Biking Culture in U.S. Cities Compared to That of Amsterdam and Copenhagen in The 1970s

AP Research

April 20 2017

Word Count: 4,923

Introduction

One of the most prominent topics of discussion in global politics is the environmental challenges society is now facing. Because of this, most countries, cities, states, and other organizations are taking action to prove their engagement in environmental protection. As transportation causes multiple environmental concerns – greenhouse gas emissions from motorized vehicles contribute largely to air pollution and climate change while at the same time the fossil fuels that the transport industry is reliant upon are a limited and unsustainable energy source – much of this focus has been on changing the way we think about transportation. There are multiple approaches cities are taking to make their transportation sector more sustainable, the main three being promoting public transportation, the use of nonmotorized transport options (biking being the most common), and finally the use of more sustainable personal vehicles, like electric cars. All of these efforts help shift society away from the dependence on fossil fuels, but only the use of nonmotorized transportation eliminates this need completely. In addition to having little to no impact on the environment, biking has been praised for having positive effects on both the mental and physical state of its users. Unfortunately, only a few cities have created a culture where enough people bike for it to be considered a legitimate form of transportation. In the U.S., biking accounts for less than 1% of trips (Buehler & Putcher, 2008; Dijkstra & Putcher, 2003), with the majority of those trips being for recreational, not utilitarian purposes (Carr & Dill, 2003). These statistics express the intense reliance on motorized transportation in U.S. cities and thus the need to increase cycling rates. The success of cities like Copenhagen and Amsterdam, where around 40% of the population commutes by bike, illustrates that it is possible to reach a place where biking competes with driving ("European Green City Index," 2009).

This paper seeks to analyze and compare the challenges U.S. cities are facing in promoting biking with the challenges Copenhagen and Amsterdam faced specifically during the 1970s. Understanding the differences between the challenges these cities face could provide

insight for potential solutions for promoting biking in the U.S. based on the ones that have already been employed by Copenhagen and Amsterdam.

Literature Review

The Argument for Biking in Cities

Biking is much less expensive than driving and public transportation in terms of the costs associated with pollution, accidents, congestion, and infrastructure. Both Amsterdam and Copenhagen save millions of Euros a year from the high rates of cycling, simply because there is less of a need to maintain and expand infrastructure for cars and public transport (Wiking, n.d.) ('Cycling in Amsterdam', n.d.). Biking is also a lot cheaper on the user, making it one of the most equitable forms of transportation (Buehler & Putcher, 2008).

Furthermore biking is a healthier mode of transportation as it allows one to exercise while traveling. With the increase of diabetes, heart disease, and obesity in the United States, there has been more of an emphasis on the importance of exercise. Because of this, biking has been suggested in several health journals as an opportunity to get this needed daily exercise (Dijkstra & Putcher, 2003). Replacing driving with biking also decreases air and noise pollution which can additionally improve health conditions.

Though cycling is less safe than driving on a per kilometer basis, a correlation has been identified between low transportation fatality rates and high levels of cycling in specific cities. There are multiple proposed reasons for why this occurs. When there are high cycling rates, motorists learn to be more conscious of cyclists and pedestrians, leading to fewer serious accidents. Cities with higher cycling rates also tend to have better biking infrastructure which can make streets safer. Furthermore, a study conducted by two professors of civil engineering at the University of Connecticut analyzed all transport accidents, not just ones involving bikes, and still found road safety to be directly related to high cycling rates (Garrick & Marshall, 2011).

This indicates that having a high level of cyclists can make cities safer for all road users. As has been illustrated, there are multiple benefits to biking as a mode of transportation, both for individuals and whole cities; it is simply a matter of getting cycling rates high enough for these benefits to be experienced.

Factors Associated with Cycling Rates

Distance.

Though most people assume that long trip distance and the greater sprawl experienced in U.S. cities accounts for the low biking rates, it is not as influential as many claim it to be. In a study conducted by two professors from the Bloustein School of Planning and Public Policy, it was found that in the U.S. "41% of all trips in 2001 were shorter than 2 miles, and 28% were shorter than 1 mile" (Putcher & Renne, 2003). Yet Americans use their cars for 66% of trips spanning a mile and 89% of trips between one and two miles (Dijkstra & Putcher, 2003). These distances can be easily covered by bike, suggesting that the real problem is the perception of long trip distances, and that there is much potential for increased bike use in the U.S.

Weather/Topography.

Certain studies have suggested climate to be a limiting factor to biking in cities that are either colder or warmer than average temperatures. In a survey released through the school of Urban and Social Policy of Victoria University it was revealed that 67% of the participants would be deterred from cycling when there was heavy rainfall, but almost all of them would still make the trip by either car or public transportation (Nankervis, 1999). Another study that analyzed biking rates in Melbourne Australia found that light rain decreased ridership by 13%, while heavy rain decreased ridership by 40% (Ahmed, Rose, & Jacob, n.d.). This indicates that it would be more difficult to promote biking in areas that have unfavorable weather. However, as exhibited by Toronto and Minnesota – two areas that are colder than average but also boast high

cycling rates for North America – harsh weather does not necessarily prevent a city from having higher cycling rates (Putcher, Komanoff, & Schimek, 1999; Murphy, 2015). Therefore most cities, regardless of their climate, have the potential to improve their cycling conditions and raise their cycling rates.

Perceived Safety.

