UC Davis
White Papers

Title

Making Bicycling Equitable: Lessons from Sociocultural Research

Permalink

Authors

McCullough, Sarah R
Lugo, Adonia
Stokkum, Rebecca van

Publication Date

2019-04-01

DOI

Data Availability

The data associated with this publication are within the manuscript.

Making Bicycling Equitable: Lessons from Sociocultural Research

| April 2019 | A White Paper from the Pacific Southwest Region University Transportation Center |

Sarah Rebolloso McCullough, PhD, University of California, Davis

Adonia Lugo, PhD, Antioch University, Los Angeles

Rebecca van Stokkum, University of California, Davis

PSR

Pacific Southwest Region UTC

University Transportation Center

ITS UCDAVIS

INSTITUTE of TRANSPORTATION STUDIES

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. UCD-17-09	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A
4. Title and Subtitle Making Bicycling Equitable: Lessons from Sociocultural Research	5. Report Date April 2019	
	6. Performing Organization Code N/A	
7. Author(s) Sarah Rebolloso McCullough, PhD https://orcid.org/0000-0003-2101-8931 Adonia Lugo, PhD Rebecca van Stokkum, PhD	8. Performing Organization Report No. UCD-ITS-RR-19-03	
9. Performing Organization Name and Address UC Davis Institute of Transportation Studies 1605 Tilia Street, Suite 100 Davis, CA 95616	10. Work Unit No. N/A	
	11. Contract or Grant No. USDOT Grant 69A3551747109	
12. Sponsoring Agency Name and Address U.S. Department of Transportation Office of the Assistant Secretary for Research and Technology 1200 New Jersey Avenue, SE, Washington, DC 20590	13. Type of Report and Period Covered Final White Paper (Sept. 2017 – March 2019)	
	14. Sponsoring Agency Code USDOT OST-R	

16. Abstract

This white paper provides guidance for how planning, policy, and advocacy may better account for complex sociocultural forces, including gender, class, and race. The authors reviewed a large body of sociocultural research on bicycling with complex models capable of addressing an intersectional understanding of identity, the innerworkings of power in society, and the nature of inequity. These findings coalesced into four recommendations for those promoting bicycling as a mode of everyday transportation: (1) Extend what it means to embrace difference; (2) Recognize that the streets are not equally safe for all; (3) Engage in a meaningful way with marginalized communities and share decision-making power; and (4) Understand how local and national histories of injustice influence and relate to current bicycling planning processes. Integrating these recommendations into advocacy, policy, and planning can lead to greater equity in representation, distribution of resources, and decision-making in promoting bicycling. System-wide implementation of these recommendations will create the greatest impact on improving issues of equity, diversity, and inclusion in bicycling. This requires broad-scale interventions, including but not limited to, training, changes to funding and decision-making structures, valuing long-term community engagement and community knowledge, broadening measures to street safety, and considering historic inequality.

17. Key Words Bicycling, bicycle culture, subjectivity, identity, inequality, sociodemographic	18. Distribution Statement No restrictions.		
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 51	22. Price N/A

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

Pacific Southwest Region UTC
University Transportation Center

[page intentionally left blank]

TABLE OF CONTENTS

About the Pacific Southwest Region University Transportation Center

The Pacific Southwest Region University Transportation Center (UTC) is the Region 9 University Transportation Center funded under the US Department of Transportation's University Transportation Centers Program. Established in 2016, the Pacific Southwest Region UTC (PSR) is led by the University of Southern California and includes seven partners: Long Beach State University; University of California, Davis; University of California, Irvine; University of California, Los Angeles; University of Hawaii; Northern Arizona University; Pima Community College.

The Pacific Southwest Region UTC conducts an integrated, multidisciplinary program of research, education, and technology transfer aimed at *improving the mobility of people and goods throughout the region.* Our program is organized around four themes: 1) technology to address transportation problems and improve mobility; 2) improving mobility for vulnerable populations; 3) improving resilience and protecting the environment; and 4) managing mobility in high growth areas.

U.S. Department of Transportation (USDOT) Disclaimer

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the information presented herein. This document is disseminated in the interest of information exchange. The report is funded, partially or entirely, by a grant from the U.S. Department of Transportation's University Transportation Centers Program. However, the U.S. Government assumes no liability for the contents or use thereof.

Disclosure

Acknowledgements

Abstract

This white paper provides guidance for how planning, policy, and advocacy may better account for complex sociocultural forces, including gender, class, and race. The authors reviewed a large body of sociocultural research on bicycling with complex models capable of addressing an intersectional understanding of identity, the innerworkings of power in society, and the nature of inequity. These findings coalesced into four recommendations for those promoting bicycling as a mode of everyday transportation: (1) Extend what it means to embrace difference; (2) Recognize that the streets are not equally safe for all; (3) Engage in a meaningful way with marginalized communities and share decision-making power; and (4) Understand how local and national histories of injustice influence and relate to current bicycling planning processes.

Integrating these recommendations into advocacy, policy, and planning can lead to greater equity in representation, distribution of resources, and decision-making in promoting bicycling. System-wide implementation of these recommendations will create the greatest impact on improving issues of equity, diversity, and inclusion in bicycling. This requires broad-scale interventions, including but not limited to, training, changes to funding and decision-making structures, valuing long-term community engagement and community knowledge, broadening measures to street safety, and considering historic inequality.

Making Bicycling Equitable: Lessons from Sociocultural Research

Executive Summary

The bicycle is a potential tool for social equity, but to realize this potential, there must be space for difference within bicycling. This white paper provides guidance for how planning, policy, and advocacy may better account for complex sociocultural forces, including gender, class, and race. The authors reviewed a large body of sociocultural research on bicycling from diverse fields such as anthropology, sociology, geography, communications, and cultural studies, which are generally not in conversation with bicycle transportation planning, policy, and advocacy. These fields have complex models capable of addressing an intersectional understanding of identity, the innerworkings of power in society, and the nature of inequity. The review focused on culling findings that could speak to issues of equity, diversity, and inclusion in bicycling transportation. These findings coalesced into four recommendations for those promoting bicycling as a mode of everyday transportation.

These recommendations are as follows:

1. Extend what it means to embrace difference. This includes recognizing and challenging situations when decisionmakers do not reflect the demographics of those affected by decisions made. Remedy such situations by including and prioritizing the perspectives of marginalized communities.
2. Recognize that the streets are not equally safe for all and that street safety encompasses more than traffic crashes. Prioritize policies and practices that make streets safe for the most vulnerable users. Account for the complexity of race, gender, class, and other social factors affect bicycling safety.
3. Engage in a meaningful way with marginalized communities and share decision-making power. This means including local communities in leadership structures for planning, policy, and advocacy. Provide compensation for their expertise and time.
4. Understand how local and national histories of injustice influence and relate to current bicycling planning processes. Planning, policy, and advocacy processes and practices should seek to address and rectify past inequalities, or at minimum not exacerbate power differentials. In assessing patterns of inequality, the knowledge of marginalized communities and residents should take precedence.

Integrating these recommendations into advocacy, policy, and planning can lead to greater equity in representation, distribution of resources, and decision-making in promoting bicycling. System-wide implementation of these recommendations will create the greatest impact on improving equity, diversity, and inclusion in bicycling. This requires broad-scale interventions,

including but not limited to: training and education, changing funding mandates to require that decision-making bodies accurately and proportionately reflect the population represented, mandating and funding long-term community engagement with disadvantaged communities, broadening what types of dangers are considered when implementing measures for street safety, creating systems of accountability that consider historic inequality, increasing funding for small-scale and grassroots advocacy in disadvantaged communities, expanding leadership training structures, and gathering new forms of data that privilege the voices of community residents.

Introduction

"Let me tell you what I think of bicycling. I think it has done more to emancipate women than anything else in the world. It gives women a feeling of freedom and self-reliance. I stand and rejoice every time I see a woman ride by on a wheel…the picture of free, untrammeled womanhood."

- Susan B. Anthony, women's rights activist (1820-1906)

"Bicycles let people move with greater speed without taking up significant amounts of scarce space, energy, or time. …They become masters of their own movements without blocking those of their fellows. Their new tool creates only those demands which it can also satisfy. Every increase in motorized speed creates new demands on space and time. The use of the bicycle is self-limiting. It allows people to create a new relationship between their life-space and their life-time, between their territory and the pulse of their being, without destroying their inherited balance."

- Ivan Illich, philosopher and critic (1926-2002)

"If we want to dismantle the violence, excesses, and exclusions of a car-dominated streetscape to re-imagine a better street, we cannot reproduce car culture within bike culture. This means understanding how the car as a tool has been implemented to reinforce existing and create new forms of racial, gender, class and other inequalities and violence. To create safe and just streets, the bike movement must intentionally center radical inclusivity that loves the diversity of bodies, needs, and experiences of cycling rather than promoting a monoculture of privileged cyclists."

- Do Lee, contemporary bicycling researcher

The bicycle often serves as a symbol for social and environmental equity, as the above quotations illustrate. Something about this two-wheeled machine powered only by the human body appeals on a visceral level. Its relative simplicity and ubiquity creates a feeling of accessibility—as if anyone can partake of its emancipatory potential. And yet, despite such oft-expressed sentiments, bicycling remains a relatively underused technology, and one that divides as often as it unites.

Regular bicycling can contribute to better health, less pollution, and better travel experiences. Despite these clear benefits and a significant growth in bicycle infrastructure investment, the percentage of trips by bike remains low, hovering under 1% since this data began being tracked nationwide in 1980. Even as many cities experienced growth in cycling in the 2000s, nationwide the U.S. saw trips by bike increasing only a tenth of a percentage between 2001 when it was 0.9% and 2009 when it hit 1.0% (*1*). And yet, growth in rates of bicycling are most substantial among African Americans, Asian-Americans, and Hispanics (See Figure 1 and 2). The decade between 2001 and 2009 saw the following growth in percent of all bike trips: 100% among African Americans, 80% among Asian Americans, 50% among Hispanics, and 22% among

Whites. This points toward a potential shift in past trends that rank African Americans as engaging in bicycle commuting at lower rates than Whites (0.3% versus 0.5%) and an amplification of the greater rates of bike commuting among Latinos and Asian Americans (0.6% and 0.5%, respectively) (*2*). Sociocultural research offers new inroads into understanding these trends and building methods for making bicycling a more accessible and viable option for all.

