al., 2011 & Frank, 2010). Not only does this study support the positive relationship between cycling and health benefits, it provides evidence that there is also a noticeable positive correlation between bicycling and a risk reduction for all-cause and cancer mortality, which prior research fails to do. The observed support for the positive relationship between bicycling and health benefits affirms H1.

In the words of Lawrence Frank after his travel survey of nearly eleven thousand participants in Atlanta, Georgia, "land use mix, car time, and distance walked were significantly associated with obesity...these results lend considerable support...linking urban form with activity and levels of obesity" (Frank, 2004). He also asserted that there is an increased time spent driving and sedentary forms of behavior when associated with limited built environment and economic opportunities, and increased odds of being obese. With this model presenting the built environment's association with obesity, its results show that this association is mediated by physical activity and sedentary behavior of driving and riding in a car. Survey data did reveal that "in one of the most sprawling regions of the nation," individuals that live in "more mixed use neighborhoods" are more likely to drive less, walk more, and are less likely to be obese (Frank, 2004). However, this research concludes that there must be more to land use mix affecting obesity than car time or walk distance which posits: what specific variables of the built environment serve as predictors of obesity and rates of physical activity?

According to further research by Lawrence Frank in 2007, his evidence documents associations between specific neighborhood design and active and sedentary forms of travel. This study focused primarily on the variables of a built environment that serve as predictors of overall levels of health, primarily those on self-selection. According to Frank, most studies fail to account for the underlying neighborhood selection factors, including reason for choosing a neighborhood, or preferences, such as neighborhoods that are preferred, that impact neighborhood selection behavior. Frank defines neighborhood preference as an individuals' self-reported preference for neighborhoods that are typically urban or suburban, regardless of current neighborhood and walkability. With walkability defined as a measure of how friendly an area is to walking which is influenced by the presence or absence and quality of footpaths, side-walks or other pedestrian rights-of-way, traffic and road conditions, land use patterns, building accessibility, and safety, among others. This research served as an evaluation of the causation among built form, behavior, and associated outcomes and to know how much more walking and less driving could occur through creating environments conducive to active transport. The research found that those that do not prefer a walkable environment are less likely to walk regardless of where they live and its built environment. In contrast, those that do prefer walkability, walk consistently regardless of where they live (Frank, 2007). Research also shows that a significant proportion of the population is mismatched with its preferred neighborhood type, or do not live in their preferred neighborhood type.

This section of research promotes the argument that those who do or do not prefer to exercise or walk, will either do, or not do, those activities regardless of where they live. However, in support of H1, research clearly showed that those that walk consistently for any purpose were proportionately healthier, and less obese, than those that do not. This research is concluded by the finding that "[b]oth attitudinal predisposition for neighborhood type and the actual characteristics of the built environment in which one lives were found to impact the choice to walk and distances driven" (Frank, 2007). Evidence clearly showed that those that preferred, and selected neighborhoods with higher walkability walked more for both "non-discretionary and discretionary travel" (Frank, 2007). In turn, he concludes increasing walkability will promote reduced vehicle use and lower obesity prevalence. The observed relationship between factors such as community design and neighborhood preference and overall levels of health and physical activity within a given community support H2. However, what are these particular variables that make an environment conducive to walkability and a bike friendly nature?