When the public perceives biking as dangerous, individuals are much less likely to choose it as their primary mode of transportation. In their 2008 study, professors of urban planning, Buehler and Putcher suggest that one of the reasons why cycling rates are so low in the U.S. is that it is much more dangerous to ride a bike there than in countries like The Netherlands and Denmark (Buehler & Putcher, 2008). In the 1970s, The U.S., The Netherlands, and Denmark all had high cyclist fatality rates **(Figure One)**. Since then, however, fatality rates have dropped by over 70% in the Netherlands and Denmark and have only dropped by 30% in the U.S. This could suggest that making biking safer in the U.S., while increasing citizen's perceptions of biking safety, could help encourage more people to bike for utilitarian purposes, as it has in the Netherlands and Denmark.

Figure One

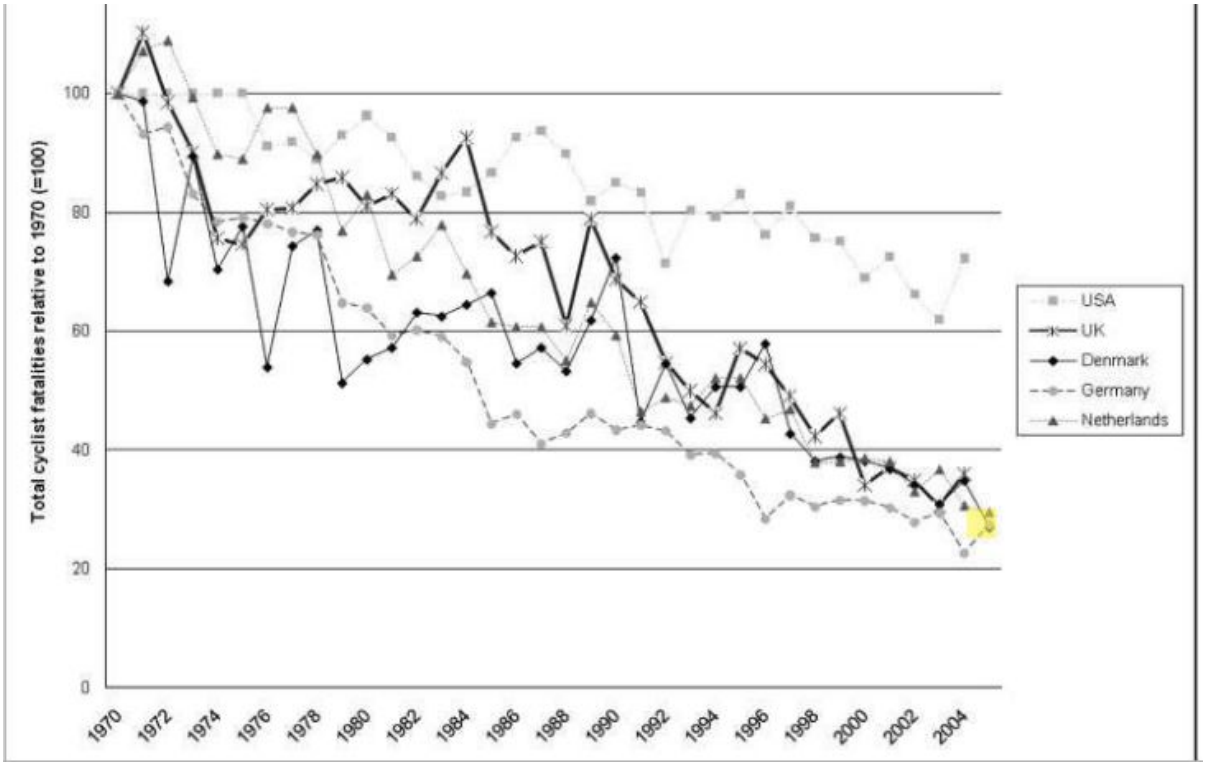

Figure One. Total cyclist fatalities in various countries from 1970 to 2004. Reprinted from "Making Cycling Irresistible: Lessons from The Netherlands, Denmark and Germany," by R. Buehler and J. Pucher, 2008

Bike Infrastructure

A strong correlation has been observed between bike infrastructure, like bike lanes and racks, and cycling rates as the presence of these facilities can make biking more safe and convenient, and therefore more desirable (Barnes, Krizek, & Thompson, 2009; Carr & Dill, 2003). Having any separation from normal roads can increase perceived safety, as there is less risk of car-bike accidents. When a city lacks bike infrastructure, and cyclists are forced to share the road with drivers, there can be confusion about where the cyclists are supposed to go which can lead to unpleasant or even dangerous situations. Not only is the presence of infrastructure important in affecting bike rates, but the quality of infrastructure. In some cases poorly

maintained bike lanes, or bike networks that lack connectivity can be just as deterring as completely lacking bike facilities in the first place.

Other studies, like the one conducted by Professors Buehler, Handy, and Xing of UC Davis in 2010, found bike infrastructure to be uninfluential in affecting biking rates. Furthermore, in the study conducted by Garrick and Marshall (2011) it points out that Berkeley had one of the lowest levels of bike infrastructure of the U.S. cities they analyzed and one of the highest cycling rates. While in Carlsbad, the city with the greatest amount of bike lanes out of the ones they analyzed, only about .3% of the population biked for utilitarian purposes (Garrick & Marshall, 2011). The authors suggested that this was because Berkeley has a higher population density and street connectivity than Carlsbad, illustrating that a combination of factors affect cycling rates, and that they cannot be analyzed singularly to understand bike culture.