Figure 1. Percent growth between 2001 and 2009 in the proportion of all trips that are taken by bicycle.
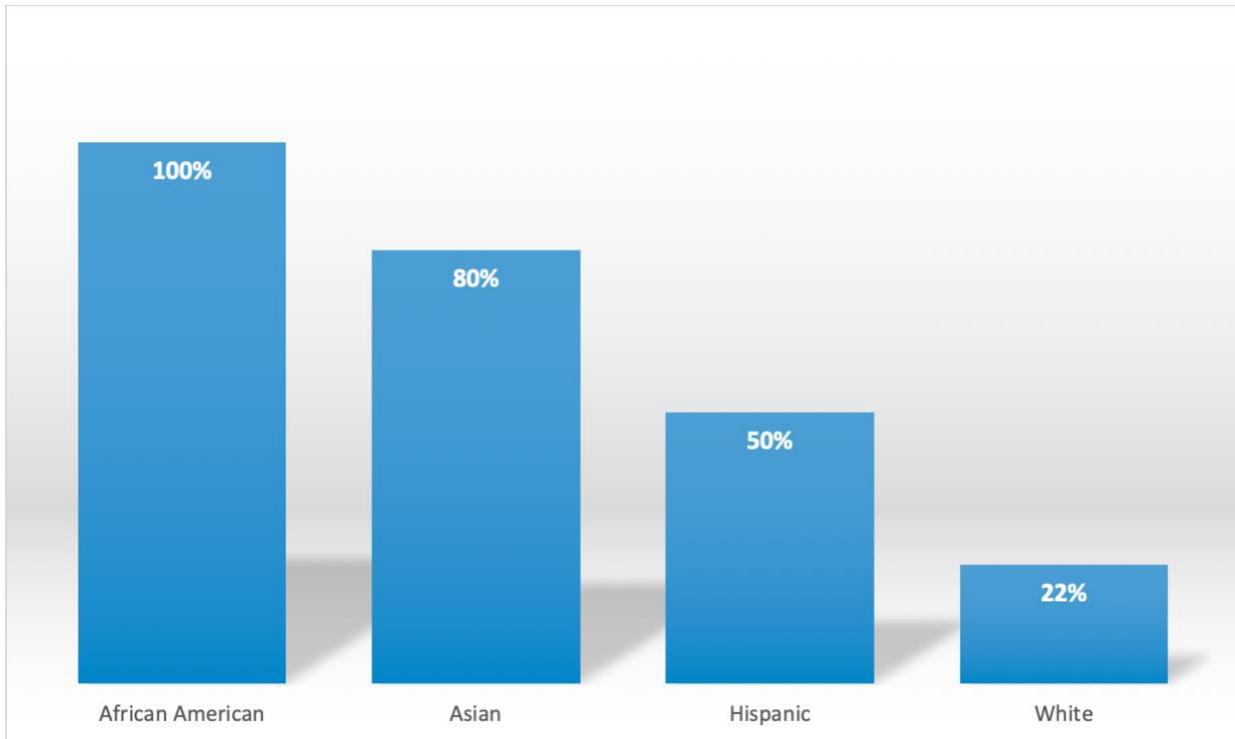
Figure 2. Average percent of commute trips by bicycle in 2010.
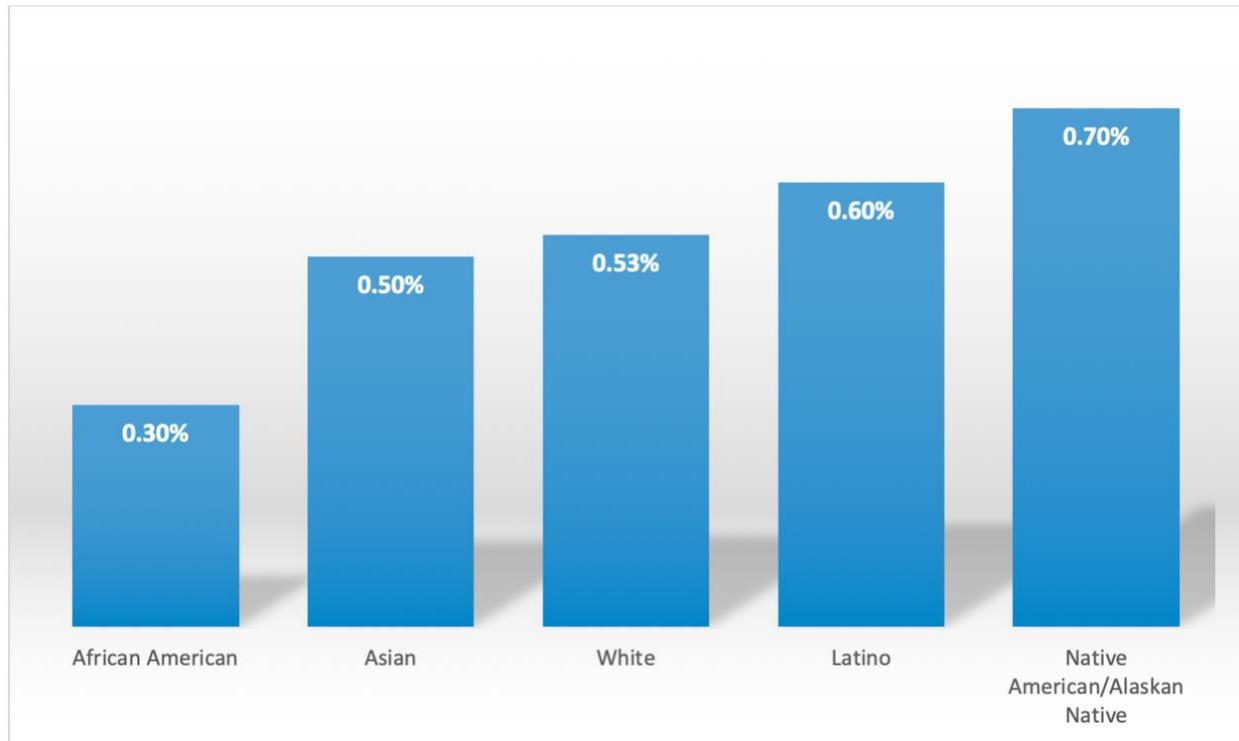
The goal of this white paper is to provide guidance for how planning, policy, and advocacy may better account for complex sociocultural forces, including gender, class, and race. To do this, the paper examines research on the cultural meaning and societal implications of bicycling, as expressed in the quotations above. This research can help transportation researchers, planners, and advocates address sociocultural issues of equity, diversity, and inclusion in bicycle transportation. The authors work from the assumption that deep inclusivity is of interest to those who wish to promote greater bicycling and worthy of investment. The paper argues that the benefits of bicycling should be accessible to all.

The white paper begins by summarizing the four major recommendations that emerged from a thorough review of scholarly literature on social and cultural aspects of bicycling. These recommendations are:

1. Extend what it means to embrace difference;
2. Act from the understanding that the streets are not equally safe for all;
3. Engage in a meaningful way with marginalized communities and share decision-making power; and
4. Acknowledge local and national histories of injustice.

After a summary of recommendations, the paper explains the origins of the project, methods, and theoretical model. Detailed descriptions of each recommendation follow and include

supporting research. Considered together, this white paper offers constructive ways to navigate the complexity of social and cultural factors in the promotion of bicycling transportation. Important gaps in the literature not addressed here are examinations of (dis)ability, trans and gender-nonconforming riding experiences, and indigeneity. They are not included because of the absence of research on these topics, a gap worth addressing.

The primary audience for these recommendations is people engaged in bicycle promotion, defined as paid or voluntary work designed to get more people riding bikes. This may include planners, advocates, researchers, policymakers, bike shop owners, and community members. The recommendations tend toward the general, rather than the specific. This is because one of the consistent messages from sociocultural research is the importance of context. A strategy that works well in one community may not be appropriate in another locale or may result in different outcomes. While this white paper does include some pointed recommendations for bicycle transportation planners, further discussion among planners, policymakers, advocates, researchers, community groups, and other stakeholders is needed to define the changes in policy, funding structures, training and education, leadership priorities, infrastructural investment, consulting services, planning processes, and other related areas.

Summary of Recommendations

Recommendation 1: Extend what it means to embrace difference.

Recognize what sort of assumptions may be influencing one's response to people with different identities and life experiences. Reflect on potential biases arising from the inevitable limitations of one's own life experiences and how that bias may be reinforced or challenged by traditional ways of doing business. Make space to recognize the ways that experiences vary across cultures and, with them, understandings of the meaning of behavior. Misunderstanding and injury can often arise when individuals with more power to change systems do not recognize these differences.

Challenge situations of social homogeneity. Notice when most people in the room look like you and take action to change that dynamic. For example, Jonathan Eisen, a microbiome researcher, uses his position as an esteemed scholar to call out the #Manel, or all-male conference panel, and declines to participate unless greater diversity is achieved. His actions point toward the limitations of doing "business as usual." Because of historical patterns of exclusion, new ways of acting and moving are needed to explicitly engage those left out of homogenous expert spaces such as the #Manel. This requires not only inviting women, people of color, or other members of marginalized groups to the table, but also recognizing that they have created their own tables, too. Bicycling promoters must see the value of those spaces.

Act from the lived experience of historically disadvantaged communities. Listen closely, and believe that these experiences are valid. Believe people's stories, even if their perspectives contrast with status quo or draw on data sources unfamiliar to one's field. Allow everyday participants' interests and concerns to shape the agenda and priorities. Develop an ability to be uncomfortable with difference and move through tension with humility and respect. This approach will help to realize bicycling's potential to grow and contribute to greater social equity.

Implementations of this recommendation may include integrating new training and education programs based in the expertise of disadvantaged community members, changing funding mandates to require that decision-making bodies accurately and proportionately reflect the population represented, building networks with grassroots leaders, and expanding leadership training structures to value and strengthen the assets of disadvantaged communities.

Recommendation 2: Recognize that the streets are not equally safe for all

Actively consider race, class, and gender in bicycling promotion and research. While research on how gender and race affect the bicycling experience is limited, clear differences are apparent. Consider how to make these differences central rather than peripheral to bicycling promotion. Research shows that the street experience of under-counted and over-regulated cyclists of color is actually more dangerous than of their less marginalized counterparts. The experience of

underrepresented communities offers lessons about street safety not often considered in bicycling promotion.

Engage in an expanded definition of safety that takes into account race, gender, class, and ability. Often, cycling safety is limited to conversations about how to avoid or mitigate the effects of traffic collisions. While this is of paramount importance to all riders, other issues of safety come to the fore among women, people of color, and low-income communities. Women, trans, and gender-nonconforming individuals face a greater level of street harassment and threats of violence than men (*3–6*). Black individuals and communities of color are disproportionately policed in public space. Theft can be a greater concern for low-income individuals who lack a safe space to store their bicycle (*7*). These gendered, racialized, and classed experiences impact their bicycling. Ability also likely influences one's street safety and bicycling experience, though this remains under-studied.

Explore how social identity changes the street experience in your community. A person's experience while riding is necessarily affected by the surrounding social climate and will change from one community to another. The assemblage model, the theory of intersectionality, and other sociocultural frameworks of power (discussed later in this paper) offer innovative tools for considering the unique dynamics of one's specific community.

Actions to implement this recommendation may include integrating sociocultural frameworks of race, gender, and power into training and education programs; expanding research agendas to examine race, gender, and other aspects of social identity; enlarging data collected and analyzed when considering street safety; reconsidering law enforcement as a hallmark of safety; and funding new types of projects geared at addressing more subtle safety concerns as well as collisions.

Recommendation 3: Engage with marginalized communities and share decision-making power

Effective community engagement will increase the impact and relevance of bicycling promotion efforts, particularly in communities of color. Quality engagement processes involve local residents from the earliest stage possible, via modes accessible to them. They also center community concerns, build on local assets, and compensate individuals for their local knowledge. Fair monetary compensation is particularly important for communities whose voices and expertise have historically been devalued.

Working with local leadership and grassroots groups and compensating them for their work can strengthen the applicability of information collected. Efficacy is highest when community members co-lead processes with city officials at the earliest stages of a project. Beyond treating this kind of engagement as a means to fulfill legal obligations for inclusion in public planning processes, planners should consider the lived experience of community leaders and their local networks to be valuable assets. The data gathered through their involvement is often more accurate and can produce results that better speak to all stakeholders.

The real and perceived relationship between bicycling and gentrification must be addressed. Research reveals that though bike lanes may not directly contribute to displacement of long-term residents, they represent the sort of infrastructural investment that often accompanies rising property values, which then leads to displacement. Bicycling promoters working in areas undergoing gentrification should take this into account and be prepared to invest in additional interventions such as collaborations with affordable housing organizations and supporting local grassroots bicycling projects. For example, neighborhoods where a majority of homes are occupied by renters should be seen as displacement-vulnerable zones where investment in bicycle promotion should take the form of local professional development and programming rather than infrastructure projects.

Implementation of this recommendation may involve training and education on effective community engagement techniques, diverting more funding to local grassroots organizations, providing support for disadvantaged communities to grow their assets, compensating local leadership for their time and knowledge, engaging local community members and grassroots organizations as co-leaders, and growing new relationships of trust that stem from the concerns raised by local communities (such as affordable housing, livable wages, and cultural preservation).

Recommendation 4: Acknowledge local and national histories of injustice

Know local history, particularly as it relates to race. Transportation systems are complicit in perpetuating racial injustice and segregation. They have historically provided access and speed to privileged populations while hurting or neglecting communities of color. Longtime community members and their descendants are often aware of these histories. Learning how to overlap the historical maps of redlining, highway construction, street investments, and development in a local context can enrich the approach bicycling promoters take.

Make history a relevant part of bicycle promotion efforts. Consider how bicycling can serve as a way of remembering or memorializing a community's past. This may include creating memorials, doing historic bike tours, or integrating local history into neighborhood bicycling projects.

Implementation of this recommendation may involve training and education on the histories of transportation inequality and housing/land use segregation, learning local histories of segregation, creating systems of accountability in current planning processes that consider the legacies of these histories, and funding historic and cultural preservation projects.

Background

Audience

Individuals and organizations engaged in activities promoting bicycle use are the primary audience for this document. **"**Bicycle promotion" can be defined broadly as the work of community-based programs and businesses, policy and advocacy activities funded by individuals and industry interests, public legislation created to support the use of bicycles, the planning process through which public resources are spent on bicycle-related projects, and transportation research oriented toward increasing bicycling mode share. Table 1 summarizes the sorts of activities, organizations, and people who have an investment in promoting bicycling.