"Recent objective monitoring of physical activity levels found only 2.5% of U.S. adults over age 60 meet physical activity recommendations," and activities such as walking and biking are the most "commonly available means to obtain physical activity" for the individuals, says Frank (2010). It is evident that creating walkable environments can facilitate the ability to meet physical activity guidelines as well as promote alternative means of transportation for the elderly (Frank, 2010 & Foley, 2002). Because of current barriers to physical activity and transportation in all populations, "researchers are investigating ways to engineer physical activity back into our daily lives" (Frank, 2010). Evidence suggests that changes to the design of communities and living spaces are essentially permanent and will have a long-term impact. These engineering changes include: short block lengths, multiple route choices, and many destinations encourage walking and biking for means of exercise and transportation. Other factors that promoted walking were the presence of parks, recreation facilities, sidewalks, and pleasant landscaping. Table 1 (Frank, 2010) of this research shows that individuals within a community that have access to medium to high walkability spend nearly three times as much time walking or exercising, at minimum once every other day. They cut time spent in a car for more than an hour by nearly 50%. It is important to note once more, that research showed that increased walkability was related to dramatically lower odds of being overweight. Conclusions found that walking levels could double if there are multiple destinations within short distances by living in a more walkable neighborhood. Other studies also showed that living in pedestrian-friendly urban neighborhoods for older adults, with nearby friendly shops and services, are associated with increased levels of walking. Evidence also concludes that policies are needed to bring destinations such as shops and services closer to a walkable friendly environment as well as the creation of direct and safe pedestrian connections to help pedestrians reach their destinations; such as supervised settings for more intense activity (Frank, 2010 & Davison, 2008). Safe routes are considered vital for both school-aged children and the elderly. Comprehensive plan policies calling for fiscal and regulatory policies such as zoning codes that impact land use density and mix, as well as subdivision codes which impact street network characteristics which need to be changed to mandate increased walkability (Frank, 2010). Research also supports engineering efforts such as the provision of onsite, alternative-transportation parking as well. It is integral to make the connection that promoting a safe and friendly walking city structure could evidently, have a positive relationship on bikeability. Fiscally, implementations such as tax abatement can be applied to "stimulate, incubate, and retain services" near to where concentrations of elderly and school age children reside and travel particularly to school (Frank, 2010 & Davison, 2008). The Safe Routes to School program and the Walking School Bus, as well as programs such as the WSB program in Auckland, New Zealand which employs retired volunteers to

supervise walking and biking routes for students, are public health and safety efforts that promote walking and bicycling to school (Davison, 2008). These programs have all seen improvements in the safety of students traveling to school, as wells in encouraging students to commute to school by biking and walking. These outcomes serve as a correlate to increased physical health of the children involved. However, as Davison (2008) concludes, for these programs to function and be sustained long-term, research supports parents and adults as primary stakeholders.

Similarities between the top fifty bicycle friendly U.S. cities, found within *Bicycling Magazine* (May 2012) in regard to how each of them were able to achieve bike friendly status supports the importance of changes on community design, walkability, and comprehensive city planning programs. The evidence observed between each of these cities brought about 6 primary factors or additions that must be considered to both increase physical health and alternative transportation participation as well as become bike friendly: constructing segregated bike lanes, municipal bike racks and storage areas, bike boulevards, having and supporting savvy bike shops, increasing the education on the benefits of biking and alternative forms of travel, and civically engaged cyclists as primary stakeholders that work toward influencing local government officials (*Bicycling Magazine*, May 2012). The observed relationship between the design of such programs in comprehensive community and neighborhood planning programs and the long-term increases in the rates of non-vehicular commuting rates and health benefits support H3.

Local Law Enforcement and the Economic Impact of Bicycles

The research reveals that bicycles have a profound impact on all levels of the economy ranging from the individual to the highest levels of government. Focusing on the individual impact, studies shows that people who use bicycles as their main mode of transportation save thousands of dollars per year (Drennen, 2012). This disposable income tends to recirculate through the local businesses and governments enhancing the local economy. This slower mode of transportation allows individuals to assess in more detail, enter stores, and make purchases at a higher rate compared to their individual counterparts in motor vehicles. While bicycles cannot carry the same load as motor vehicles, their riders frequent places more often and spend larger amounts of money over the same period of time at local businesses than pedestrians, motorists, and public transit commuters (Clifton, Morrissey, & Ritter, 2012). This is evident at San Francisco's Valencia Street, where only 37% of store owners believed their sales would go up due to new bike lanes and corrals. However, San Francisco's Main Street Program, with bicycling traffic being a crucial factor, revealed that investments in bicycle and pedestrian infrastructure was the probably cause of increased sales of up to 105% of previous totals for some stores (Drennen, 2012). The same area saw an increase in commercial property values of nearly 167%, while during that same period there was roughly a 76% decline in store front vacancy rates. This level of significant impact on the stores will help the owners of the businesses and buildings to increase their retail and office rental rates. The approximated revenue increase is expected to be between 65% and 71% (Eichenfield & Associates, 2002).