Traffic Calming/Bike Favored Infrastructure

One of the main challenges in getting people to switch from driving to biking in the United States is the affordability and convenience of automobile use. In Pucher, Komanoff, and Schimek's 1999 study they addressed the correlation between the low gas taxes, high amounts of free parking, and a lack of road tolls with the high driving rates and consequently low cycling rates in the U.S. (Putcher et al., 1999). This has lead other academics to recommend increasing the price of driving, through either tolls, taxes, or parking, to promote the use of more sustainable modes of transportation (Schipper, Hand, & Gillingham, 2010). Certain studies have gone as far as to encourage so called anticar infrastructure, like artificial dead ends or traffic circles, that physically makes it less convenient to drive (Buehler & Putcher, 2008).

Selection of Copenhagen and Amsterdam

Copenhagen and Amsterdam were selected for this study over other cycling cities for a few reasons. First of all, both of these cities have experienced extremely low cycling rates in their past and have had to consciously develop their bike culture. Furthermore most cities with

high cycling rates are not as affluent as the U.S., as citizens turn to other forms of transportation when they cannot afford automobiles. This makes these other cities less comparable to the U.S. as there is a clear reason (affluence) for the difference in cycling rates. This is not an issue with Amsterdam and Copenhagen as their relative wealth is similar to the U.S.

History of Biking in Amsterdam and Copenhagen

People often assume that the high rate of biking in Copenhagen and Amsterdam is due to their long histories with cycling and that because of this, there is not an easy way to replicate their success in other cities that do not share this past. However, Copenhagen and Amsterdam have both suffered from car domination in the past and have had to consciously develop their bike culture to get the bike share to where it is today. This proves that bike culture and use does not have to be an innate quality of a city and that it can be developed in places like the U.S., where biking is rarely used for utilitarian purposes. It is important to understand how Amsterdam and Copenhagen's historical relationships with biking relate to that of other cities because it can explain why they have become bike dominated while others have not.

Similarly to most other cities, biking first exploded in Copenhagen and Amsterdam in the late 1800s. In both cities, biking quickly became the dominant mode of transportation and remained very popular up until the 1950s. Though the percent of people biking in Amsterdam and Copenhagen at the time were high, they were not the only cities in the world with these impressive rates. What differentiated the two cities from others was their recovery from the world wide reduction of bike use that began in the 1950s (Zee, 2015). During this time, cars became more affordable and convenient which caused a steep decline in the number of trips made by bike in most cities. Amsterdam went from its peak rate of about 85% of trips made by bike to around 30% while Copenhagen went from 55% to about 25% **(Figure two)**. However, people in these cities soon realized that there were great consequences to automobile use. The newly adored cars caused great amounts of air and noise pollution, and the streets became less

walkable. Soon the number of transport accidents shot up, resulting in further resentment of car use ("Meerjarenplan Verkeersveiligheid", n.d.). While in most cities, people began to focus on how to make the automobiles safer, more efficient, and affordable in order to fix these problems, more people in Copenhagen and Amsterdam decided instead that phasing out automobile use and going back to their biking roots was a better way to attack the situation. Beginning in the 1970s activist groups in both of these cities began retaliating against the increased use of cars and the intolerance of bikers (Ruby, n.d.) ("The Cycling Embassy," n.d). The public's increased distress with car use gave the governments of these cities a reason to take action against cars and eventually lead to policies and infrastructure that favored bikes over other modes of transport (Meilby & Wagner, 2012).

