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Supplemental infrastructure: How community networks and immigrant identity influence cycling

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Abstract

While factors such as urban form, infrastructure, and attitudes shape cycling behavior, the experience of cycling can vary drastically across socioeconomic and identity groups. For foreign-born residents of the United States, additional factors associated with income and cultural context may influence cycling. In this study, I ask how factors associated with being an immigrant, such as economic status, cultural habits, residential location, and social environments, motivate or deter cycling. Results are based on 23 in-depth interviews with low-income Latino immigrants in the San Francisco Bay Area. Interviews reveal that close-knit social networks buoyed by support from immigrant-serving organizations encourage cycling, providing social infrastructure where other types of infrastructure may be absent. However, neighborhood safety is a significant deterrent that men and women respond to in different ways. Other effects, such as gentrification, immigrant experiences, and cultural narratives, shape individuals' perceptions of belonging as a cyclist in their neighborhood. Findings suggest that planners should collaborate with immigrant-serving community organizations and be more centrally involved in addressing neighborhood conditions and their effects on travel.

Keywords: Bicycling; immigrants; qualitative research; social justice; social environments

Introduction

Many cities and regions have dedicated a growing amount of resources to bicycle planning in efforts to increase cycling, improve safety, and promote health, despite the small share of all trips that are made by bicycle. Bicycle advocates, enthusiasts, and planners themselves have welcomed this renewed commitment to active transportation. But justice-oriented thinkers both call into question the distributional fairness of cycling investments and charge that bicycle planning has inadequately incorporated the wants, needs, and voices in marginalized communities. Latin American immigrants make up just one such social group, but they comprise a significant share of migrants to the United States. Understanding how their multiple identities as newcomers and cyclists and the ways in which their cultural histories and narratives intersect with policy priorities can help set the stage for more equitable bicycle planning practices.

Centering identity when explaining mode choice brings a different perspective to how groups make complex travel decisions. In the case of cycling, identity can refer to status as a member of a social group such as immigrants, but it can also refer to an affinity for cycling itself. Bicycle planning efforts tend to focus on high-quality infrastructure and dense urban form because they correlate with more cycling, and therefore can create new cyclists, but the influence of these variables varies across the population. For example, prior research has found that immigrants to the United States cycle more than their US-born counterparts even after controlling for several built environment and socioeconomic characteristics (Smart 2010). Non-infrastructural influences must play a role. Unfortunately, few studies examine *why* immigrants bicycle. Research on car use among immigrants may be instructive, however; it finds that culturally-specific factors, such as relying on social network ties to borrow cars and get rides, and sending remittances to family, reduces driving or delays car ownership (Blumenberg and Smart 2013; Blumenberg and Smart 2010; Chatman and Klein 2013; Lovejoy and Handy 2011). These same types of social networks also help people living in poverty achieve greater mobility (Blumenberg and Agrawal 2014).

The goal of this paper is to bring attention to how lived experience and identity play roles in cycling for transportation. I ask how factors associated with status as an immigrant, such as economic status, cultural habits, residential location, and social environments, motivate or deter cycling. I base the analysis on 23 in-depth, semi-structured interviews with low-income Latino immigrants in the San Francisco Bay Area. I found evidence that immigrant-serving community organizations played an important role in bolstering close social support for cycling. They act as supplemental infrastructure to moderate negative effects of neighborhood conditions such as poor infrastructure and personal safety. Orga-

nizational resources, both social and material, allowed immigrants to start and continue to cycle. Immigrant identities, and the cultural narratives associated with them, affected whether people saw cycling as valuable. Neighborhood conditions that affected personal safety and reflected demographic change negatively shaped perceptions of cycling. In the rest of this paper, I begin by reviewing research on identity, culture, cycling, and frameworks for understanding travel decisions. I then move to describing the research methods, providing context of the study region, and presenting analysis of interview data. In the final section I synthesize the findings and highlight the study's implications for planning and policy.

Literature review

Cyclists in planning and society

The experience of traveling varies drastically depending on neighborhood conditions, socioeconomic position, and knowledge. These factors differ across the population and are associated with individual identities and backgrounds. Planning in the absence of knowing how these identities interact with transportation needs may lead to inadvertent oversights when developing context-sensitive solutions. For example, marginalized population groups who cycle are under-counted and thus generally under-planned for (Golub et al. 2016), and policies that ostensibly promote safety can discriminate against immigrants based on their occupational classification (Lee et al. 2016). The multiple ways cyclists identify bring complexity to already-complex mode choice decisions.