Table 1. Bicycling Promotion Stakeholders

Bicycling Promotion Activities	Primary Organizations	People
Local bike repair projects	Community bike shops and do-it-yourself bike spaces	Individuals who run, support, and participate
Policy advocacy	Non-profit bicycle advocacy organizations	Individuals who work, volunteer, and provide funding for policy change
Legislation supporting bicycling and funding for bicycling	Federal and state governments	Elected and government officials
Planning processes, including building bicycle-friendly infrastructure	Planning agencies and municipal governance	Municipal staff, active transportation planners, engineers
Research to promote bike mode share	Universities	Researchers
Bike share	For-profit companies, city government	Company employees, city government staff and officials
Social and community rides	Grassroots and community organizations	Bike advocates and community organizers
Programs to promote bicycling (Bike to Work/School, Bike months)	Non-profit bicycle organizations, government agencies	Nonprofit and government staff and volunteers, participants

Origins of Project

The need to shed light on the importance of sociocultural factors on bicycling emerged from conversations among two online professional networks: the Bicicultures list and the Bike Equity Network. Bicicultures is a community of bicycling researchers who study sociocultural aspects of cycling. It was started in 2011 by co-authors Sarah McCullough and Adonia Lugo, and another researcher, Lusi Morhayim. As participants joined the Bicicultures list and shared their research questions, it became clear that many had interest in making the qualitative research methods native to their disciplines into something useful for bicycle promotion.

The Bicicultures network included researchers who were participating in and studying the field of bicycle promotion and were themselves often avid riders. By 2013, the Bicicultures network had joined the growing conversation around "bike equity," or efforts to address historical inequalities tied to race, class, and gender through bicycle promotion efforts. In late 2013, co-author Adonia Lugo started another email list, the Bike Equity Network (BEN), which aimed to forge connections among bicycle promoters who were interested in advancing equity, diversity, and inclusion through their efforts. Many Bicicultures scholars joined BEN, which became a hub for discussion around topics considered outside of the bicycle research and promotion paradigm, such as racial discrimination in enforcement of traffic laws, gentrification, and the lack of compensation for local knowledge within the planning process. There was a desire to build bridges and understand how to bring bike equity into bicycle promotion overall, building on the original Bicicultures research focus. In this way, a confluence developed between qualitative methods and diversity efforts in bicycle promotion. The histories of these conversations necessarily influence this document.

Methodology

This white paper draws from a wide range of scholarly disciplines that address social and cultural dynamics, including many not typically included in transportation studies. These disciplines have developed potent theoretical tools and methodologies that take into account the histories, structural issues, and everyday norms that contribute to ongoing inequality. Some scholars in these fields have applied these insights to bicycling transportation; however, most of this research has not reached the field of transportation studies and bicycle research. Fields reviewed include but are not limited to anthropology, history, cultural studies, sociology, geography, communication, media studies, gender studies, and ethnic studies. This white paper puts these dispersed but rich insights in conversation with research on bicycle transportation conducted in transportation studies to identify key recommendations.

Research reviewed addresses sociocultural aspects of bicycle transportation with a focus on equity, diversity, and inclusion. This includes human behavior, group dynamics, human-infrastructure interaction, attitudes, norms, identity, embodiment, equity, policy, mobility, and safety. Research that directly addressed social categories of difference such as gender, race, and class was also reviewed. Two methods were used to gather sources from significantly different academic or professional conversations. First, scholars in the professional networks of

Bicicultures and BEN gave recommendations which allowed the authors to amass a disparate literature on sociocultural aspects of bicycling. This composition of books, edited volumes, journal articles, and reports reached across a range of disciplines and only occasionally crossed over with transportation studies. Identification of key themes from this literature was influenced by the needs of bicycling transportation professionals and what were perceived to be key gaps in transportation research, policy, and advocacy based on academic conversations among Bicicultures and BEN. Then a review was conducted of scholarly journals on transportation studies, public health, and planning to learn the contours of sociocultural research on bicycling in those disciplinary spaces.[1] This search was supplemented by searches on Google Scholar. Keyword searches both within the journals and Google Scholar helped to amass an initial collection of articles. The goal was to focus on contemporary issues and concerns of bicycle transportation in the United States by filtering out articles that: were not about bicycling; addressed other aspects of bicycling such as leisure or industry; addressed the phenomenon prior to 1945; were not sociocultural in focus; or were conducted in a non-U.S. location. From the body of resulting articles, an initial review for themes was conducted, which then allowed for a more focused analysis on key conversations. This process allowed us to identify connections between the Bicicultures/BEN literature review and the transportation studies literature review. With the nodes of importance determined, the authors broadened the search to engage international and historical literature as it was relevant to key themes and background conversations. One of the most important findings from this process was the identification of key ways in which qualitative and quantitative studies on bicycling can complement one another and contribute to a more complex understanding of bicycling practices. These insights will be covered in another publication. This publication synthesizes findings in sociocultural fields that are often disconnected from transportation studies and bicycle planning but contain valuable insights.

Bicycling as an Assemblage Model

Sociocultural research suggests that it is productive to think about the relationship between human experience, the built environment, and technologies. In the case of bicycling, this translates to considering the relationship between riders, road or pathway infrastructure, and bicycles. Here, this mode of thinking is considered a "bicycling assemblage."[2] The assemblage reminds us that riders, infrastructure, and the bicycle are key, interlocking components of the bicycling experience. Each influences and affects the other, which can create complex feedback

---

[1] Journals reviewed included *Mobilities*, *Journal of Transport Geography*, *Transfers, Environment & Planning A*, *Environmental Justice*, *Transport Policy, Transportation Research Part F: Traffic Psychology and Behavior, Journal of American Planning, American Journal of Public Health, Accident Analysis and Prevention, Injury Prevention,* and *Gender, Place & Culture.*

[2] Building on the assemblage concept developed in social theory, the bicycle assemblage encompasses the relational complexity of lived experience as it emerges at each intersection between material and social worlds. The history of the assemblage concept is beyond this paper's scope, but social theorists Deleuze and Guattari (*8*) are often credited as its originators.

loops and unanticipated outcomes. The assemblage presents a model for how to consider this complexity.

This model, illustrated in Figure 3, allows one to consider how these three apparently separate elements work together to shape assumptions, predictions, and judgments about bicycling. They inform what is often considered the "right" way to bike, who the "typical" cyclist is, and how bicycling promotion is done. The assemblage concept highlights the multifaceted nature of elements producing particular bicycle experiences. It also offers an opportunity to develop recognition of how one's own cycling preferences enter into the process of bicycle promotion. That is, individual bicycle promoters carry assumptions about bicycling that may contradict or conflict with other extant bicycle assemblages. This conceptual framework allows space for reflection on how standards for "bike friendly" or "complete streets" riding conditions may be affected by promoters' own social positions and travel experiences.

Figure 3. Bicycling Assemblage Model
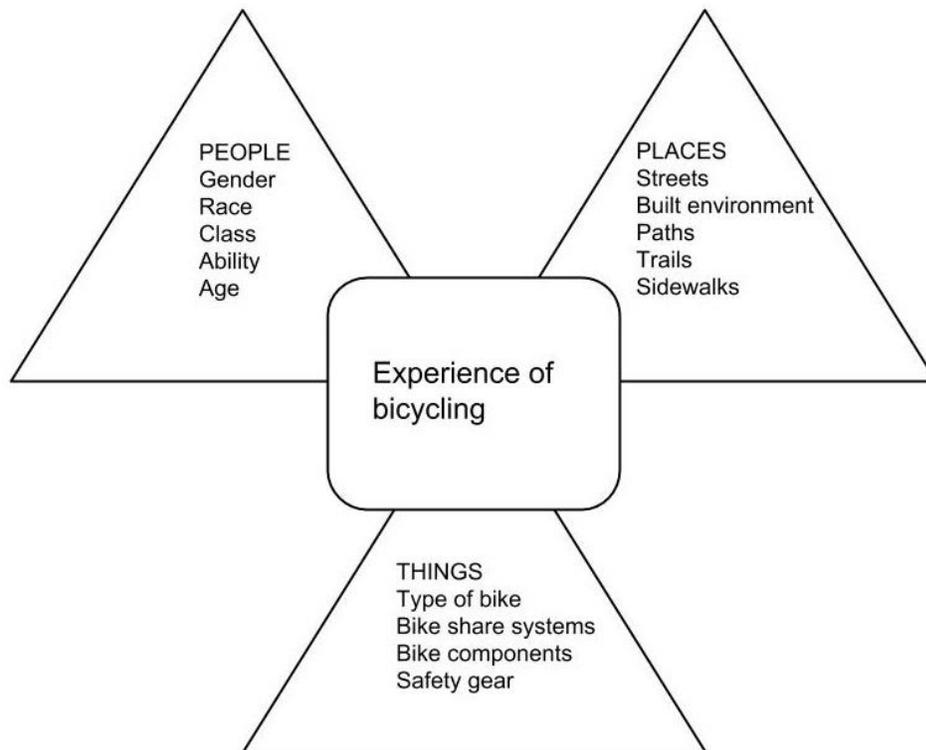
Bicycle users are an inherently diverse group. They may have very different experiences even in the same built environments. Considering the human side of bicycling will help bicycling promoters to design interventions that address concerns raised by Black, indigenous, people of color, low-income communities, and women. Listening to traditionally marginalized voices will help bicycling promoters to understand why conventional approaches to increasing bicycle

usage can have inequitable effects on communities. Those working to promote bicycling can use the assemblage model to consider possible interventions that may not fit into current paradigms. Current paradigms tends to focus on infrastructure changes such as street design and land use. Bicycle availability is also a core focus more recently addressed through bike share programs. While constructive, infrastructural changes and bicycle availability are just two strategies. The bicycle assemblage approach opens other possible intervention points for improving travel experiences and increasing access to bicycling for transportation and recreation. Selecting other change points is crucial if bicycling is to become inclusive and diverse.

Sociocultural researchers have used the assemblage concept to reveal how flexible the city can be and how our streets connect diverse lives and communities. Street design elements such as bike lanes, paths, and signage contribute to experiences of bicycling but do not determine them, considering how much diversity there is in who is riding. The concept of "human infrastructure" extends bike infrastructure to include social elements such as attitudes toward transportation, fellow road users, and unofficial community-based efforts to support bicycling (*9*). Human relationships influence bicycling policy and planning processes, advocacy, riding practices, and the design of efforts to promote bicycling. Sociocultural research has strong tools to analyze the dynamics of these relationships. Just as road infrastructure investments affect bicycling practices, so too do human infrastructures. Therefore, to increase bicycling practice, jurisdictions must also invest in human infrastructures. What does this look like? It means investing in grassroots community organizations, providing resources for community programs and events, and compensating people for their time and expertise. It also means forging linkages with other social networks of those not as well-represented or heard. Transportation choices are made in a politically-charged landscape where race, gender, class, ability, and migration status limit freedom of mobility. Failing to take these realities into account can lead to physical infrastructure that reproduces those race and class barriers to mobility.

Recommendation One: Extend What It Means to Embrace Difference

"Bicycle planners must relinquish the long-held goal of achieving consensus within the cycling community and work as advocates for those whose needs are greatest and for whom traditional governmental processes have failed." – Bruce Epperson (*10*)

"Concerns for the 'diversity' of bike culture, however, is both relatively new and rooted in the spatial contradictions that divide bicycle users like immigrants, low-income residents, people of color and women, from the emerging hegemonic understanding of urban cyclists as white, affluent, socially motivated progressives (de Place 2011)." – John Stehlin (*11*)

"The project of trying to change the dominant culture (as symbolized by the car) lies at the heart of bike activism, which explains in part why it has been difficult for participants in organized bicycling to examine how they produce a dominant culture within bicycling itself." – Aaron Golub, Melody Hoffman, Adonia Lugo, and Gerardo Sandoval (*12*)

To build an inclusive bicycling movement, it is crucial to draw on multiple perspectives when conducting research and advocacy. As discussed below, bicycle promotion emerged during the era of legal segregation and explicit white supremacy. For this reason, it is especially important for individual practitioners to recognize how their own identity shapes their assumptions about what will appeal to existing and potential bicycle users. This requires engaging in reflexive self-examination. In other words, bicycle promoters should engage in practices that allow them to see how others experience the world differently and to understand that those experiences are valid. It also means considering how one's own life experiences contribute to one's assumptions.

Given the diverse population of the U.S., those interested in promoting bicycling should develop relationships with individuals and groups who occupy a different social identity than their own. When the social identities of those in a conversation are relatively homogenous, invest heavily in engaging with communities not represented. For example, if a process is lacking racial or gender diversity, go to community spaces where those missing voices are abundant. Start by listening to their concerns and providing resources for residents to define their own transportation-related problems. Then, provide resources for them to innovate community-designed solutions. These should guide research and policy, and they may differ from conventional bicycle promotion strategies. This will likely require widening the scope of bike concerns and engaging in work that is more challenging and less comfortable. This includes a transparent acknowledgement of bicycle promoters' own access to privilege within institutions historically dominated by white men. The new allies developed in this process will help to build the broad-based support for bicycling that is necessary for enacting a culture change that values sustainable, active transportation.