Figure Two

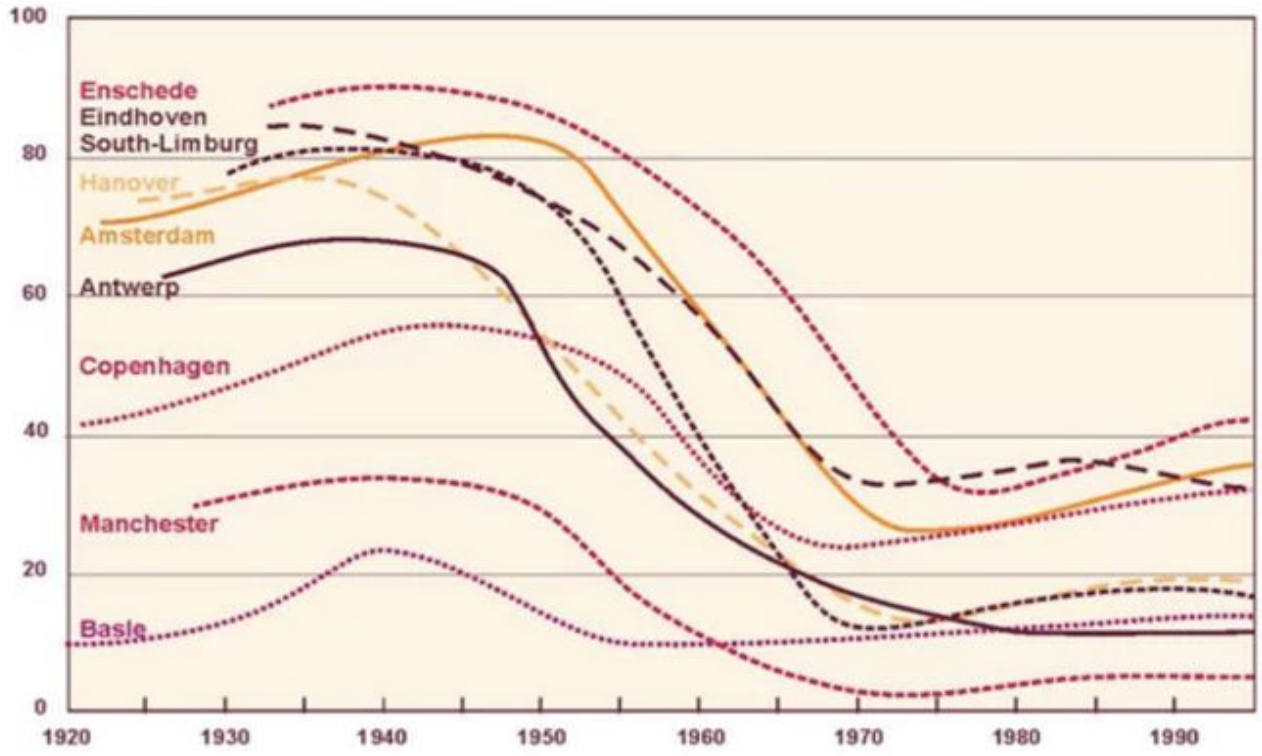

Figure Two. Evolution in the percent of trips made by bike in Dutch and Danish Cities. Reprinted from "How Amsterdam became the bicycle capital of the world", by R. Zee 2015

Question

There is existing research both on the factors that affect biking and the biking histories of Copenhagen and Amsterdam, but there has been little research done on how the challenges experienced by biking cities, like Copenhagen and Amsterdam, compare to the challenges and experiences of cities that currently have low cycling rates. Though this concept is lacking in existing literature it is often seen in the work of environmental organizations, like CycleSpace (a Dutch cycling advocacy group) or State of Green (a Danish environmental solutions network), that apply the experiences of environmentally successful cities and countries to other organizations. This study aims to solidify that concept by providing research on how the experience of Copenhagen and Amsterdam could be applied to U.S. cities.

Methods

To gather information on the challenges different U.S. cities face with promoting biking, bike coordinators from 10 different U.S. cities were contacted **(Chart 1)** and asked to participate in an 11 question interview about bike culture in their city **(Table 1)**. Population, Population Density, and the rate of use of other types of sustainable transportation were the three main factors focused on in the selection of these cities. More specifically, the cities were picked based on the findings of the U.S. and Canada Green City Index ("U.S. and Canada Green City Index", 2011) and the study "Bicycle Commuting and Facilities in Major U.S. Cities" conducted by professors of urban planning, Jennifer Dill and Theresa Carr from Portland State University (Carr & Dill, 2003). Interviews were chosen as the primary method of gathering data because most existing research has evaluated the bike culture in cities by using quantitative data (like the percent of roads that contain bike infrastructure) while this study aimed to incorporate the perspective of individuals working to develop the biking culture.

For the second part of the data collection, individuals involved in biking organizations were contacted from both Amsterdam and Copenhagen **(Chart 1)**. For Amsterdam, Fietsersbond (The Dutch Cycling Union) and Cyclespace were selected and for Copenhagen, The Danish Cycling Embassy. Fietsersbond and The Danish Cycling Embassy were chosen because both of these organizations were present during the cycling movement in the 1970s, and Cyclespace was chosen because the goal of this organization is similar to the aimed application of this study, which is to help apply Amsterdam's cycling experience and expertise to cities all over the world. After the interviews with the bike coordinators from the U.S. cities, a list was compiled of the main challenges that they felt their cities faced while trying to promote utilitarian biking **(Table 2)**. For each challenge listed, individuals from the biking organizations in Copenhagen and Amsterdam were asked if their city faced a similar problem during the 1970s.

Chart 1: Participants in Parts One and Two of Data Collection

U.S. City / Organization	Participant	Title
Boston	Stefanie Seskin	Active Transportation Director
Miami	Collin Worth	Bicycle Coordinator/Transportation Analyst
Milwaukee	Ibrahim S Amin	Department of Public Works, Civil Engineer
Los Angeles	Michelle Mowery	Founder of LADOT Biker Program
Detroit	Jeffrey Nolish	Mobility Specialist
San Diego	Andy Hanshaw	Executive Director of The San Diego Bike Coalition
Charlotte	Ben Miller	Bicycle Program Coordinator
Houston	Robert Guthart	Transportation Planner
Phoenix	Joseph Perez	Bicycle Coordinator
Columbus	Scott Ulrich	Bike Coordinator
The Cycling Embassy of Denmark	Mai-Britt Kristensen	Project Manager
Fietsersbond	Wim Bot	Policy Adviser
CycleSpace	Cornelia Dinca	-

Table 1: Interview Questions For U.S. City Bike Coordinators

Biking Infrastructure

1. What are the main challenges you have encountered while trying to increase bike infrastructure (bike racks, bike lanes, etc) in your city?

Support for Biking

2. Beyond your department, do you feel that the city government prioritizes or supports promoting biking or reducing car use in the city.

3. Have you found that the citizens of your city are generally supportive of efforts to promote biking and expand biking infrastructure?

City Biking Program

4. How has the city's Bicycle program, and your efforts to improve biking infrastructure affected the community's opinions about biking?

5. What has been the most effective way you have found to encourage people to bike in your city

Relationship to Driving

6 Do you feel that in order to increase the number of bikers in your city you will have to make driving a less desirable option?