Bicycle planning generally serves to encourage a particular type of cyclist: one interested in cycling and willing to do it more, but uncomfortable in traffic and concerned about personal safety. Fearless or enthusiastic cyclists need little in the way of additional provisions, while a substantial fraction of the population has no interest, ability, or willingness to use a bicycle for any purpose, according to an oft-cited typology of urban cyclists (Geller 2009). Most people identify as "interested but concerned" (Dill and McNeil 2013), so policy implicitly connects cycling identity with specific tools. These tools include high-quality bicycle infrastructure, including physical separation, and connected networks, which have been shown to increase cycling and support the interested cyclist (Buehler and Dill 2016; Buehler and Pucher 2012; Dill and Carr 2003).

Cycling confidence and its role in influencing mode choice is set within a broader societal context. Scholars have argued that, particularly in countries where motor-vehicle traffic predominates, cycling is stigmatized and reflects dimensions of other class or so-

cial positions. Cycling has been associated with poverty, lack of driving ability, or simple abnormality (Aldred 2013a; Aldred 2013b; Furness 2010). The local context also frames identity to normalize cycling or continue to cast it as an odd activity. In cities where cycling is a regular, everyday activity, cyclists perceive themselves to be participating in a regular, local practice (Heinen and Handy 2012). But where cycling is novel and an emerging practice, it becomes chic and suggests one is willing to be avant-garde in their transportation habits and use (Aldred and Jungnickel 2014). And even in places where cycling is regularized, various communities will frame it in different ways. More recently, as the visibility of cycling and bicycle planning in cities has increased, the public has viewed cyclists variously as special interest groups taking away drivers' rights (Goodman 2010) or as gentrifiers demanding new infrastructure in historically marginalized neighborhoods (Lubitow and Miller 2013), depending on social position.

Intersecting identities and the background for mode choice

Where "cyclist" is its own identity that influences mode choice, individuals must navigate multiple other identities in their mode choice decisions. Each brings its own effects with it, such as ethnicity, country of origin, residential location, and gender. Some have argued that cycling is highly visible due to its rarity, but bicycle users who are ethnic or racial minorities or women are even more conspicuous as they do not fit the stereotypical model of the white male sport cyclist (Steinbach et al. 2011). This visibility is complex; planning processes and official counts render bicycle users who are immigrants or other people of color invisible (Golub et al. 2016). In some historically marginalized communities, this invisibility is reflected in protests that bicycle planning is associated with gentrification and displacement from new, white residents (Lubitow and Miller 2013; Lubitow et al. 2016). In New York City, food delivery workers, who are primarily Latino and Asian immigrants, do a significant share of cycling. They possess substantial accumulated knowledge of bicycle safety needs via their professional journeys in the city, but mainstream bicycle planning renders them into both invisibility—through exclusion from planning processes—and hyper-visibility, through legal requirements to wear reflective clothing while working. They draw attention from "good" cyclists as "bad" cyclists who do not observe traffic rules and regulations (Lee et al. 2016). And where cycling is conspicuous, immigrants who lack authorization to reside in the United States place themselves at risk when cycling by drawing attention to their activity. This could have significant consequences, especially if they are involved in a traffic crash or personal safety incident and do not feel free to call police or seek medical treatment (Bernstein 2016).

Attentiveness to distinct needs of immigrants matters because status as an immigrant will

influence residential location and resource availability. Immigrants' homes and jobs often concentrate in immigrant enclaves, which promote short travel distances and more cycling, walking, and public transit use. For Latino immigrants, this phenomenon has been dubbed "Latino Urbanism" (e.g. Rojas 2010). Sociologists theorize that formation of ethnic enclaves helps strengthen social ties and accumulation of social capital, which immigrants can turn into human capital, financial capital, and resource gain (Coleman 1988; Massey 1999). These relationships help explain persistent concentration of co-ethnic immigrants in a handful of metropolitan areas across the country (Portes and Rumbaut 2014). Strong network ties among immigrants facilitate pooling of resources, extending the practice of getting rides to and from work, shopping, errands, and during emergencies (Blumenberg and Smart 2013; Blumenberg and Smart 2010; Lovejoy and Handy 2011; Messias et al. 2012). Immigrants who live in immigrant neighborhoods are more likely to bicycle because of stronger social ties with neighborhood bicyclists, while non-immigrants in the same neighborhoods, who cycle less, may be dissuaded from bicycling because they view the activity as something "other people" do (Smart 2015).