The increased revenue from bicycle tourism is a critical factor that communities need to take into consideration when they are beginning to set their goals to become a Bicycle Friendly Community℠. Bicycle tourism and recreation has a multifaceted and profound impact on state and local economies, additional revenue emanating from the tourist population, increased property values, new bicycle related businesses and business opportunities, and increasing the health benefits from bicycling (Flusche, 2012). For example, $925 million of Wisconsin's economic activity is achieved through the influx of cash from bicycle tourism and bicycle related recreational activities. The "potential value of health benefits from reducing short car trips and increasing bicycle trips" aids in increasing the total revenue generated to an astounding $1.5 billion (Grabow et al., 2010). Part of the large influx of money is a result of bicycle tourist spending around $20 more per day per individual more than any other type of tourist (Flusche, 2012).

A second area of concern relates to the impact law enforcement personnel have on the bicycling community. The research has uncovered that "[m]any motorists and even some police officers appear unaware that vehicle codes of all US states and Canadian provinces grant cyclists the right to ride on most roads" (Pucher et al., 1999). Making it crucial for a city to have concise bicycle friendly laws and police who are trained in the correct application of those laws to maintain a Bicycle Friendly Community℠ status. The League recommends the identification of a Police Liaison officer, whose responsibilities are to be the individual that the bicycle community can contact in order to obtain current information on municipal ordinances and to build community relations. At the beginning of this project the City of La Crosse did not have an identified Police Liaison Officer, which is a highly sought after city commitment. However, Lieutenant Patrick Hogan of the Professional Standards/Community Service Bureau has accepted the title.

La Crosse Police are specifically concerned with the low number of registered bikes. The police usually store recovered bicycles in a warehouse that is named the "Bike Barn." This allows individuals that have a lost or stolen

bike the possibility to identify and recover it. Community programs like Bike Rodeos and the Bike Barn are important opportunities for law enforcement to positively support bicyclists. Morris et al. reveal that Bike Rodeos can be an effective tool in increasing the number of children wearing helmets, which directly relates to preventing traumatic head injuries (2004). Through these programs law enforcement officers are able to have positive interactions with children and their parents. This helps to increase safety by conducting inspections on their bicycles and registering their bicycles to help recovery efforts, if they are lost or stolen.

CONCLUSIONS

Healthy Communities

Four conclusions emerge from the body of previous empirical scholarship concerning the importance of bicycling on health. First, increased levels of bicycling and physical activity have a clear correlation on the overall level of health of an individual. These correlations offer support for the theoretical arguments that biking, and alternative forms of exercise, have a direct impact on the level of improvements in levels of obesity and overall, most notably cardiovascular, fitness within a community.

Secondly, measurements of built environment (community design), neighborhood preferences, and walkability within a given community are important correlative predictors of obesity. Although it is unclear that the implementation and access to bike friendly infrastructure lowers obesity, evidence suggests that increased bike infrastructure and preferred neighborhood design promotes a more active lifestyle.

Thirdly, designing programs that consider changes in comprehensive planning programs, zoning regulations, and integration of walking patterns into engineering standards can potentially have a long-term effect on increasing commuting rates. These in turn, increase health benefits for future generations. However, this issue warrants future research, which potentially requires effective evidence-based programs to gather high-quality research on how to accurately identify correlative predictors of active commuting; effective programs account for factors such as preferences of communities, schools, and families.

Fourth, the increasing advocacy toward walkability and walking a form of travel and exercise within neighborhoods and communities, will in-turn, increase the advocacy toward bicycling as another alternative for travel. Paired with exercise, these factors will have a clear positive relationship toward overall levels of health.

Businesses and their employees.

The focus of this project needs to address all four of the Es required by the League and also meet the needs of businesses. Simply telling businesses that the city would like them to apply would likely result a small number who want to support the effort moving forward. It is likely the businesses would be those already invested in healthier options for themselves, their employees, and, by extension, the community. The plan put forward by this research team includes materials that support the development of applications that will be submitted in the June review round for the League.