7 What would be the challenges in making driving less desireable-either by making it more expensive or less convenient

Current Vs. Future State of Biking

8 Why do you think that people are more prone to choosing driving over biking in your city, and how does the city address this?

9 Are there any characteristics of your city that give it an advantage or disadvantage in promoting biking, when compared to other U.S. cities

10 *Could* you see your city ever becoming a 'biking city' like Copenhagen or Amsterdam where the majority of people bike instead of drive? Why or Why not

Table 2: Challenges Faced By U.S. Cities in Promoting the Use of Bikes For Utilitarian Purposes

Biking Infrastructure
Lack of Bike Facilities*
Lack of Connected Bike Facilities*
Difficulty in Expanding Bike Facilities
Support for Biking
Public opposition to expanding bike infrastructure
Lack of political support for reducing car use
Lack of Funding
Perception of Biking
Perceived status of car ownership, and a negative perception to transit and bike use
Perceived danger of biking compared to driving
Lack of Cycling Education*
Physical Qualities of The City*
Unfavorable weather
Hilly, uneven streets
Long trip distance
Influence of Driving
Competing with the convenience and low cost of driving
Driving being a culture/habit*

* Questions were not included in interviews with Copenhagen/Amsterdam because they did not apply to those cities' experiences

Findings and Analysis

U.S. Cities Interviews (Table 1)

Challenges faced by U.S. bike coordinators {Questions 1, 2, 3, 8, 9}

Five of the interview questions related to challenges experienced by the cities in promoting biking. The challenges that were recorded from these five interview questions were sorted into five broad categories and fourteen subcategories for analysis **(Table 2 and Chart 2).**

Nine out of the 10 cities listed infrastructure as being a factor preventing them from achieving higher cycling rates, making it the most frequently cited challenge. Only one city (Miami) thought that it was a complete lack of infrastructure, while six cities felt it was a lack of connected infrastructure. Four of the cities agreed that expanding bike facilities was a challenge. This was often because of narrow streets that made the addition of bike facilities expensive, complicated, or simply impossible. Seven of the ten cities listed problems relating to support for biking. Multiple bike coordinators described citizens being concerned that increasing bike infrastructure would increase traffic for drivers. Others felt that citizens were not necessarily opposed, but were simply indifferent to utilitarian biking. A few of the cities within this category described political leaders being in support of biking until it interfered with car use or required funding. This could indicate that the politicians within these cities are not as firmly committed to increasing cycling rates as those in more successful cycling cities. Seven of the ten cities listed challenges relating to citizen perception of cycling. Within this category bike coordinators expressed concerns that the perceived status of driving influenced cycling rates. Others described the perceived danger of cycling negatively affecting cycle rates. A few coordinators also described the lack of citizen education about biking as a problem. Seven of the ten cities listed challenges relating to the physical qualities of the city. The two main challenges discussed in this category were unfavorable weather and experiencing sprawl. Finally, six of the ten cities listed a challenge relating to driving's influence on biking. All six of the cities agreed that the comfort

and appeal of driving results in lower bike rates, and a few mentioned the fact that driving has become so established in their cities that it has developed into a culture or habit.

Chart 2 (Results from Questions 1,2,3,8,9)

Challenge Experienced	Names of Cities Who Listed The Challenge	Number of Cities Who Listed The Challenge
Biking Infrastructure	Miami, Charlotte, Los Angeles, Houston, San Diego, Columbus, Milwaukee, Boston, Phoenix	9/10
Lack of Bike Facilities	Miami	1/10
Lack of Connected Bike Facilities	Charlotte, Los Angeles, Houston, San Diego, Milwaukee, Columbus	6/10
Difficulty in Expanding Bike Facilities	Charlotte, Los Angeles, Boston, Phoenix	4/10
Support for Biking	Los Angeles, Miami, San Diego, Phoenix, Columbus, Houston, Milwaukee	7/10
Public opposition to expanding bike infrastructure	Los Angeles, Miami, San Diego, Phoenix, Columbus, Houston, Milwaukee	7/10
Lack of political support for reducing car use	San Diego, Columbus, Miami, (Phoenix Potential to do more)	4/10
Lack of Funding	Houston, Milwaukee	2/10
Perception of Biking	Miami, San Diego, Detroit, Houston, Columbus, Phoenix, Milwaukee	7/10
Perceived status of car ownership	Miami, San Diego	2/10
Perceived danger of biking compared to driving	Detroit, Houston, Columbus, Phoenix, San Diego	5/10
Lack of Cycling Education	San Diego, Milwaukee	2/10
Physical Qualities of The City	Miami, Milwaukee, Columbus, Detroit, Charlotte, Houston, Boston	7/10
Unfavorable weather	Miami, Milwaukee, Columbus	3/10
Long trip distance	Detroit, Charlotte, Houston, Columbus, Boston, Milwaukee	6/10
Influence of Driving	Phoenix, Charlotte, Columbus, Detroit, San Diego, Boston	6/10
Competing with the convenience and low cost of driving	Phoenix, Charlotte, Columbus, Detroit, San Diego, Boston	6/10
Driving being a culture/habit	San Diego, Boston	2/10

Making Driving Less Desireable {Questions 6 & 7}

The city bike coordinators were asked whether they felt that driving would have to become less desirable for biking to become more popular, and what challenges they felt they would face in making driving less desireable. Most of the coordinators felt that the city would not have to interfere with car use to promote biking (**Chart 3)**. Four out of the ten cities agreed that driving will have to become less convenient while the other six felt that it did not. In this question, San Diego, Miami and Phoenix agreed that making driving less desireable was needed, but that it could only work if biking became more desireable. Boston was the only city who discussed actively making driving less convenient (by making parking more expensive and less accessible). Milwaukee, Detroit, and Columbus agreed that making driving less convenient could increase bike rates, but they felt it was not needed because other strategies, like increasing bike infrastructure, could have just as profound of an effect. Six of the ten cities specified in their response that they would rather promote biking than discourage car use, and that the goal was to allow all forms of transportation to thrive.