Gender in low-cycling countries is a strong differentiator of cycling behavior. Women cycle less often than men in the United States, the UK, and other places where cycling represents a small fraction of trips taken (Garrard et al. 2012; Pucher et al. 2011). Women report greater concerns for personal safety and would prefer to cycle where bicycle infrastructure separates motor-vehicle traffic from bicycle lanes or on low-traffic streets (Emond et al. 2009; Garrard et al. 2008). Women also tend to fulfill a greater share of household responsibilities, conducting trips that are harder to make by bicycle (Emond et al. 2009). In sum, mobility is gendered in ways that interact with cultural practices, socioeconomic status, physical design, and psychological attributes (Loukaitou-Sideris 2016).

The intersection of nativity, gender, and safety also has consequences for cycling behavior. In the United States, both immigrant and non-immigrant women bicycle less than men (Smart 2010), which may be principally because of safety concerns (Garrard et al. 2012). But in the high-cycling Netherlands, immigrant women bicycle much less than both immigrant men and the native-born Dutch, suggesting culture and gender differences affect travel behavior (van der Kloof 2015). Bicycle safety concerns are more acute for immigrants to the United States and their descendants. Latinos in the US are involved in a disproportionate number of bicycle crashes because they are more likely to ride during darkness and may be less familiar with traffic laws (Knoblauch et al. 2004). The National Highway Safety Administration has targeted marketing materials to the Hispanic community for bicycle safety, among other campaigns, for this reason (National Highway Traffic Safety Administration 2016). In New York City, researchers found census tracts with higher proportions of both Latin American immigrants and newer immigrants expe-

rienced more bicycle and pedestrian crashes, controlling for built environment characteristics (Chen et al. 2012).

How we understand the decision-making processes around travel dictates where policy priorities will focus. The social ecological model of active travel helps frame how these multiple intersecting identities and experiences affect cycling (Sallis et al. 2006). In short, the model states that behavior is a function of the complex interaction between multiple environments, including the individual, social, and built environments. Cycling, for example, requires positive attitudes toward cycling, a supportive social environment, good infrastructure, and dense urban form (Handy and Xing 2011). Where the model falls short is in explaining exactly how those links are constructed, and which factors might mediate or take precedence over others in explaining cycling in diverse groups. Understanding the multiple identities and social contexts that immigrants navigate and their influences on cycling helps us locate overlooked sites for bicycle planning interventions.

Site context: Immigrants in the San Francisco Bay Area

This study analyzes data from low-income Latino immigrants who lived in the central San Francisco Bay Area, defined as the five largest counties in the combined statistical area. About 33 percent of the region's population is foreign born. Although most Bay Area immigrants hail from Asia, 26 percent are from Latin American countries and about two-thirds of that group is from Mexico—the most common single country of origin (Ruggles et al. 2015). Several contextual factors influence economic opportunities and mobility patterns among Latino immigrants[1]. Income is one. For example, Latino immigrants are more likely to be in poverty compared to other nativity groups in the five Bay Area counties: 17 percent earn poverty-level wages, whereas 11 percent of US-born individuals and 10 percent of immigrants from other origins are below the poverty level. Median household income among Latino immigrant households is $61,571, compared to $101,753 for households headed by US-born individuals and $106,122 for households headed by immigrants from other origins. While San Francisco Bay Area Latino immigrants have lower rates of poverty and higher median incomes compared to the nation at large, almost three-quarters earn less than the regional household median income, compared to almost two-thirds across the United States (Ruggles et al. 2015).

Earnings reflect other barriers to advancement. Nearly 40 percent of Latino immigrants in the region speak English not well or not at all. Their educational attainment is sub-

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[1]I use the terms *Latin American immigrant* and *Latino immigrant* interchangeably to refer to residents who were born in Latin America (Mexico, Central America, or South America).

stantially lower than other groups as well: 47 percent have never completed high school, compared to 29 percent of US-born individuals and 17 percent of immigrants from other origins. Employment type reflects these patterns as well. About a quarter of Latin American immigrants hold service occupations as housekeepers, building cleaners, construction workers, cooks, and landscapers. Note that most of these professions require mobility during working hours to get to disparate job sites, making it difficult to get to work by bicycle. It is not surprising then, that fewer Latino immigrants bicycle to work (1.7%) compared to US-born workers (2.3%), but still more so than immigrants from other origins (1.4%). While much has been made over growth in cycling trips among Latinos and other people of color during the previous decade (League of American Bicyclists 2013), cycling growth among Latino immigrants in the region since 2009 has flattened (FHWA 2018).