Downtown Mainstreet, Inc. is an office representing and promoting a coalition of businesses from downtown La Crosse. Robin Moses, the executive director, is supportive of plans to encourage downtown area businesses to apply after a discussion regarding the impact of having more businesses with a bicycle friendly status could have on the economy of the city and downtown businesses. While parking is a major concern in downtown La Crosse, having more people bicycling into the downtown area would increase the number of shoppers while reducing the traffic congestion and limited parking issues that exist. Ms. Moses will be reviewing the bicycle friendly business application and this research team's constructed website resources in the next few weeks. A suggestion offered by this team, that is expected to be considered, is allowing bicycle training classes to be taught at the Downtown Mainstreet, Inc. office in order to provide smaller businesses access to claim education classes are available on their own applications to the bicycle friendly program.

The website that is being created to support businesses includes information that will be helpful to businesses as they work to complete the application. At a bare minimum, providing resources encourages them to consider making changes to be more bicycle friendly, even if they choose not to apply. It will also contain information for their employees on the health benefits of biking and also information on the Safe Routes to School program.

A primary goal of this project was to add at least one new business to the city's list of bicycle friendly status awardees; however, Ms. Moses quickly generated a list of nearly twenty businesses that she thought might be interested, given her past interactions with their management. She also expressed a willingness to work with members of the steering committee in order to encourage businesses to apply for status, as well as to advocate for additional bicycle parking downtown.

Local Law Enforcement and the Economic Impact of Bicycles

It was discovered through tenuous amounts of research that a community with a friendly and safe environment, that encourages bicycling as a mode of transportation, tends to create a healthier economy, which in turn results in more revenue circulating through the local economy. A business that is looking to increase its participation in the bicycling community can work to build new bicycle parking areas, such as bicycle corrals and lockers. Increasingly businesses are looking into adopting a bike-sharing program, in which they provide bicycles for the personal use of employees as well as for conducting business related errands (Clifton et al., 2012). Businesses that continually advocate to the local government and engage with the community will continue to gain momentum in the direction of obtaining the proper infrastructure in which to make their area a friendlier and safer environment for pedestrian and bicycle traffic. The initial investment of bicycle infrastructure in business districts is an opportunity to demonstrate the success bicycle related expenditures, an essential step in gaining approval for the large economic commitment that will be required to continue making improvements. However, multiple studies have proven that investments in bicycle infrastructure will lead to increased revenue as demonstrated by the North Carolina's Outer Banks study. The Outer Bank area spent $6.7 million dollars on bicycle infrastructure and improved engineering. Estimations conservatively postulate that the "Outer Banks generates $60 million in economic activity through bicycle tourism" (Flusche, 2012).

Law enforcement officers play a crucial role in developing and sustaining a Bicycle Friendly Community℠ by supporting and creating an environment that is not only welcoming, but also informative, to the local bicycle enthusiast population. The La Crosse police department receives the required training and information on a consistent basis. The research has yet to show and evidence that they are inadequately or improperly enforcing the laws. Members of local law enforcement participate in local school functions, such as bike rodeos; however, the aim of increasing the frequency of open dates and length of openings of the Bike Barn never came to fruition. Lt. Patrick Hogan forwarded this research team's recommendations to upload pictures of all bicycles recovered to the Bike Barn website and increase the Bike Barn's hours of operation. However, the fact that most bicycles are in an extremely poor condition and the fact that there is a lack of available funding for these proposals makes this extremely difficult. The research postulates that the best method for an individual to increase the probability of recovering a lost or stolen bicycle will be through proper registration that allows law enforcement officials to identify the proper owner of the recovered bicycles. The City of La Crosse currently has a free registration initiative that can be conducted at the local police station and also during certain bicycle related events, including Bike Rodeo programs.

Children: Bike Friendly Future

The research showed that there were far more programs in place to encourage biking as a form of travel than previously expected. The long term effects of these programs has yet to be documented, but those involved say that they have noticed a difference in the willingness of children to travel to school on bicycles or by walking. It was also found that these programs are becoming more popular as they are spreading to more schools in the City of La Crosse.

One of the problems that this program faces is the need for a change in infrastructure surrounding some of the schools. Without a change in infrastructure, certain schools do not feel comfortable encouraging young students to bike and walk to school, due to safety concerns. The County Health Department is actively advocating the required infrastructure changes along school routes to be considered by the city planners.