Chart 3 (Results from Questions 6 & 7)

Stance on the need to make Driving Less Desireable	Names of Cities Who Listed This Opinion	Number of Cities Who Listed This Opinion
Yes	San Diego, Phoenix, Miami, Boston	4/10
We need to make driving less desireable but must also make biking more desireable for this to work	San Diego, Phoenix, Miami	3/10
We are currently working to make driving less desireable	Boston	1/10
We should make driving less desireable to increase bike rates but the overall goal is to allow People Access To All Forms of Transportation	Miami	1/10
No	Charlotte, Los Angeles, Houston, Milwaukee, Detroit, Columbus	6/10
You Can Just Make Cycling More Desireable	Milwaukee, Detroit, Columbus	3/10

The Goal is Not To Reduce Driving But To Allow People Access To All Forms of Transportation	Charlotte, Los Angeles, Houston, Milwaukee, Detroit, Columbus	6/10

Could You See Your City Ever Becoming a 'biking city' like Copenhagen or Amsterdam {Question 10}

The city bike coordinators were also asked whether or not they thought that their city could ever become a 'biking city' where a large portion of the population bikes as their main form of transportation. Every bike coordinator interviewed agreed to some extent that biking could become a popular form of transportation in their city **(Chart 4)**. Six out of the ten cities felt that with their current efforts it would just take a matter of time before they caught up to cities that have higher cycling rates. Three out of the ten cities felt like it was possible, but specified that there would have to be specific changes in their approach to reach that future. Only one city (Charlotte) felt like it would not be obtainable for the city as a whole, but that it could be possible on a smaller scale in specific neighborhoods.

Chart 4 (Results from Question 10)

Opinion on the Future of Bike Culture in the City	Names of Cities Who Listed This Opinion	Number of Cities Who Listed This Opinion
Yes, We are on track and over time we will catch up	Detroit, Los Angeles, Boston, Houston, Milwaukee, Phoenix	6/10
Yes, but there will have to be major changes for this to happen	Miami, San Diego, Columbus	3/10
Not throughout the whole city, but it could happen in specific neighborhoods	Charlotte	1/10

Discussion

Comparison of Challenges Experienced in the U.S. With the Experiences of Amsterdam and Copenhagen

Challenges relating to bike infrastructure were the most frequently listed by the U.S. bike coordinators (with nine of the ten cities mentioning them), and of these, lack of connected bike infrastructure was the most frequent. This is consistent with the findings of Barnes et al. (2009) and Carr & Dill (2003) that emphasize the importance of bike infrastructure in the development of bike culture in cities. According to the three participants from Copenhagen and Amsterdam, their cities also experienced a lack of sufficient bike infrastructure in their past and have had to increase it in order to obtain their high cycling rates. The difference is that the support for infrastructure in Copenhagen and Amsterdam came from the citizens while in the U.S., citizens are generally opposed to or uninterested in bike infrastructure. This will likely make it more difficult for U.S. cities to increase their bike infrastructure.

Four of the ten cities discussed a difficulty in expanding bike infrastructure because of narrow roads. All three respondents from Amsterdam and Copenhagen agreed that their cities have narrow streets similar to the ones experienced by specific cities in the U.S.. The respondent from Copenhagen agreed that they have experienced challenges as a result of this, but both respondents from Amsterdam did not view these streets as a challenge. They pointed out that they have actually served as an advantage by making conditions more fit for biking than driving. When asked about why this was an advantage in the Netherlands but a challenge in the U.S., the respondent from Fietsersbond clarified that this difference is because in the 1970s cyclists in Amsterdam had more of an influence on the roads than U.S. bikers do today. Because of this, cyclists had the ability to take over these narrow streets, that were already unfavorable to cars. These streets became bicycle havens, which eventually spread throughout the city. Today, in

U.S. cities, cars have been dominant for so long that cyclists do not have the same power that they did in Amsterdam in the 1970s, meaning that they cannot take over narrow streets, even when they are already inconvenient for cars. This difference means that narrow roads in the U.S. have no advantage and are even detrimental when it prevents the expansion of bike infrastructure.

Seven of the ten cities commented that public opposition to the expansion of bike infrastructure was a challenge. The respondents from Amsterdam and Copenhagen all agreed that their cities had faced this during the 1970s. Both participants from Amsterdam specifically mentioned business owners being concerned that biking would not bring the same level of development as driving. The respondent from CycleSpace said that a few of these individuals even threatened to sue the local government. The respondents said that educating citizens about the benefits of biking and disproving the misinformed fears of business owners were the methods that helped their cities overcome this challenge. Most of the U.S. cities that were interviewed are invested in educating their citizens on biking, indicating that this could become less of a challenge over time.