Those interested in promoting bicycling can use multiple styles of bicycling that speak to a range of audiences through media and publicity materials. Consider ways of portraying bicycling practices as assemblages of rider, bike, and place. This perspective can help us to consider how these three factors work together to create a picture of who cycling is "for." It is important to be aware of how different styles of bicycles may carry different social significance for different groups. Reflection of this sort can help us to better understand the subtle, social barriers erected that prevent some populations, particularly women and people of color, from feeling welcome as cyclists. The concept of "intersectionality" is helpful here. Intersectionality points toward how different categories of social identity such as race, class, gender, ability, sexuality, nationality, and religion overlap. That is, they work together to shape one's experience of the world and affect how one is treated by individuals and institutions (such as police enforcement, courts, businesses, etc.) (*13*, *14*).

Table 2 demonstrates how intersectionality and assemblage affect one's reading of bicycling behavior. These are all hypothetical and invite the reader to consider what sort of associations one might attach to each of these portraits.

Table 2. Portraits of Intersectional Bicycling Assemblages

A middle-aged, Chinese-American woman rides a mountain bike on a developed trail just before a thunderstorm
An elderly white man experiencing homelessness rides a rusted cruiser on the sidewalk of a busy thoroughfare in the hot sun
Four Black teenagers ride single speed racing bicycles on a busy arterial, cutting between cars during rush hour
A Latina transwoman balances a large bag on the handlebars of her road bike as she uses a residential street to ride to work early in the morning

The descriptions in Table 2 above do not accord with most representations of bicycling, nor are these characters the usual imagined audience for new bicycling infrastructure projects. They may engage in bicycling practices that, while technically illegal, feel safer to them. They may fall outside the norms of bicycling transportation, in terms of who is often imagined as riding and who is represented in planning and advocacy. These examples demonstrate that the bicycle is not a neutral, universal object. Rather, the bike carries symbolic meaning that changes over time and space. Symbolic meaning points toward the associations and ideas that become attached to the two-wheeled conveyance.

Research from the fields of history, literary studies, and media studies provides rich evidence of what social meanings have been invested in the bicycle. Historically, the bicycle has been a symbol of socialism, anarchism, feminism, progress, and modernity (*10*, *15*, *16*). Other more recent symbolic meanings include economic failure, social deviance, environmentalism, the creative class, and gentrification. Zack Furness's book (*17*) analyzes the bicycle as a symbol of

failure in movies, often of failed masculinity (110-114). Luis Vivanco (*18*) joins Furness in arguing that the bicycle often becomes a point of deviance from a car-centric culture. Dave Horton (*19*) wrote about the bicycle as iconic of a "green lifestyle." Melody Hoffmann points out that Richard Florida's highly influential work on "the creative class" as an urban revitalization strategy describes riding a bicycle as a "key signifier of urban change" (*20*). And yet for the same reasons, among some communities of color, the bicycle has become a symbol for gentrification and displacement (*11, 20*). Since these meanings can vary from group to group, it is important to consider what social symbolism is invested in bicycling, and how this may speak favorably to some audiences while excluding others.

Another example of the connections between symbol and identity can be found in research on the "cyclist identity." This research has focused less on dynamics of race and class, and more on the creation of a cycling identity in contrast to a car driver identity. For example, Aldred (*21*) explores the circulation of the stereotype of cyclists as poor users of the road. She reveals the different strategies cyclists utilize to combat this stigma. Some cyclists engage in a performance of being a "good cyclist" (following traffic laws, wearing visible clothing and a helmet, carrying lights and locks), while others sought to distance themselves from a sporty cycling identity (Lycra-wearing, long rides). Though she carefully notes the relationship of the cyclist identity to other social identities, she does not fully explore how factors such as race and gender might influence the degree and tenor of such stigmatization.

It matters what type of cyclists are brought to the fore in advocacy, research, and policy. For example, a key component of the cyclist identity is the enthusiastic choice to travel by bicycle. Interventions designed for road users who have abundant travel options may not serve those who cycle out of necessity. These assumptions, left unexamined, can result in the unintentional exclusion of those bicycle users most needing support. Homogeneity among bicycle promoters, in the long term, hurts the expansion of bicycling as transportation. Cupples and Ridley (*22*) argue that cycling advocacy tends toward representing universals that elide cultural and social difference. Golub et. al. (*12*), in their introduction to *Bicycle Justice and Urban Transformation*, make a similar point. In bicycling advocacy, there is a presumed cyclist, which results in "othering" of those who do not adhere to expectations and unstated norms.

Epperson (*10*) argued that bicycle planning only advanced the interests of an elite minority of cyclists. This group promoted a style of cycling known as effective cycling, or vehicular cycling. Popularized by author John Forrester, effective cycling posited that bicycles are vehicles, and operators should act and be treated like car drivers. In the vehicular cycling framework, cyclists maintained road safety by aggressively establishing their right to the road and assiduously following all traffic laws, while maintaining speeds closer to motorized traffic. Infrastructure designed exclusively for bicycles was seen as endangering cyclists' rights to use the full roadway (*23, 24*). Epperson points out how this philosophy presumes a specific cycling identity that is alienating to many riders and most municipal residents. This includes what Epperson calls "involuntary users," such as those who cycle because of their lack of access to a car. He argues that it "ignores the needs of the majority—the young, old, and especially the poor… It has

adopted positions that have left it open to charges of racism, sexism, and classism" (*10*). While Epperson's critique stands out in that it connects the problems of effective cycling to categories of identity such as race, class, and sex (and ability), he was far from alone in his beliefs about the limitations of this philosophy and the need for dedicated bicycling infrastructure.

The debate between vehicular cyclists and advocates for bike infrastructure has a long, vitriolic history (*25*). Today, bicycling advocacy has generally abandoned vehicular cycling as the dominant mode in favor of championing built environment change and has begun to address the limitations of this relatively privileged cyclist identity. This is demonstrated in trends such as "8 to 80," which advocates to make cities and bicycling infrastructure safe for people ages eight to eighty years old. This work demonstrates how bicycling-friendly infrastructure improves perceptions of safety. Programs for women bicyclists also abound. Infrastructure and safety improvements are often favored as interventions from which all bicyclists can benefit (*26*). Thus, it may be mystifying as to why some bicyclists may not support bicycling-friendly infrastructure and policies. Understanding how identity affects one's relationship to bicycling can help to unravel how contention can arise around things that may at first glance appear universally helpful to bicyclists.

Identity and Bicycling

For sociocultural researchers, identity is defined as categories of social difference that affect our everyday interactions and sense of self. To break this down, "categories of social difference" refers to the many classification systems society has determined to matter. These are differences that people track, that affect how people think about themselves, and how others respond. People often make assumptions about others based on these categories, and these categories tend to produce judgment and bias. Key sites of difference in the U.S. context are gender, race, class, ability, sexuality, religion, and nationality. These identities constitute one's subject position; that is, they contribute to how one thinks of oneself. This includes conceptions and practices of group belonging, self-fashioning (dress, grooming, posture), social roles, intimate relationships, and everyday behavior. Subject position becomes something both conscious and unconscious—something that one may be unable to change at will, but that is flexible. This conception of identity suggests that individual identity is always inextricably connected to social forces, thereby limiting individual autonomy. Given a history of relational hierarchy and ongoing structural hierarchies in the United States privileging some identities over others (male over female/gender non-conforming, white over black/indigenous/people of color, able-bodied over disabled, heterosexual over lesbian/gay/bisexual/queer/intersex/asexual (LGBTQIA)), those who occupy a subject position with more privilege tend to also be granted more autonomy over their ability to self-define and pursue diverse life paths with less impediments. Thus, identity is individual and also informed by social relations and power.

Rather than referring to a quality as intrinsic to gender or race, it can be helpful to think of particular qualities as "racialized" or "gendered." This is meant to locate the definition of race

and gender in a social context, rather than in an individual body.[3] That is, race and gender are created through social and historical conditions, not inherent traits of bodies. This allows us to speak of certain acts or norms as racialized or gendered without necessarily equating them with all men or all white people, etc.

Sociocultural researchers, particularly those working within feminist and ethnic studies, point out how attempts to create a universal research subject often instead further entrench the perspective and experience of the most privileged class of people. This results in universalizing the norms of those most privileged (*27*). Those whose worldviews, practices, and experiences differ from this dominant group become marginalized, and their everyday reality becomes a point of contrast or difference from the purported universal. One of the most egregious examples of this dynamic is in medical research, where male bodies and men's concerns have long been the primary site for research. Differing results of therapies or medications on women become framed as a problem or as a deviation from the expectation that arose based on the study of male patients. A term to describe this is "othering." It is worth considering the degree to which parallel issues hold in bicycling advocacy, policy, planning, and research.

Analysis of sociocultural research on bicycling suggests that othering may indeed be present. One current site where such a debate is playing out in bike advocacy is in the promotion of the Swedish traffic safety model known as Vision Zero. Vision Zero aims to decrease traffic deaths to zero, a remarkable and worthy goal. Problems in perspective arise when one examines the details of how advocates aim to accomplish this goal. One of the pillars of Vision Zero is increased police enforcement of traffic violations. For a person whose life experience tells them that the police are fair enforcers of the law, this sounds like a very reasonable way to enhance street safety. For a person whose life experience tells them that police engage in unfair and sometimes deadly racial profiling, this sounds as if it will further endanger their safety on the streets. Research on traffic stops shows strong evidence that law enforcement agents engage in racial profiling (*28–30*), which substantiates fears within communities of color that an increased emphasis on law enforcement will disproportionately affect them. A similarly-named but unrelated program, Campaign Zero, directly addresses the need to limit police interventions in communities of color. While activists in a few cities (Portland, Minneapolis, Chicago) have been successful in bringing this need to light, Vision Zero promoters have yet to remove the law enforcement pillar from most U.S. models. This is an example where racialized perspectives can have a strong effect on policy.

If policymakers and advocates do not take these concerns seriously, they may be subject to the valid question of *whose* safety is prioritized by programs such as Vision Zero. The cyclist who has less fear of discretionary police stops may feel safer, while those who studies have shown may be disproportionately ticketed for minor bicycling violations, such as cyclists of color, will

---

[3] It is important to note that this definition of identity does not equate with essentialism, a philosophy which endows particular types of people (men/women) with intrinsic characteristics. Indeed, women can adopt masculine traits and be subject to social sanction or privilege because of that.

not (*31–34*). Some people are seen as acceptable cyclists, while others are suspect, and conventional approaches to enforcement tend to reinforce who is outside the norm along racialized lines.

Histories of Bicycling as an Agent for Social Change

Sociocultural researchers of bicycling see great potential in the bicycle to be an agent for social change. However, at the same time researchers point out the well-acknowledged potential of cycling to challenge car culture, its potential to bring about a more equitable society is not fully realized (*35, 36*). This is in part because "bicycle research tends to record little deviation from organized bicycling's in-group norms." (*12*). The term "organized bicycling" refers to the dominant structures of advocacy that have historically been dominated by white, middle-class, able-bodied men. This is not coincidental but rather has arisen based on historical patterns of exclusion.

This is most clearly exemplified in explicit practices of segregation in bicycling. The League of American Wheelmen (now known as the League of American Bicyclists) passed a "color bar" in 1894 that banned non-whites from the organization. This should be seen as part of the broader trend toward legal segregation in that era, as illustrated by the 1896 "separate but equal" decision from the Supreme Court in the case of Plessy v. Ferguson.[4] In his history of the bicycle industry, Epperson reports that "working-class white Southerners were so bigoted that they wouldn't even ride in the same roadways as their black counterparts" when mass production made bicycles more affordable (*37*).

As those same mass production techniques continued being developed and brought private automobiles within reach of middle-class families, public interest turned away from bicycling. The "Good Roads" movement started by bicyclists grew into the development of highways with a hefty price tag. While bicycle promoters may have opposed highway projects because they cemented public reliance on automotive transportation, there has been less attention to environmental justice concerns about the placement of highway projects. Highways built to service suburban housing occupied by predominantly white populations were built over or through historically Black and Latino communities in many cities, often cutting those communities in half and decimating the livability of their built environment (*38–41*). At the same time, redlining practices in the housing market kept them there, as they were systemically kept out of new developments through discriminatory practices in lending and real estate (*42*).

By the mid-twentieth century, bicycling had few champions. However, in the 1970s the ecological and political implications of non-petroleum transportation gave bicycling a new appeal. Riding together, wrenching together, and protesting together led to the organic

---

[4] This landmark case enshrined the doctrine that the constitution did not guarantee non-whites access to whites-only spaces. The case was brought before the Supreme Court by Homer Plessy, a mixed race man who was imprisoned for sitting in a whites-only train car in Louisiana. The transportation justice implications of this case are worthy of further study but beyond the scope of this paper.

flourishing of bicycle subcultures around the United States in that decade, and this could have been a turning point in addressing the history of racial segregation in bicycling. There is little research available on this era, but it suggests that interest in socializing around bicycles was present within black and brown as well as white communities. This diversity was not reflected in organized bicycle advocacy, however, which meant the earlier dominance of white perspectives was built anew into the advocacy space that continues today. Until recently, terms such as diversity and equity referred not to race or economic class, but to how road space should be divided among classes of users (drivers, cyclists, pedestrians, etc.).