The research has shown that efforts are being made to make the City of La Crosse a Bicycle Friendly Community. The interviews and statistics that are available from the County Health Department suggest that biking will continue to grow as an issue for members of this community. The future of this issue will revolve around the efforts and actions of the next generation's civically engaged activists. This issue will need to gain the support of more community members in order to gain the city funding needed to make the necessary changes. As the schools and the County Health Department continue to work together, La Crosse will continue to grow as a healthier and more civically engaged community.

Bicycling and Civic Engagement

The discussion of what future groups can do to facilitate the development of a bike friendly community is an important issue. It will take more research to determine the optimal ways for activists to communicate the importance of this issue to the city and to other citizens. Spreading knowledge that there is a rational reason for them

to encourage a bicycle friendly community will raise awareness to growing advocacy efforts. As a result, their civic engagement on this movement will increase.

Reading scholarly articles and comparing other cities' bicycle websites made it clear that are several key themes to be considered. First the city needs to make dramatic changes to the built environment which will rely heavily on the level of pressure from the civic engagement of activists. Once infrastructure improvements begin to take place, more committed advocacy can be expected with increased effectiveness. The built environment and bicycle oriented civic engagement have a symbiotic relationship.

Finally, the bicycle website needs to become more user friendly and include educational material on the benefits of bicycling to the riders, as well as advocacy for bicycle friendly features in the community. The city must make efforts to include the affluent neighborhoods in their plans to alter the built environment. It is more difficult for people in areas with less socioeconomic and educational status to find the necessary ways to become civically engaged and they must be given special consideration when considering projects such as this.

LIMITATIONS

The first limitation in regard to this article is that no two cities are exactly alike. With this in mind, to a certain extent, there is a limited utility of cross-city comparisons, which is this article's primary focused. For example, David Rojas-Rueda's et al. research focused primarily on Barcelona, Spain and Kay Teschke et al. focused upon North American cities. The diversity between cities such as Barcelona and cities in both the U.S and Canada is vast, as vast as the differences between rural, suburban, urban, and metropolitan areas.

In addition, none of these studies provided any effective evidence-based programs which resulted in high-quality research on how to accurately identify correlative predictors of active commuting, which includes factors such as community, school, and family preferences. An integral step would be the ability to gather high-quality research to determine individuals' desired alternative forms of travel and exercise, as well as their matched neighborhood preferences, to serve as correlative evidence of what factors within the environment affect travel and exercise preferences.

In regard to the top fifty bike friendly cities, limitations were inherent in regard to their comparison, such as factors like vast differences in physical geography, available funds, the span of years in which programs and infrastructure have been in place, as well as the size of each city and the distance of citizens' destinations from their neighborhoods. The city of Minneapolis, MN, despite its non-bicycle friendly winters, became the most bicycle friendly city in the U.S, surpassing Portland, OR, primarily due to its ideal geographic situation. Being that the region is so flat, biking is an ideal form of transportation along with the metropolitan nature of the city not being necessarily car friendly. According to Stephen Cottrell, a sales manager at Freewheel Bike in Minneapolis (Brown, 2013), "It was just a matter of time before the bike infrastructure was built." Whereas cities like Portland, OR, have had the groundwork for their city's bike infrastructure laid for them over twenty years ago and despite the passing of two decades, the process itself became ingrained into the culture of the city and as a result, promoted the civic engagement of bike advocates and interest groups.

This research project met with several obstacles. Much of the initial material provided by local stakeholders only served as background information as a way to interpret the required elements from the League of American Bicyclists. The meeting in which the researchers proposed their support project to the steering committee, ultimately responsible for the application, resulted in the initial research agenda being abbreviated to only two key elements of the original six that were proposed. At the request of the steering committee, the focus of the research became the identification of a police liaison and creating a plan to increase the number of bicycle friendly businesses by finding businesses that would most likely be amenable and successful in obtaining a higher status than Honorable Mention. The lack of scholarly research in the area of law enforcement has hindered the ability to expand on the areas encompassed by the activities of law enforcement and the precise impact that they have on a bicycle friendly community.