Four of the ten cities mentioned a lack of political support for limiting car use as a challenge. The respondents from Copenhagen and Amsterdam agreed that their cities had faced this at some point in their histories. The participants from Amsterdam clarified that this was a problem they faced much earlier in Amsterdam's history and that since the late 1970s there has been strong political support for cycling projects. The respondent from Fietsersbond added that this is a more intense problem in the U.S. because the car culture is more established, and therefore has more political support than it ever did in The Netherlands. Furthermore, the political support for cycling in Amsterdam and Copenhagen did not develop until citizens showed an intense interest in it. This could mean that it will take longer for political support to develop in U.S. cities, as citizen support is lower.

Two of the ten cities listed the perceived status of car ownership as a challenge. All three respondents from Amsterdam and Copenhagen agreed that this was not a problem in their cities. The respondent from Cyclespace added that this was only a challenge with immigrants or nonnative Dutch. This contradicted the findings of Buehler, Handy, and Xing's (2010) study that revealed a strong correlation between the perceived poverty of cyclists and negative opinions about cycling. This indicates that it could be a cultural difference between cities like Amsterdam and Copenhagen, and those like the ones in the U.S. where driving has been established for a longer period of time.

Five of the ten cities listed the perceived danger of biking as a challenge. The respondent from The Danish Cycling Embassy commented that this was not an issue in Copenhagen, however, both respondents from Amsterdam said that the safety of biking was a huge concern in the 1970s as fatality rates were rising from the increased prevalence of automobiles. However, the respondent from Fietsersbond clarified that this was not so much a deterrent to biking as it was a catalyst for the biking movement. Instead of people responding to the increased danger of biking by switching to other modes of transportation, like citizens in the U.S. today, citizens in Amsterdam and Copenhagen decided to fight back against car use in the city, leading to the high cycling rates currently experienced. This difference is likely because at that time, driving was not as established in Amsterdam as it is in the U.S. today, so it was easier for citizens to recognize the automobile's role in the increased danger of cycling.

Six of the ten cities listed long trip distance as a challenge to getting more people to bike. The respondent from Fietsersbond discussed in his interview the importance of long term policies in Amsterdam's cycling success. A lot of these policies had to do with land use, and encouraged development in the city's center to discourage sprawl. This has helped make the destinations more central in Amsterdam, and therefore more bike-able. Though long trip distance

was a consistent challenge among U.S. cities, very few of them discussed land use policies or the prevention of sprawl as an effective way to make biking more favorable.

Finally, six of the ten cities listed competing with the convenience and low cost of driving as a challenge. All three respondents from Amsterdam and Copenhagen agreed that this was and has continued to be a challenge. Both respondents from Amsterdam mentioned that it is more expensive to drive there than it is in the U.S. and that this has helped convince more people to bike. Similarly, Denmark is one of the most expensive countries to own a car in (with the 180% tax they have on new vehicle purchases). Furthermore, both Denmark and The Netherlands have taken action to make driving physically less convenient through the use of anitcar infrastructure. They have also created multiple no car zones and significantly lowered the speed limit in certain areas (Buehler & Putcher, 2008). Despite the great success of these actions in Amsterdam and Copenhagen, six of the ten U.S. cities specified that they were adamantly against making driving less convenient, and only one of the ten cities (Boston) talked about actually taking action to do this. This is interesting because although U.S. cities recognize the convenience of driving as an obstacle to getting more people to bike, very few of them are willing to take action to make it less convenient. Most of the cities that participated described their goal as making all transportation options viable to give citizens a choice, rather than promote one form (like biking) and discourage another (like driving). Therefore, it is not a lack of knowledge or resources that account for the difference in the U.S.'s approach to driving and Amsterdam and Copenhagen's. Instead it is a difference in the vision these cities have for their transportation sector.

Conclusions

The challenges faced by Copenhagen and Amsterdam in the 1970s were similar to those faced currently by U.S. cities, but differed in three main regards. First of all, the U.S. cities are experiencing these challenges much more intensely because cycling rates are much lower and

cars are much more established than they ever were in Amsterdam and Copenhagen. This could indicate that the longer cities wait to encourage biking, the harder it will be for it to become a major mode of transportation. Second of all, citizens were the ones leading the cycling movements in Copenhagen and Amsterdam whereas most of the bike coordinators from the U.S. described lack of citizen support as a major challenge. This has left the cycling movement in the hands of the local governments and cycling organizations. Finally, U.S. cities have a different approach to transportation than Amsterdam and Copenhagen did in the 1970s, leading them to not pursue one of the most effective methods Copenhagen and Amsterdam employed–making car use less desireable. Though these three differences could make the transition to biking a longer, and more difficult process for U.S. cities, all of the coordinators felt that in at least some areas of their cities, utilitarian biking could become commonplace.

Limitations/Delimitations

Because only ten cities were used for the analysis of biking culture in the U.S., they might not accurately represent what all American cities are experiencing. Furthermore, because most of the research was conducted through interviews, it is possible that the interviewees bias could have affected the results. As all of the U.S. bike coordinators who were interviewed worked for their city governments, therefore it is possible that in an effort to maintain a positive reputation of their city, they did not disclose all of the problems or challenges they were facing. Finally, the conclusions could have been stronger with more historical documents from the bike movement in Amsterdam and Copenhagen. These documents were difficult to obtain for the purpose of this study for two main reasons-a lack of familiarity with the archive websites for Amsterdam and Copenhagen, and the language barrier.