Bicycle promotion got another boost in the early 1990s, when the autonomous event Critical Mass began self-organizing in San Francisco and spread to cities around the world (*43*). Some participants used Critical Mass to make connections between taking back streets and larger sociopolitical change movements, such as the Los Angeles activists who were arrested during Critical Mass at the 2000 Democratic National Convention in that city (*44*). At the same time, bicycling advocates, many who originally met in rides such as Critical Mass, began mobilizing to influence land use and transportation investment strategies. This required a focus on securing the financial and political commitment to achieve infrastructure projects, which created a new need to protect the respectability of bicycle politics. By the 2000s many advocacy groups were distancing themselves from local Critical Mass movements (*35*, *44*). This represents a split in tactics between mass mobilization and strategic policy change. While policy change does important work to divert funding and resources, grassroots movements ensure that those funds impact those most in need. This divide between high-level policy work and community activism can often be racialized and exhibit class stratification, with those most privileged working in policy. Lacking systems of accountability, a mismatch can occur between expressed political goals of typically environmentally minded, progressive cyclists and the gendered, racialized, and class-based outcomes actually achieved by policy efforts (*36*).

This history grounds contemporary equity work in bicycling and suggests that work must be done to address histories of discrimination that prevented all people from benefiting from the social change potential of bicycling. This means that when making space at the table for historically disadvantaged communities, planners, policymakers and advocates should also plan time and space for the discussion of frustrations, tensions, and hesitations emerging from experiencing histories of exclusion. Patience and self-awareness will be necessary to move through these moments and build decision-making bodies that fully represent those affected by resolutions passed. This process will improve biking for everyone. This will require researcher/practitioner reflexivity, empathy for other perspectives, transparent acknowledgement of structural privilege, and a shared commitment to moving past it. Tangibly, this may include integrating new training and education programs based in the expertise of disadvantaged community members, changing funding mandates to require that decision-making bodies accurately and proportionately reflect the population represented, building networks with grassroots leaders, and expanding leadership training structures to value and strengthen the assets of disadvantaged communities.

Recommendation Two: Operate from an Understanding That the Streets Are Not Equally Safe for All

"Whether because of the lasting impact of environmental determinism, discomfort with asking what are seen as 'sensitive questions,' privileging the expertise of a White, middle-class viewpoint (*18*), a lack of understanding about the potential impact of social identity, or likely, a combination of these, race is often absent from many studies of bicycling planning and safety, which has the effect of erasing it entirely." – Tara Goddard (*45*)

"The pursuit of bicycle justice needs to account for how our public streets are often differently felt, used, experienced, and enacted by people based upon their social positioning, including that of race, class, and perceived foreignness." – Do Lee (*46*)

People of all races, classes, and genders ride their bicycles, and should be a part of the bike movement. To fully include them, the ways race, class, ability, and gender shape people's experiences while bicycling must be understood. The following section outlines insights about race, class and gender from current research that are highly relevant to policymakers and practitioners. And yet, more research is needed on how these identities affect bicycling, particularly from an intersectional perspective. Policymakers, planners, and advocates should actively consider what identities, communities, and social groups face significant barriers to participation and actively support these groups' ability to contribute their knowledge to the planning process. Consider how local context affects one's street experience, particularly in regard to safety; consider how street safety is affected by race, class, ability, and gender, as there is evidence that the streets are not equally safe for all.

Within transportation studies research, gender is the most common site of difference studied. Bicycling research has found that in low-cycling countries, such as the U.S., women cycle less than men (*47, 48*). However, there is little consensus around why this is the case. The difficulty in determining clear causes for the lower rates of cycling among women is often attributed to low cycling rates in general (1% in the U.S.) and further depressed rates of women who cycle. This results in fairly small sample sizes in many studies. Further, the complexities of interpretation and causation are difficult to capture in survey form. Finally, the impulse to find clear differentiations across various geographic locations also risks ignoring local contexts and the ways that one's experience of gender varies with race, class, sexuality, and ability. Little research in the field exemplifies this intersectional approach to examining gender and bicycling.

The reviewed literature produced only a handful of studies on ability or sexuality. Aside from an analysis of representations of disabled cyclists (*49*), ability/disability is not directly addressed. It is sometimes the subject of oblique discussion in analysis of age and the abilities of older cyclists, but this oversimplified approach does not do justice to the centrality of bodily ability to the bicycling experience. Similarly, sexuality is not adequately addressed in bicycling transportation research. Aside from one study that examines travel patterns of residents in gay and lesbian neighborhoods (*50*), sexuality was not addressed in reviewed literature. The

bicycling experience of trans individuals is absent from the literature. These absences bear closer analysis, particularly from an intersectional perspective that considers how sexuality, gender, race, class, and ability intersect to affect one's bicycling experience.

Studies of Women's Bicycling

Returning to studies of women's bicycling behavior, numerous studies seek to examine various factors such as risk aversion (*51*, *52*), attitudes (*53*, *54*, *52*, *55*), trip characteristics (*56*), household responsibilities (*57*, *58*), confidence levels (*59*), life changes (*60*), and lack of representation (*61*). Exploration of causes for these differences mirror gendered roles (women as more risk-averse and cautious, or as a caretaker staying closer to home). One factor widely acknowledged as significant regarding women versus men's riding involves risk aversion and the desire to be separated from traffic. Aldred et. al. (*62*) conducted a systematic review of how cycling infrastructure preferences vary using stated preference surveys. In their review of 54 studies, the authors found that female cyclists prefer to use routes with maximum separation from cars. Based on these findings and the fact that no group preferred integration with traffic, Aldred et al. suggest increasing cycling by implementing universal design matching the preferences of those marginalized. This conclusion was affirmed by an earlier UK study in which Aldred et. al. (*63*) find that increased cycling mode share does not produce an inclusive cycling culture. Thus, they advocate for more deliberate engagement with marginalized groups.

Findings such as these suggest adhering to a universal design approach, which critical disability studies scholar Aimi Hamraie suggests required decentering the historically presumed user (*64*). In cycling, this would mean planning for the needs and preferences of marginalized groups, such as women socialized into different safety concerns and societal roles. This logic extends to other social identities of vulnerability, such as race.

Studies of Race and Bicycling

Race is a relatively new area of inquiry for bicycling transportation studies, and sociocultural research offers tools to jump-start new research agendas. Goddard (*45*) points out the resounding silence on examinations of race in bicycling transportation research and suggests some theories from social psychology that may be helpful in addressing this gap. The recently published *Incomplete Streets* and *Bicycle Justice and Urban Transformation* (in which Goddard's essay is included) bring a direct focus on racial justice into the field. Aside from these texts, there are only a handful of articles addressing the intersection of bicycling and race. Extending the purview to recently completed dissertation and theses expands the pool, thus indicating an expectation of future publications as these junior scholars continue their work.

The significance of racial identity and stereotyping in bicycling includes both how individuals are seen as cyclists and their experiences while cycling. Literature on bicycling and race often builds connections to a complex of broader social issues and concerns that extend beyond the bicycle, assuming intersectional complexity. The collection of essays in *Bicycle Justice* points toward two key challenges of current bicycle advocacy that deserve significant research investment: the

marginalization of certain riders and the disparities perpetuated through bicycling investments (3). Addressing these challenges requires looking at social dynamics beyond individual rider behavior. Indeed, it is the potential of bicycling to address broader systemic inequalities that fuels much of the research on bicycling and race. More critical analysis of how bicycling intersects with historical injustice and ongoing systemic oppression could expand the positive impact of bicycling. Doing this requires methods that can account for the complexity of diversity in the United States. Qualitative methods are well-suited to address this challenge, as they are capable of accounting for "the lived experiences of bicycling which are often mediated by class, gender, and racial inequalities" as well as historical influences (12).

Invisible Cyclists

The term "invisible cyclists" has been popularized to describe low-income cyclists of color and the lack of attention to these communities in policy and research (65–67). The prototypical invisible cyclist is described as a person of color riding a run-down mountain bike on the sidewalks. They occupy geographies different than those attended to by bicycle advocacy, which leads them to be under-counted and generally ignored by cycling advocates and planners (11). Lee et al. (46) point out how the term "invisible" is problematic, as it reinforces the barriers separating these riders from mainstream bike advocacy. After all, they are only invisible from a specific, privileged viewpoint. Literary scholars Mirandé and Williams (68) offer an alternative perspective. They offer a reframing of the low-income cyclist at "rascuache." They describe rasuache as "an underdog aesthetic that presupposes the perspective and world view of the have-nots" that can be found in objects such as cars or bicycles and in social embodiment through dress and bodily comportment (132). Their study of cycling from the perspective of Chicano culture provides an example of how reframing cycling from a different perspective offers new insights and reinforces sites of continuity across social difference. For example, their analysis of the bicycle as an important and intimate extension of the body resonates with other bicycling literature on embodiment (22, 69).

The term "invisible" stands in contrast to these cyclists' heightened visibility for surveillance and regulation. For example, Lee et. al. (70) reveals how food delivery cyclists in New York City are subject to stricter regulations and enforcement than other cyclists. This trend aligns with research on how police engage in racial profiling or allow implicit bias to influence who they pull over, ticket, and arrest, what is commonly referred to as "driving while Black" (71). Research on how these practices extend to bicyclists, or "biking while Black," has yielded disturbing results. A study by SPARQ at Stanford University found that 73% of all bicyclists pulled over by Oakland police were Black. This is a disproportionate representation in a city where 28% of the population is Black. The study also found that Black bicyclists (and drivers) in West Oakland were three times more likely to be handcuffed than white bicyclists (31). The *Tampa Times* noticed a similar trend in Tampa, Florida, where 79% of bike citations are given to Black individuals in a city where they comprise 25% of the population (32). In New Orleans, black cyclists are similarly over-represented in who is ticketed (72). In Chicago, police gave out significantly more bicycling tickets in Black and Latino communities than in majority white communities, despite higher rates of bicycling in some of those locations (33). The Minneapolis

Bicycle Coalition analyzed records of bicycling citations and arrests resulting from bicycle-related citations (*34*) and found that Black individuals were disproportionately represented in incident and arrest reports related to bicycling citations. They also saw a pattern of negative racialized perceptions in arrest reports and the strategy of jailing people who officers thought would not "respond" to a citation—often individuals who also identified or showed signs of being homeless. The study of bicycling citation and arrest rates bears further analysis. This paper suggests approaches that center the experiences of those affected, such as Black communities, in the research, as well as more traditional approaches that analyze law enforcement data. Qualitative research and spatial analysis in Black and Latinx communities will be particularly beneficial in cities where data about race are not collected by law enforcement.

Differential Experiences and Barriers

The different experience of Black riders is reiterated in Brown and Sinclair's (*73*) study of barriers to bicycling for Blacks and Hispanics in New Jersey, as well as potential solutions.[5] Using a combination of intercept surveys and focus groups, they identified the three biggest barriers to cycling: (1) fear of traffic collisions, (2) fear of robbery and assault, and (3) pavement conditions. Other barriers included fear of being stranded with a broken bicycle and fear of being profiled by the police. A study of barriers within low-income communities of color in Portland identified the following top barriers: (1) cost, (2) fear of traffic collisions, and (3) lack of safe bike storage (*7*). These identified barriers both overlap with and differ from other studies of bicycling barriers. In a study of barriers to cycling that surveyed a majority White population, top barriers were (1) fear of traffic collisions, (2) inclement weather, (3) distance, and (4) fear of crime (*74*). It is important to note that the barriers presented in the surveys of each study varied, pointing toward the importance of researcher assumptions and prior knowledge of targeted participants. This brief review suggests that barriers change across different communities, while fear of traffic collisions remains a consistent anxiety. For example, within the Portland-based study, they found that barriers changed in different neighborhoods and across different ethnic groups. This suggests that barriers and solutions should take into account local context and identify target populations rather than taking a broad approach.

Barriers also differ for immigrant communities. Research on immigration and bicycling points toward the importance of locality and the stress of encounters with law enforcement. Mike Smart (*75*) writes about "the immigrant effect"—the phenomenon that new immigrants to the United States are more likely to bike than native-born residents. His work shows that this is only partially explainable by socioeconomic, demographic, and geographic variables. "Additional research may highlight ways in which immigrants are not using bicycles as a result of preference, but instead as a reaction to discriminatory practices or a transportation system inappropriate for their needs." Smart calls for further research, particularly ethnographic work, to address unanswered questions on the immigrant effect. He also recommends that

---

[5] A complicating factor in reviewing research is that the terms "Hispanic" and "Latinx" are used to refer to the similar populations. This paper's authors prefer the more inclusive Latinx, but defer to identifiers used by the researchers.

transportation planning agencies include immigrant communities in their processes. Smart and Klein (*50*) also conducted research on the relatively local travel patterns of gay and lesbian individuals living in gay and lesbian neighborhoods. While not immediately applicable to bicycling, this research resonates and provides a point of comparison to the above authors' suggestion that the presence of ethnic enclaves in urban cities may also influence travel patterns.