Unfortunately, at that time, the League removed the business application from its website and announced that it would be revamping the application and making it available in May for businesses wishing to apply for the June deadline. Again, the business part of the project was altered slightly to be a preparatory one in which focus was on creating materials and connections that would be ready when the new application is available. As the project concludes, a new limitation has emerged; the League has announced the once free application will now have an associated fee, up to $500 every four years, based on the number of employees. The financial cost may curtail the number of businesses willing to participate in the program.

Lastly, the largest limitation is time. As the class comes to an end, so does the research group's participation in the efforts to support the business community's awareness and completion of the League's application process. This is now left in the capable hands of several community activists; however, there may be a drop in momentum of efforts that can be extended as those who will be working on this have many other responsibilities.

FURTHER PLANS

This paper is simply the first step towards building a bicycle friendly community. Future researchers should use this as a step to build upon when investigating the way in which the Safe Routes program has affected the youth as they grow older. Evidence has already shown the importance of bicycling on health; the next step is to evaluate the impact on the growth of civic engagement surrounding this topic.

In the future, researchers will investigate the expansion and sustainability of programs similar to the Safe Routes program. Existing efforts include the WSB and the Bike Rodeos, but more could still be implemented.

The creation and implementation of a volunteer group to make traveling to school a safer option for the children in the community is a further goal of this research. Groups like the Coulee Region RSVP group could be an excellent potential candidate to fill the role. It is also essential to gain the continued support of not only new schools, but also of the currently enlisted schools' PTA and PTO in order to help these programs continue to expand. As they expand, a healthier community can be expected to emerge from these school outreach programs.

The information found in this research will be made available to the general public on the city website at an indiscriminate time in the near future. The knowledge of the Safe Routes to School program should encourage parents to utilize the programs run by the County Health Department. Engagement of community groups in support of programs similar to this should and will continue to make parents feel assured that steps to increase bicycling safety are being taken. The continued spread of knowledge on these programs will make a difference in the amount of parents who actively play a role in promoting bicycling to school as an alternative mode of transportation.

If future research does reveal a trend for children involved in these programs to promote bicycle friendly infrastructure, studies on the growth of activism as a whole should be conducted. It has been shown that as issues grow in prevalence, community engagement swells. It is entirely possible that a new generation of bicycle activists, who view bicycling as viable alternative for daily transportation, are coming out of the current bicycle programs in the La Crosse Schools systems.

This research team would also like to see more groups become active in the bicycle friendly process. Without an increase in public interest, it is unlikely that any changes, particularly in infrastructure, will ever occur. Efforts to gain public support must continue to occur as this movement as the city begins its new long term transportation program.

The committee that will be moving forward with the city's application will have substantive work to do in order to be successful in maintaining the Silver Status that the city currently enjoys or moving to Gold Status. Suggestions from the research group include initiating regularly planned bicycle training courses for downtown businesses taught either by the police liaison or bicycle shop employees. Making this training available to large employers and coalitions of smaller employers would allow several of them to "check a box" on their League applications. Downtown businesses would also benefit from additional bicycle racks being placed throughout the downtown area, but perhaps the parking ramps would be a good start. In addition to adding racks to the ramps, signage on the outside of the ramp indicating that bicycle parking was available inside would be beneficial as well.

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REFERENCES

"Attributes of a Bicycle Friendly Business." (2015) The League of American Bicyclists. Retrieved from http://bikeleague.org/sites/default/files/Attributes_of_BFB.pdf

"Award Database." (2014) The League of American Bicyclists. Retrieved from http://bikeleague.org/bfa/awards

Baicker, K., Cutler, D., Song, Z. (2010, January) Workplace Wellness Programs Can Generate Savings. Health Affairs, 34(4)

"The Bicycle Friendly AmericaSM Program." (2015) The League of American Bicyclists. Retrieved from http://bikeleague.org/sites/default/files/BFB_overview_Spring_2015.pdf

"Bicycle Friendly La Crosse." (2015) City of La Crosse. Retrieved from https://www.cityoflacrosse.org/index.aspx?nid=2544

Bicycling Magazine. "Bike Friendly Cities: America's Best Bike Cities: Bicycling's Top 50." (5/21/12). Bicycling Magazine. www.bicycling.com.