Call for Future Research

As the main conclusions of this study drew attention to the differences between Amsterdam, Copenhagen, and the U.S. cities' experiences with biking, it is recommended that a

more detailed analysis be done on how these differences will affect the U.S.' ability to increase cycle rates. Furthermore, further research should be done to confirm that the results of this study are consistent with other U.S. cities (not just the ten focused on in this paper). As previously stated, a delimitation to this study was the inability to access a larger quantity of historical documents about the biking movements in Copenhagen and Amsterdam. In future projects, this could be an interesting addition that could bring new insight to the topic.

References

Ahmed, F., Rose, G., & Jacob, C. (n.d.). Impact of weather on commuter cyclist behaviour and implications for climate change adaptation.

Aluvihare, R., Brömmelstroet, M., & Van der Horst, I. (2014). Amsterdam Cycling Plan.

Amsterdam's cycling history. (n.d.). Retrieved from http://www.iamsterdam.com/en/visiting/plan-your-trip/getting-around/cycling/amsterdam-cycling-history

Andersen, M. C. (n.d.). Danish Bicycle Infrastructure History. Retrieved from http://www.copenhagenize.com/2012/02/danish-bicycle-infrastructure-history.html

Baykal, A., & Jensen, F. (n.d.). Action Plan For Green Mobility .

Beentjes, R., Boers, J., Dijkshoorn, H.,Ujčić-Voortman, J., Van der Meeren, K., & Beltman, W. (2015). Amsterdamse Thermometer van de Bereikbaarheid. Amsterdamse Thermometer van de Bereikbaarheid.

Bondam, K. (2006). Copenhagen Bicycle Account 2006. Copenhagen Bicycle Account.

Dill, J., & Carr, T. (2003). Bicycle Commuting and Facilities in Major U.S.. Cities: If You Build Them, Commuters Will Use Them. Transportation Research Record: Journal of the Transportation Research Board, 1828, 116-123. doi:10.3141/1828-14

European Green City Index Assessing the environmental impact of Europe’s major cities (Rep. No. A19100-F-P152-X-7600). (2009). München: Siemens AG.

FAQ Cycling in Amsterdam. (n.d.). Retrieved from http://www.iamsterdam.com/en/media-centre/city-hall/dossier-cycling/cycling-faq

Handy, S. L., Xing, Y., & Buehler, T. J. (2010). Factors associated with bicycle ownership and use: a study of six small U.S.. cities. Transportation, 37(6), 967-985. doi:10.1007/s11116-010-9269-x

Krizek, K., Barnes, G., & Thompson, K. (2009). Analyzing the effect of bicycle facilities on commute mode share over time. Journal of Urban Planning and Development. doi:10.1061/ ASCE 0733-9488 2009 135:2 66

London Cycling Campaign. (n.d.). Retrieved from http://lcc.org.uk/pages/holland-in-the-1970s

Marshall, W. E., & Garrick, N. W. (2011). Evidence on why bike-friendly cities are safer for all road users. environmental practice, 13(01), 16-27. doi:10.1017/s1466046610000566

Meerjarenplan Verkeersveiligheid 2016-2021. (n.d.). Retrieved from https://issuu.com/gemeenteamsterdam/docs/12-iv058-1-meerjarenplan_verkeersve?e=19262377%2F34362228

Meilby, R., & Wagner, M. (2012, January 01). De bilfrie søndage 1973-74:Den psykologiske overgang fra friti... Retrieved from https://www.mysciencework.com/publication/

Nankervis, M. (1999). The effect of weather and climate on bicycle commuting, Transportation Research Part A, vol. 33, pp. 417-431.

Pucher, J., & Buehler, R. (2008). Making Cycling Irresistible: Lessons from The Netherlands, Denmark and Germany. Transport Reviews, 28(4), 495-528. doi:10.1080/01441640701806612

Pucher, J., & Dijkstra, L. (2003). Promoting Safe Walking and Cycling to Improve Public Health: Lessons From The Netherlands and Germany. American Journal of Public Health, 93(9), 1509-1516. doi:10.2105/ajph.93.9.1509

Pucher, J., Komanoff, C., & Schimek, P. (1999). Bicycling renaissance in North America? Transportation Research Part A: Policy and Practice, 33(7-8), 625-654. doi:10.1016/s0965-8564(99)00010-5

Ruby, L. (n.d.). How Denmark became a cycling nation. Retrieved from http://denmark.dk/en/green-living/bicycle-culture/how-denmark-become-a-cycling-nation

Schipper, L., Hand, P., & Gillingham, K. (2010). The Road From Copenhagen: Fuel Prices and Other Factors Affecting Car Use and CO2 Emissions in Industrialized Countries. T. (2015). Copenhagen City of Cyclists . The Bicycle Account 2014.

The League of America Cyclists . (n.d.). 2015 American Community Survey (ACS) (Rep.).

The Cycling Embassy, %. (n.d.). Facts about Cycling in Denmark. Retrieved from http://www.cycling-embassy.dk/facts-about-cycling-in-denmark/statistics/

U.S. and Canada Green City Index Assessing the environmental performance of 27 major U.S. and Canadian cities (Rep. No. A19100-F-P179-X-7600). (2011). Munich: Siemens AG.

Wiking, M. (Ed.). (n.d.). Copenhagen – Beyond Green The socioeconomic bene ts of being a green city.

Zee, R. V. (2015, May 05). How Amsterdam became the bicycle capital of the world. Retrieved from https://www.theguardian.com/cities/2015/may/05/amsterdam-bicycle-capital-world-tran sport-cycling-kindermoord