Bernstein (*76*) provides valuable insight into how the cycling experience differs for undocumented Latino immigrants. For those she interviewed, cycling was never a positive experience. Living in a country where they could never truly feel safe due to the ever-looming threat of deportation, they did not feel that bicycling was fun, free, and liberating, a sentiment among many frequent bicyclists (*51*). Rather, bicycling was a safer option than driving unlicensed in a state where those without documentation could not get a driver's license. Bernstein offers insightful suggestions on how to engage and involve undocumented Latino cyclists in bicycling and planning. These suggestions include working with immigrant-serving organizations and compensating them, and engaging in more interactive meeting formats that are culturally appropriate and value their expertise, such as James Rojas' Place It workshops.

The existing literature shows that race affects the embodied, felt experience of bicycling. Crucially, studies show both positive and negative effect among bicycle users. In Mirandé and Williams, cycling is a very pleasurable bodily sensation through which to explore spatial difference among Latino riders (*68*). In Bernstein, recent Latino immigrants experience no joy in bicycling because of the oppressive threat of deportation looming over their daily lives (*76*). Also of interest in regards to bodily experience, Versey introduces the importance of sociocultural factors that influence bodily appearance when considering increasing physical activity among African-American women (*77*). Specifically, she points toward the cultural importance of hair as a site of identity construction that must be addressed. This is particularly salient for bicycling, as mandates and social pressures to wear helmets may be particularly limiting for many African-American women.

What much of this research shares is a contextualization of place and community. This research often focuses on the riding experience as it intersects with other aspects of bicycle users' lives. They discuss the history and contemporary context of the city in which their research is conducted. This information is crucial to their analyses and insights. These methodologies acknowledge and account for the fact that cycling never happens in a vacuum. Rather, it is woven into the fabric of daily life. This is particularly important in research on infrastructure and the relationship between bicycling and gentrification, discussed in the next section.

Tangible movements toward implementation of these recommendations may include integrating sociocultural frameworks of race, gender, and power into training and education programs, expanding research agendas to examine race, gender and other aspects of social identity, enlarging data collected and analyzed when considering street safety, reconsidering enforcement as a hallmark of safety, and funding new types of projects geared at addressing more subtle safety concerns as well as collisions.

Recommendation Three: Engage with Marginalized Communities and Share Decision-Making Power

"Whether or not bikes are a catalyst for gentrification, for many people bikes do *symbolize* gentrification in meaningful ways." – Amy Lubitow (*78*)

"Community leadership, engagement, and capacity building are crucial to the success of any project created to improve conditions for a specific population." -Moore-Monroy et. al. (*79*)

The issue of limited engagement with invested communities is best exemplified in research that examines the relationship between bicycling and gentrification. While there are various definitions of gentrification, one that resonates within this body of literature is the process of developing a neighborhood that does not include longtime residents and erases the culture and cultural spaces of those longtime residents (*78, 80, 81*). Race and class are highly salient categories of difference in most gentrification processes. Often, it is new, well-educated, middle- to upper-class White residents who displace longtime working class people of color. Systems of privilege reinforced in the development and planning process favor the voices of these new residents and their interests. These dynamics form the basis upon which Golub et. al. (*12*) argue that bicycling can be a symbol for gentrification, whiteness, and privilege.

Zavestoski and Agyeman's edited collection, *Incomplete Streets* (*82*), argues for streets "not just as physical and material amenities that function to move people and goods, but as significant social and symbolic spaces where users are linked to intersecting economic, transportation, food, cultural, and governance systems, as well as personal, group, and community histories and experiences" (7). They point out how Complete Streets can provide a platform for gentrification by policing the cultural practices of longtime residents that do not align with Complete Streets. These difficulties arise from different assumptions about the purpose of streets and reveal the racialized and classed hierarchies unwittingly built into programs such as Complete Streets. Authors included in *Incomplete Streets* such as Langegger, Mehta, and Vallianatos point out how the implementation of Complete Streets visions can actually stifle the lively ecology, rich histories, and *la vida pública* of the streets. Planners and local governances should closely consider how to allow existing street cultures to flourish as infrastructural changes are made.

Richard Florida's books on the creative class have influenced more recent trends in urban renewal, and, with it, gentrification and displacement. Two key factors in attracting the creative class are tolerance and a lifestyle of "street level culture" described as participatory, lively, and urban (*83*). In practice, this has resulted in predominantly White new residents displacing neighborhoods historically inhabited by majority people of color (*20, 84, 85*). The creative class is an appealing framework for city leaders interested in expanding urban tax bases, and many cities have actively catered to this demographic. Bicycling is part of the experiential "street level culture" that is supposed to attract the creative class (*83*). Hoffmann and Lugo (*86*) argue that the manner through which elected officials embrace bicycling privileges certain populations,

particularly the creative class. This limits the contours of what can be considered a "bicycle-friendly" neighborhood and contributes to the exclusion of people of color and low-income populations by not taking into account their values, voices, and experiences. In a similar vein, Stehlin (35) argues that formerly fringe urban phenomena such as urban gardening and bicycling now define progressive urbanism, while remaining complicit in perpetuating racial inequity. Smiley et. al.(87) note how gentrification processes rely upon the relative malleability of place character by examining the role of bicycling infrastructure in changing the character of Memphis, Tennessee. However, they also note that these changes privilege those with power and who occupy the "creative class," contributing to racialized gentrification.

Research on communities of color perceiving bicycling as a tool for gentrification offers valuable lessons for planners and points toward new potential directions for inquiry. Portland in particular has been a hot spot for this research. Herrington and Dann (81) document a correlation between bicycle ridership and displacement in Portland, though they point toward housing development as the root cause. This trend is substantiated by other research conducted in Portland. Lubitow and Miller (88) utilize a case study there to argue that sustainability projects need to develop a deeper interface with social equity issues. Too often, sustainability is seen as apolitical, but the controversy over the introduction of bike lanes into North Williams, one of the few Black neighborhoods in Portland, demonstrated that such projects have their politics. Their analysis reveals how a seemingly innocuous infrastructure change such as bike lanes becomes tied up with historical neglect, institutional racism, and gentrification. Their essay argues for the importance of generating a stronger interface between urban sustainability and environmental justice, where tools to confront these issues are well-developed. Melody Hoffmann studies the same case, and points out that though bicycle infrastructure is not in itself a form of gentrification, the mode through which projects are implemented can cater to an "upwardly mobile, creative, white demographic" rather than longtime residents (20). She documents how bicycling became another site where Black residents felt that they were being erased from the community. They saw bike lanes as the latest in a long history of local planners de-prioritizing their needs in favor of more privileged populations.

Amy Lubitow describes how a historically Puerto-Rican neighborhood in Chicago viewed bike lanes as a symbol of gentrification and a takeover of street space by outsiders. And yet, a community bike space helped Latino residents to "offset the alienation of development" (78). Such a space gave residents a new way to engage with the politics of the street and bicycling on their own terms, rather than through infrastructure imposed in a top-down fashion. A review of urban and bicycling blogs reveals many more examples of communities of color using the bicycle as a way of building community, and more research is needed to study this overlooked practice. Community engagement and investment is recommended in community bicycle spaces as a method for pursuing such research and for involving overlooked communities in policy and planning processes.

Key findings from literature on community engagement are that local communities have invaluable expertise for bicycle projects. Good engagement processes center community concerns and build on local assets, including community leadership and residents' long-term commitment. However, community engagement is not a standard blueprint that looks the same everywhere. Golub et. al. (*12*) argue that bicycle planning processes must be responsive to the different ways communities use public space and adapt participation processes to fit their needs. Partnership with grassroots organizations, where these organizations are compensated for their skills and services, is key to building an engagement process that is right for a specific community. DeGregory et. al. (*89*) document a successful community-engaged bicycle infrastructure process in Brooklyn that built on community assets and gave a sense of power to residents. Hannig (*80*) argues for community engagement as a key factor in creating an equitable bike share system. Those in power tend to make assumptions about the barriers, challenges, and issues that disadvantaged communities face without actually asking them what they think the problems and potential solutions are. Moore-Monroe et. al. (*79*) echo the importance of centering community concerns in their study of a community cycling center in a Latinx community in Pima County, Arizona. They point to the importance of taking an asset-based approach, moving from community leadership, and engaging in a long-term commitment, even in the face of short-term funding.

Key ways to implement these recommendations include training and education on effective community engagement techniques, diverting more funding to local grassroots organizations, providing support for disadvantaged communities to grow their assets, compensating local leadership for their time and knowledge, engaging local community members and grassroots organizations as co-leaders, and growing new relationships of trust that stem from the concerns raised by local communities (such as affordable housing, livable wages, and cultural preservation).

Recommendation Four: Acknowledge Local and National Histories of Injustice

"To study the present, I had to study the past." – Melody Hoffman (*20*)

"Many more transportation advocacy-focused efforts would do well to consider how including youth voices and those of other communities not often heard in planning spaces can collectively enhance all efforts." – Azzarello et. al. (*90*).

Histories of racial oppression and their legacies are relevant and bear consideration in sustainable transportation research and policy. This is especially true when considering the place of bicycling in a neighborhood undergoing gentrification. History and local context are deeply important to current bicycling practices and planning processes, particularly in communities of color. Past histories shape relationships, community trust in government processes, expectations, attitudes, and motivations. Bicycling research, policy, and planning processes should consider local history as a highly salient factor. Acknowledging and working from a deep understanding of past unjust practices can help us to see how their legacies continue to affect the street space today. This approach can facilitate more meaningful engagement with communities not present or opposed to bicycle promotion efforts. Involve these communities in the conversation at the earliest stages possible, including priority setting, planning, and budgeting. Listen to their issues and potential solutions to problems and prioritize these needs. Crucially, this may mean investing in different solutions than what the conventional bicycle promotion process has championed. New research and advocacy efforts point towards the efficacy of compensating local organizations and leaders for their time and expertise (*76*, *79*, *91*). This can greatly strengthen the quality of information collected and engagement achieved. This approach can lead to more equitable bicycling promotion.

Transportation systems have played a role in racial segregation and the disempowerment of low-income communities and communities of color (*41*). For example, highways built to service suburban housing for predominantly white populations were built over or through historically Black and Latinx communities in many cities, often cutting those communities in half and decimating the livability of their built environment (*38–40*). At the same time, redlining practices in the housing market kept them there, as they were systemically kept out of new developments through discriminatory practices in lending and real estate (*92*). Transportation infrastructure investments tended to accrue to privileged populations, including the extension of rail lines, road improvements, and other new innovations (*93*, *94*). Simultaneously, the neglect of inner city neighborhoods that housed communities of color led these places to be categorized as "blighted" and made them vulnerable to environmental injustices (*95*, *96*). As cities have once again become more attractive to developers and more privileged populations, these communities have become the target of gentrification that now displaces the residents who have long been struggling to bring life and vitality to streets long neglected (*97*). This is a major reason why transportation infrastructure, particularly related to active transportation, is

sometimes seen as a handmaid to gentrification and displacement (*20*, *98*, *99*). The perception is that longtime potholes and broken streetlights are only fixed as the road is remade for new residents who prefer bicycling, once again leaving longtime residents to feel as if their concerns are ignored. Sustainable transportation and the livable communities they facilitate become seen as something only granted to more privileged populations.

This context is crucial to understanding how gentrification, and bicycling promotion, can alienate longtime residents. Hoffmann (*20*) studies how, in the face of displacement and a hyper-gentrified neighborhood (of which bike lanes were but one small part), North Williams, Portland residents sought recognition for their history and longtime presence there. Even if they could not prevent their community from being taken over by outsiders, this predominantly Black community sought acknowledgement. Hoffmann calls their desire for creating historical landmarks of their erased everyday community spaces a form of "haunting," a marker that harm has been done. They also exhorted the city to improve their community engagement process for future infrastructure and development projects.