Blue, E. (2013, December 1). "Bikenomics: How Bicycling Can Save The Economy". Portland, Oregon. Microcosm Publishing

Brown, J. (March 3, 2013). Most bike-friendly cities in the United States. CNN. Retrieved from http://travel.cnn.com/explorations/life/usa/most-bike-friendly-cities-us-016148

Bueker, C. (2011). "Resources, Relevance, and Relationships: Differential Motivations Behind Local Civic Engagement in American Democracy". New England Journal of Political Science, 5(2), 265-307.

City of Copenhagen, Technical and Environmental Administration, Traffic Department. (2013). "City of Cyclists: Copenhagen bicycle life". Retrieved from www.uci.ch

Davison, K., Werder, J., Lawson, C. (July, 2008). "Children's Active Commuting to School: Current Knowledge and Future Directions." Preventing Chronic Disease: Public Health Research, Practice, and Policy 5(3) 1-11.

Drennen, E. (2003). "The Economic Effects of Traffic Calming on Urban Small Businesses," San Francisco State University.

Eichenfield & Associates. (2002, July). Strategies for revitalizing our downtowns and neighborboods: Evaluating California Main Street Program. *The James Irvine Foundation.*

Flusche, D. (2012, July) Bicycling means business: The economic benefits of bicycle infrastructure. *Advocacy Advance*, p. 1-27. Retrieved from www.advocacy advance.org

Foley, D., Heimovitz, H., Guralnik, J., Brock, D. (Aug, 2002). "Research and Practice: Driving Life Expectancy of Persons Aged 70 Years and Older in the United States." American Journal of Public Health 92(8) 1282-1289.

Frank, L., Saelens, B., Powell, K., Chapman, J. (2007). "Stepping towards Causation: Do Built Environments or Neighborhood and Travel Preferences Explain Physical Activity, Driving, and Obesity?" Social Science and Medicine 65: 1898-1914

Frank, L., Kerr, J., Rosenberg, D., King, A. (2010). "Healthy Aging and Where You Live: Community Design Relationships With Physical Activity and Body Weight in Older Americans." Journal of Physical Activity and Health 7: S82-S90.

Frank, L., Andresen, M., Schmid, T. (2004). "Research Articles: Obesity Relationships with Community Design, Physical Activity, and Time Spent in Cars." American Journal of Preventive Medicine 27(2) 87-96.

Grabow, M., Hahn, M., & Whited, M. (2010, January) Valuing Bicycling's Economic and Health Impacts in Wisconsin. Retrieved from http://sage.wisc.edu/IGERT/download/bicycling_Final_Report.pdf

Internal Revenue Service. (2014) Employer's Tax Guide to Fringe Benefits (IRS Publication 15-B). Retrieved from http://www.irs.gov/publications/p15b/

Kaye, L. (2013, August 27) How Bicycling Cuts Health Care Costs for Businesses. Retrieved from http://www.triplepundit.com/special/business-of-biking/bicycling-cuts-health-care-costs/

McKenzie, Brian. (2014, May) "Modes Less Traveled—Bicycling and walking to work in the United States: 2008-2012". U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau. Retrieved from www.census.gov

Oja, P., Titze, S., Bauman, A., de Geus, B., Krenn, P., Reger-Nash, B., Kohlberger, T. (2011). "Health Benefits of cycling: a systematic review." Scandinavian Journal of Medicine & Science in Sports 21: 496-509.

Pucher, J., Komanoff, C., & Schimek, P. (1999) "Bicycling renaissance in North America?" Transportation Research Part A, 33(7/8) 625-654 doi:10.1016/S0965-8564(99)00010-5

Rojas-Rueda, D., de Nazelle, A., Tainio, M., Nieuwenhuijsen, M. (Aug, 2011). The health risks and benefits of cycling in urban environments compared with car use: health impact assessment study. The BMJ. Retrieved from http://www.bmj.com/content/343/bmj.d4521

Teschke, K., Reynolds, C., Ries, F., Gouge, B., Winters, M. (2012). Bicycling: Health Risk or Benefit. The University of British Columbia Medical Journal. Retrieved from http://www.ubcmj.com/pdf/ubcmj_3_2_2012_6-11.pdf

Wyrrarrds, N. (2012). "5 essentials of a bicycle friendly community". Planning, 78(5)