The desire to memorialize a place's past, including histories that may cause discomfort or appear discontinuous with a neighborhood's new character can be read as an act of resistance by those displaced or overrun. Another strategy for preserving potentially lost history is presented by Nedra Deadwyler (*100*). She has used urban bike tours as a means to educate attendees about Atlanta's civil rights history and engage riders in ongoing civil rights issues. Another way communities of color have used bikes as a way to preserve place character is through designing group rides and spaces rooted in local culture. A particularly rich place for such examples is at the Youth Bike Summit. The Youth Bike Summit is a youth-led convening that explores "the power of the bicycle as a catalyst for positive social change" and centers equity in this work (*90*). Most participants come from "intensely local" community bike shops and organizations that directly address niche needs of their neighborhood. Examples of these projects abound, with youth-oriented bike programs existing in nearly all major cities and many smaller towns across the country. While it may seem counterintuitive to look to the youth when talking about the history of a community, intergenerational alliances between these energetic youth and elder community members hold some of the best promise for forging a future that learns from the past.

Implementation of this recommendation may include training and education on the histories of transportation inequality and housing/land use segregation, learning local histories of segregation, creating systems of accountability in current planning processes that consider the legacies of these histories, and funding historic and cultural preservation projects.

Implementation

This white paper suggests that sociocultural research offers significant insights into how to create more inclusive bicycling promotions. The recommendations outlined in the paper should take bicycle promoters further in their mission to bring the well-documented health, ecological, and social benefits of bicycling to more U.S. residents. The assemblage concept engages with technologies, people, and environments, which is crucial in this moment as "new mobility" companies make claims about serving the public good through the dissemination of their products.

Recommendation 1: Extend what it means to embrace difference

- Integrate new training and educational programs based on the expertise of disadvantaged community members.
- Engage in personal and collective exercises that question assumptions and explore the role of privilege in shaping assumptions.
- Challenge situations of social homogeneity where meaningful racial and gender diversity are not present.
- Change funding mandates to require decision-making bodies that accurately and proportionately reflect the population.
- Understand that the lived experiences of others may be different. Prioritize the knowledge of those from historically marginalized groups.
- Build networks with grassroots leaders and expand leadership training structures to value the assets of disadvantaged communities.

Recommendation 2: Operationalize the understanding that streets are not equally safe for all

- Integrate sociocultural frameworks of race, gender, and power into training and education programs.
- Actively consider race, class, and gender in bicycling promotion and research.
- Engage in an expanded definition of safety that takes into account race, gender, class, and ability. Consider how street safety includes not just collisions, but also harassment, theft, discriminatory policing practices, and gender- or race-based violence. This may require expanding the scope of current data collected and analyzed and providing funding for these efforts.
- Explore how social identity changes the street experience in your community through the lens of the bicycling assemblage, considering the person, bicycle, and street landscape.

Recommendation 3: Engage in a meaningful way with marginalized communities and share decision-making power

- Take part in training and education on effective community engagement techniques.

- Address issues of gentrification and displacement by working with longtime community members on affordable housing, living wages, cultural preservation, and their priority issues.

- Divert more funding to local grassroots organizations and provide support for disadvantaged communities to grow their assets.

- Conduct community engagement that includes local leadership and grassroots groups at the earliest stage possible. Build deep relationships that span beyond the scope of one project. This can increase the impact and relevance of bicycle promotion, particularly in communities of color.

- Share decision-making power with marginalized communities and compensate them for their work.

Recommendation 4: Acknowledge local and national histories of injustice

- Engage in training and education on the histories of transportation inequality and housing/land use segregation.

- Research your region's local history, particularly as it relates to race. Local libraries and local residents contain a wealth of information. Consider how this history will affect the work you are conducting.

- Make history a relevant part of bicycle promotion, planning, and policy efforts. Local residents carry these histories; knowing them will enable better collaboration and dialogue.

- Preserve the culture and presence of longtime community members and provide funding for these efforts.

References

1. Pucher, J., R. Buehler, D. Merom, and A. Bauman. Walking and Cycling in the United States, 2001–2009: Evidence from the National Household Travel Surveys. *American Journal of Public Health*, Vol. 101, No. S1, 2011, pp. S310–S317.

2. League of American Bicyclists, and Sierra Club. *The New Majority: Pedaling Towards Equity*.

3. Bowman, C. G. Street Harassment and the Informal Ghettoization of Women. *Harvard Law Review*, Vol. 106, No. 3, 1993, pp. 517–580. https://doi.org/10.2307/1341656.

4. Davis, D. The Harm That Has No Name: Street Harassment, Embodiment, and African American Women. *UCLA Women's Law Journal*, Vol. 4, 1993, pp. 133–178.

5. Lombardi, E. L., R. A. Wilchins, D. P. Esq, and D. Malouf. Gender Violence. *Journal of Homosexuality*, Vol. 42, No. 1, 2002, pp. 89–101. https://doi.org/10.1300/J082v42n01_05.

6. Gordon, A. R., and I. H. Meyer. Gender Nonconformity as a Target of Prejudice, Discrimination, and Violence Against LGB Individuals. *Journal of LGBT Health Research*, Vol. 3, No. 3, 2007, pp. 55–71. https://doi.org/10.1080/15574090802093562.

7. Community Cycling Center. *Understanding Barriers to Bicycling Project*. Community Cycling Center, Portland, OR, 2012.

8. Deleuze, G., and F. Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia*. University of Minnesota Press, 1987.

9. Lugo, Adonia E. *Bicycle/Race: Transportation, Culture, & Resistance*. Microcosm Publishing, Portland, Oregon, 2018.

10. Epperson, B. Bicycle Planning: Growing up or Growing Old? *Race, Poverty and the Environment*, Vol. 6, No. 1, 1995, pp. 42–44.

11. Stehlin, J. Regulating Inclusion: Spatial Form, Social Process, and the Normalization of Cycling Practice in the USA. *Mobilities*, Vol. 9, No. 1, 2014, pp. 21–41. https://doi.org/10.1080/17450101.2013.784527.

12. Golub, A., M. Hoffmann, A. E. Lugo, and G. Sandoval, Eds. *Bicycle Justice and Urban Transformation: Biking for All?* Routledge, New York, 2016.

13. Crenshaw, K. Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics. *University of Chicago Legal Forum*, Vol. 1989, 1989, pp. 139–168.

14. Carbado, D. W., K. W. Crenshaw, V. M. Mays, and B. Tomlinson. Intersectionality: Mapping the Movements of a Theory. *Du Bois Review: Social Science Research on Race*, Vol. 10, No. 2, 2013, pp. 303–312. https://doi.org/10.1017/S1742058X13000349.

15. Bijker, W. E. *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*. MIT Press, Cambridge, Mass, 1995.

16. Withers, J., and D. P. Shea. *Culture on Two Wheels: The Bicycle in Literature and Film*. 2016.

17. Furness, Z. *One Less Car: Bicycling and the Politics of Automobility*. Temple University Press, Philadelphia, PA, 2010.

18. Vivanco, L. A. *Reconsidering the Bicycle: An Anthropological Perspective on a New (Old) Thing*. Routledge, New York, 2013.

19. Horton, D. Environmentalism and the Bicycle. *Environmental Politics*, Vol. 15, No. 1, 2006, pp. 41–58. https://doi.org/10.1080/09644010500418712.

20. Hoffmann, M. L. *Bike Lanes Are White Lanes: Bicycle Advocacy and Urban Planning*. University of Nebraska Press, Lincoln, 2016.

21. Aldred, R. Incompetent or Too Competent? Negotiating Everyday Cycling Identities in a Motor Dominated Society. *Mobilities*, Vol. 8, No. 2, 2013, pp. 252–271. https://doi.org/10.1080/17450101.2012.696342.

22. Cupples, J., and E. Ridley. Towards a Heterogeneous Environmental Responsibility: Sustainability and Cycling Fundamentalism. *Area*, Vol. 40, No. 2, 2008, pp. 254–264.

23. Forester, J. *Effective Cycling: 6th Edition*. The MIT Press, Cambridge, Mass, 1992.

24. Schultheiss, W., R. L. Sanders, and J. Toole. A Historical Perspective on the AASHTO Guide for the Development of Bicycle Facilities and the Impact of the Vehicular Cycling Movement. *Transportation Research Record*, Vol. 2672, No. 13, 2018, pp. 38–49.

25. Furth, P. Bicycling Infrastructure for Mass Cycling: A Transatlantic Comparison. In *City Cycling*, MIT Press, Cambridge, MA, pp. 105–139.

26. Stewart, G., N. K. Anokye, and S. Pokhrel. What Interventions Increase Commuter Cycling? A Systematic Review. *BMJ open*, Vol. 5, No. 8, 2015, p. e007945.

27. Ahmed, S. *On Being Included: Racism and Diversity in Institutional Life*. Duke University Press, 2012.

28. Conner, M. Traffic Justice: Achieving Effective and Equitable Traffic Enforcement in the Age of Vision Zero Colloquium: Getting There from Here: An Exploration of Regionalism and Transportation in the United States. *Fordham Urban Law Journal*, Vol. 44, 2017, pp. 969–1004.

29. Novak, K. J., and M. B. Chamlin. Racial Threat, Suspicion, and Police Behavior: The Impact of Race and Place in Traffic Enforcement. *Crime & Delinquency*, Vol. 58, No. 2, 2012, pp. 275–300. https://doi.org/10.1177/0011128708322943.

30. Roh, S., and M. Robinson. A Geographic Approach to Racial Profiling: The Microanalysis and Macroanalysis of Racial Disparity in Traffic Stops. *Police Quarterly*, Vol. 12, No. 2, 2009, pp. 137–169. https://doi.org/10.1177/1098611109332422.

31. Hetey, R. C., B. Monin, A. Maitreyi, and J. L. Eberhardt. *Data for Change: A Statistical Analysis of Police Stops, Searches, Handcuffings, and Arrests in Oakland, Calif., 2013-2014*. 2016.

32. Zayas, A., and K. Stanley. How Riding Your Bike Can Land You in Trouble with the Cops — If You're Black. *Tampa Times*, Apr 17, 2015.

33. Wisniewski, M. "Biking While Black": Chicago Minority Areas See the Most Bike Tickets. *chicagotribune.com*, Mar 17, 2017.

34. Hoffmann, M., and A. Kmiecik. *Bicycle Citations and Related Arrests in Minneapolis*. Minneapolis Bicycle Coalition, Minneapolis, 2016.

35. Stehlin, J. G. *Business Cycles: Race, Gentrification, and the Production of Bicycle Space in the San Francisco Bay Area*. University of California, Berkeley, Berkeley, CA, 2015.

36. Stehlin, J. G., and A. R. Tarr. Think Regionally, Act Locally?: Gardening, Cycling, and the Horizon of Urban Spatial Politics. *Urban Geography*, Vol. 38, No. 9, 2017, pp. 1329–1351. https://doi.org/10.1080/02723638.2016.1232464.

37. Epperson, B. D. *Peddling Bicycles to America: The Rise of an Industry*. McFarland, 2014.

38. Avila, E. *The Folklore of the Freeway: Race and Revolt in the Modernist City*. University of Minnesota Press, Minneapolis, MN, 2014.

39. Estrada, G. If You Build It, They Will Move: The Los Angeles Freeway System and the Displacement of Mexican East Los Angeles, 1944-1972. *Southern California Quarterly*, Vol. 87, No. 3, 2005, pp. 287–315. https://doi.org/10.2307/41172272.

40. Rosen, M. D., and J. Fisher. Chicano Park and the Chicano Park Murals: Barrio Logan, City of San Diego, California. *The Public Historian*, Vol. 23, No. 4, 2001, pp. 91–111. https://doi.org/10.1525/tph.2001.23.4.91.

41. Bullard, R., G. Johnson, and A. Torres, Eds. *Highway Robbery: Transportation Racism and New Routes to Equity*. South End Press, Cambridge, Mass, 2004.

42. Hernandez, J. Redlining Revisited: Mortgage Lending Patterns in Sacramento 1930–2004. *International Journal of Urban and Regional Research*, Vol. 33, No. 2, 2009, pp. 291–313. https://doi.org/10.1111/j.1468-2427.2009.00873.x.

43. Carlsson, C., Ed. *Critical Mass: Bicycling's Defiant Celebration*. AK Press, Edinburgh, Scotland; Oakland, CA, 2002.

44. Lugo, A. E. CicLAvia and Human Infrastructure in Los Angeles: Ethnographic Experiments in Equitable Bike Planning. *Journal of Transport Geography*, Vol. 30, 2013, pp. 202–207. https://doi.org/10.1016/j.jtrangeo.2013.04.010.

45. Goddard, T. Theorizing Bicycle Justice Using Social Psychology: Examining the Intersection of Mode and Race with the Conceptual Model of Roadway Interactions. In *Bicycle Justice and Urban Transformation: Biking for All?*, Routledge, New York, pp. 100–113.

46. Lee, D. J. Embodied Bicycle Commuters in a Car World. *Social & Cultural Geography*, Vol. 17, No. 3, 2016, pp. 401–422. https://doi.org/10.1080/14649365.2015.1077265.

47. Nehme, E. K., A. Perez, N. Ranjit, B. C. Amick, and H. W. Kohl. Sociodemographic Factors, Population Density, and Bicycling for Transportation in the United States. *Journal of Physical Activity and Health*, Vol. 13, No. 1, 2016, pp. 36–43.

48. McDonald, N. C. Is There a Gender Gap in School Travel? An Examination of US Children and Adolescents. *Journal of Transport Geography*, Vol. 20, No. 1, 2012, pp. 80–86. https://doi.org/10.1016/j.jtrangeo.2011.07.005.

49. Andrews, N., I. Clement, and R. Aldred. Invisible Cyclists? Disabled People and Cycle Planning – A Case Study of London. *Journal of Transport & Health*, Vol. 8, 2018, pp. 146–156. https://doi.org/10.1016/j.jth.2017.11.145.

50. Smart, M. J., and N. J. Klein. Neighborhoods of Affinity: Social Forces and Travel in Gay and Lesbian Neighborhoods. *Journal of the American Planning Association*, Vol. 79, No. 2, 2013, pp. 110–124. https://doi.org/10.1080/01944363.2013.883227.

51. Aldred, R. A Matter of Utility? Rationalising Cycling, Cycling Rationalities. *Mobilities*, Vol. 10, No. 5, 2015, pp. 686–705. https://doi.org/10.1080/17450101.2014.935149.

52. Garrard, J., G. Rose, and S. K. Lo. Promoting Transportation Cycling for Women: The Role of Bicycle Infrastructure. *Preventive Medicine*, Vol. 46, No. 1, 2008, pp. 55–59. https://doi.org/10.1016/j.ypmed.2007.07.010.

53. Akar, G., N. Fischer, and M. Namgung. Bicycling Choice and Gender Case Study: The Ohio State University. *International Journal of Sustainable Transportation*, Vol. 7, No. 5, 2013, pp. 347–365. https://doi.org/10.1080/15568318.2012.673694.

54. Emond, C. R., W. Tang, and S. L. Handy. Explaining Gender Difference in Bicycling Behavior. *Transportation Research Record*, Vol. 2125, No. 1, 2009, pp. 16–25. https://doi.org/10.3141/2125-03.

55. Garrard, J., S. L. Handy, and J. Dill. Women and Cycling. In *City Cycling*, MIT Press, Cambridge, MA, pp. 211–233.

56. Krizek, K. J., P. J. Johnson, and N. Tilahun. Gender Differences in Bicycling Behavior and Facility Preferences. No. vol 2, Washington, DC, 2005, pp. 31–40.

57. Schneider, R. J., M. C. Diogenes, L. S. Arnold, V. Attaset, J. Griswold, and D. R. Ragland. Association between Roadway Intersection Characteristics and Pedestrian Crash Risk in Alameda County, California. *Transportation Research Record*, Vol. 2198, No. 1, 2010, pp. 41–51. https://doi.org/10.3141/2198-06.

58. Garrard, J., S. L. Handy, and J. Dill. Women and Cycling. In *In City cycling, Pucher, J., Buehler, R., & Gottlieb, R. (Eds.)*, MIT Press, Cambridge, MA, pp. 211–233.

59. Félonneau, M.-L., E. Causse, A. Constant, B. Contrand, A. Messiah, and E. Lagarde. Gender Stereotypes and Superior Conformity of the Self in a Sample of Cyclists. *Accident Analysis & Prevention*, Vol. 50, 2013, pp. 336–340. https://doi.org/10.1016/j.aap.2012.05.006.

60. Scheiner, J. Gendered Key Events in the Life Course: Effects on Changes in Travel Mode Choice over Time. *Journal of Transport Geography*, Vol. 37, 2014, pp. 47–60. https://doi.org/10.1016/j.jtrangeo.2014.04.007.

61. Riggs, W., M. Rugh, K. Chung, and J. Schwartz. Bicycling and Gender: Targeting Guides to Women. *Women in Sport and Physical Activity Journal*, Vol. 24, No. 2, 2016, pp. 120–130. https://doi.org/10.1123/wspaj.2015-0020.

62. Aldred, R., B. Elliott, J. Woodcock, and A. Goodman. Cycling Provision Separated from Motor Traffic: A Systematic Review Exploring Whether Stated Preferences Vary by Gender and Age. *Transport Reviews*, Vol. 37, No. 1, 2017, pp. 29–55. https://doi.org/10.1080/01441647.2016.1200156.

63. Aldred, R., J. Woodcock, and A. Goodman. Does More Cycling Mean More Diversity in Cycling? *Transport Reviews*, Vol. 36, No. 1, 2016, pp. 28–44. https://doi.org/10.1080/01441647.2015.1014451.

64. Hamraie, A. *Building Access: Universal Design and the Politics of Disability*. University of Minnesota Press, 2017.

65. Koeppel, D. Invisible Riders. Bicycling Magazine, , 2005.

66. Fuller, O., and E. Beltran. The Invisible Cyclists of Los Angeles. Planners Network, Jul 14, 2010.

67. Newton, D. The Invisible Cyclists: Immigrants and the Bike Community. Streetsblog Los Angeles, Jan 18, 2011.

68. Mirandé, A., and R. L. Williams. Rascuache Cycling Justice. In *Bicycle Justice and Urban Transformation: Biking for All?*, Routledge, New York, pp. 130–142.

69. Forsyth, A., and K. Krizek. Urban Design: Is There a Distinctive View from the Bicycle? *Journal of Urban Design*, Vol. 16, No. 4, 2011, pp. 531–549. https://doi.org/10.1080/13574809.2011.586239.

70. Lee, D. J., H. Ho, M. Banks, M. Giampieri, X. Chen, and D. Le. Delivering (In)Justice: Food Delivery Cyclists in New York City. In *Bicycle Justice and Urban Transformation: Biking for All?*, Routledge, New York, pp. 114–129.

71. Alexander, M. *The New Jim Crow: Mass Incarceration in the Age of Colorblindness*. The New Press, 2012.

72. Brasted, C. One-Third of New Orleans Cyclists Are Black, but They Face the Most Bike Charges in Traffic Court. *NOLA.com*. https://www.nola.com/opinions/index.ssf/2018/09/black_bike_riders_new_orleans.html. Accessed Oct. 4, 2018.

73. Brown, C. T., and J. Sinclair. *Removing Barriers to Bicycle Use in Black and Hispanic Communities*. Alan M. Voorhees Transportation Research Center, Rutgers, New Brunswick, NJ, 2017, p. 18.

74. Fowler, S. L., D. Berrigan, and K. M. Pollack. Perceived Barriers to Bicycling in an Urban U.S. Environment. *Journal of Transport & Health*, Vol. 6, 2017, pp. 474–480. https://doi.org/10.1016/j.jth.2017.04.003.

75. Smart, M. US Immigrants and Bicycling: Two-Wheeled in Autopia. *Transport Policy*, Vol. 17, No. 3, 2010, pp. 153–159. https://doi.org/10.1016/j.tranpol.2010.01.002.

76. Bernstein, J. No Choice But To Bike: Undocumented and Bike-Dependent in Rust Belt America. In *Bicycle Justice and Urban Transformation: Biking for All?*, Routledge, New York, pp. 143–155.

77. Versey, H. S. Centering Perspectives on Black Women, Hair Politics, and Physical Activity. *American journal of public health*, Vol. 104, No. 5, 2014, pp. 810–815.

78. Lubitow, A. Mediating the "White Lane of Gentrification" in Humboldt Park: Community-Led Economic Development and the Struggle over Public Space. In *Bicycle Justice and Urban Transformation: Biking for All?*, Routledge, New York, pp. 249–259.

79. Moore-Monroy, M., A. M. Wilkinson-Lee, D. Lewandowski, and A. M. Armenta. No Hay Peor Lucha Que La Que No Hace: Re-Negotiating Cycling in a Latino Community. In *Bicycle Justice and Urban Transformation: Biking for All?*, Routledge, New York, pp. 217–230.

80. Hannig, J. Perceptions of Bike Sharing in Underserved Communities Within Milwaukee and the Twin Cities. *Theses and Dissertations*, 2015.

81. Herrington, C., and R. J. Dann. Is Portland's Bicycle Success Story a Celebration of Gentrification? A Theoretical and Statistical Analysis of Bicycle Use and Demographic Change. In *Bicycle Justice and Urban Transformation: Biking for All?*, Routledge, New York, pp. 32–52.

82. Zavestoski, S., and J. Agyeman, Eds. *Incomplete Streets: Processes, Practices, and Possibilities*. Routledge, New York, NY, 2015.

83. Florida, R. L. *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life*. Basic Books, New York, NY, 2002.

84. Leslie, D., and J. P. Catungal. Social Justice and the Creative City: Class, Gender and Racial Inequalities. *Geography Compass*, Vol. 6, No. 3, 2012, pp. 111–122. https://doi.org/10.1111/j.1749-8198.2011.00472.x.

85. Brown-Saracino, J. *The Gentrification Debates: A Reader*. Routledge, 2013.

86. Hoffmann, M., and A. Lugo. Who Is "World Class"? Transportation Justice and Bicycle Policy. *Urbanities*, Vol. 1, 2014, pp. 45–61.

87. Smiley, K. T., W. Rushing, and M. Scott. Behind a Bicycling Boom: Governance, Cultural Change and Place Character in Memphis, Tennessee. *Urban Studies*, Vol. 53, No. 1, 2016, pp. 193–209. https://doi.org/10.1177/0042098014556590.

88. Lubitow, A., and T. R. Miller. Contesting Sustainability: Bikes, Race, and Politics in Portlandia. *Environmental Justice*, Vol. 6, No. 4, 2013, pp. 121–126. https://doi.org/10.1089/env.2013.0018.

89. DeGregory, S. T., N. Chaudhury, P. Kennedy, P. Noyes, and A. Maybank. Community Vision and Interagency Alignment: A Community Planning Process to Promote Active Transportation. *American journal of public health*, Vol. 106, No. 4, 2016, pp. 654–657.

90. Azzarello, P., J. Pirone, A. Mattheis, and A. M. Armenta. Collectively Subverting the Status Quo at the Youth Bike Summit. In *Bicycle Justice and Urban Transformation: Biking for All?*, Routledge, New York, pp. 231–248.

91. Lugo, A., D. Lee, N. Doerner, S. McCullough, S. Sulaiman, and C. Szczepanski. Untokening Mobility: Beyond Pavement, Paint and Place. *The Untokening*. http://www.untokening.org/updates/2018/1/27/untokening-mobility-beyond-pavement-paint-and-place. Accessed Apr. 13, 2018.

92. Hernandez, J. Redlining Revisited: Mortgage Lending Patterns in Sacramento 1930–2004. *International Journal of Urban and Regional Research*, Vol. 33, No. 2, 2009, pp. 291–313. https://doi.org/10.1111/j.1468-2427.2009.00873.x.

93. Grengs, J. Community-Based Planning as a Source of Political Change: The Transit Equity Movement of Los Angeles' Bus Riders Union. *Journal of the American Planning Association*, Vol. 68, No. 2, 2002, pp. 165–178. https://doi.org/10.1080/01944360208976263.

94. Wells, C. W. *Car Country: An Environmental History*. University of Washington Press, 2012.

95. Pulido, L. L. *Environmental Racism and Urban Development. Up against the Sprawl: Public Policy and the Making of Southern California*. University of Minnesota Press, Minneapolis, MN, 2004.

96. Sze, J. *Noxious New York: The Racial Politics of Urban Health and Environmental Justice*. MIT Press, 2006.

97. Hyra, D. S., G. D. Squires, R. N. Renner, and D. S. Kirk. Metropolitan Segregation and the Subprime Lending Crisis. *Housing Policy Debate*, Vol. 23, No. 1, 2013, pp. 177–198. https://doi.org/10.1080/10511482.2012.697912.

98. Flanagan, E., U. Lachapelle, and A. El-Geneidy. Riding Tandem: Does Cycling Infrastructure Investment Mirror Gentrification and Privilege in Portland, OR and Chicago, IL? *Research in Transportation Economics*, Vol. 60, 2016, pp. 14–24. https://doi.org/10.1016/j.retrec.2016.07.027.

99. Stehlin, J. Cycles of Investment: Bicycle Infrastructure, Gentrification, and the Restructuring of the San Francisco Bay Area. *Environment and Planning A*, Vol. 47, No. 1, 2015, pp. 121–137. https://doi.org/10.1068/a130098p.

100. Deadwyler, N. Civil Bikes: Embracing Atlanta's Racialized History Through Bicycle Tours. In *Bicycle Justice and Urban Transformation: Biking for All?*, Routledge, New York, pp. 172–179.

Data Management

Data for this study is bibliographic in nature and can be found in the reference pages.

Reuse and Redistribution

This document is free for redistribution.