Many low-income neighborhoods in the San Francisco Bay Area are subject to strong gentrification and displacement pressures. Every person interviewed for this study lived in a neighborhood that was at risk of or currently experiencing gentrification, displacement, and exclusion (Zuk and Chapple 2015). The pace of gentrification and displacement has been accelerating, including in several of the neighborhoods where study participants lived and during the interim between interview phases. These pressures place long-term residents and established communities at risk for disruption. And because these pressures are strongest in central city neighborhoods with closer destinations and more robust bicycle infrastructure, they take on a dual nature: (1) giving the appearance that cycling and gentrification go hand-in-hand, and (2) increasing likelihood of pushing out a higher proportion of bicycle commuters compared to other groups, as their earnings are significantly less than those who commute to work by other modes of transportation.

Methods

Interviews

I conducted the 23 interviews used for this study in two phases with research assistance from native Spanish speakers. Eligible participants were low-income Latino immigrants to the United States, age 18 or older. "Low-income" was not explicitly measured or defined, though all interviewees were students, itinerant laborers, affiliated with need-based social service agencies, or they otherwise indicated their low-income status through the interviews (for example, by describing their occupational status or explaining the high cost of a transit fare). The first set of 15 interviews took place in spring and summer 2014, while the remainder took place in winter and spring 2016. The first set of interviewees in-

cluded individuals regardless of usual mode of travel to support a related research study, while the second set included only those who had ridden a bicycle within the past year. Recruiting efforts for the related project prioritized people who had cycled at any point in their lives and used public transit, so most participants had experience bicycling in the US, though not all did. We recruited most interviewees with the help of immigrant-serving community-based organizations, and others via follow up from an intercept survey for the related study (Barajas et al. 2016). Note that we conducted 26 interviews in total, but three interviewees did not meet the eligibility criteria for the study. The number of interviews is within the range of other qualitative research on travel, cycling, and equity (e.g. Schneider 2013; Wilton et al. 2011).

Interviews were semi-structured with open-ended questions about the neighborhood environment, experiences with various modes of travel, and recommendations for planning improvements (see Appendix A for topic guides). I designed the interview topic guides to encourage participants to detail about their experiences using transportation. Participants were asked to describe their perceptions of their neighborhoods, why they cycled, and community needs. They were also prompted to compare their travel experiences to those with higher socioeconomic status, such as their bosses, teachers, or wealthier people they knew. I developed iterations of the interview protocol based on responses. For example, several initial interviewees talked at length about emotional and cultural aspects of cycling, so I included new questions about how cycling made people feel and whether interviewees thought many Latino immigrants cycled.

The second set of interviews also provided an opportunity to reach theoretical saturation in the data analysis, or the point at which interviews no longer added new information to the categories selected (Corbin and Strauss 2014). The semi-structured nature of the interviews and purposefully designed open-ended questions allowed participants to bring up topics important to them; the interviewers followed participants' leads if they fit within the conversation. Although interviewees knew they were taking part in a study about transportation use, interviews led with a general discussion about neighborhood perceptions to minimize inadvertent signaling that interviewers expected certain responses.

Interviews lasted between 45 minutes and an hour. They were in Spanish or English at the request of the interviewee. We conducted all but three interviews in pairs, with a native-Spanish speaking research assistant leading the interview under my direction, while I led the English-speaking interviews. All participants had immigrated from Mexico, El Salvador, Guatemala, or Cuba. They had lived in the US from two weeks to over 20 years. Interviewees resided primarily in Oakland, San Jose, San Francisco, or Hayward. In the text that follows, all participants are identified by pseudonym that either I assigned

or they selected. Descriptive characteristics of the interviewees are shown in Table 1.

Table 1: Summary characteristics of interview participants

	N = 23
Country of origin	
Mexico	14 (61%)
Guatemala	6 (26%)
El Salvador	1 (4%)
Nicaragua	1 (4%)
Cuba	1 (4%)
Female	11 (48%)
Average age (approximate)	39
Average length of time in US (yrs)	15
Residential location	
Oakland	8 (35%)
San Francisco	7 (30%)
Hayward	3 (13%)
San Jose	3 (13%)
San Leandro	1 (4%)
Concord	1 (4%)

Data analysis

I relied on grounded theory methods in part to construct the analysis. Grounded theory methodology distinguishes itself from other qualitative methods in two primary ways. First, data categories are generated during analysis rather than in advance, in a process known as open coding. Second, analysis and data collection are done hand-in-hand, so that the researcher can follow new themes as they arise during interviews (Corbin and Strauss 2014). In contrast to a quantitative modeling approach to studying travel behavior, which seeks to explain how outcomes are caused by particular factors, a qualitative approach seeks to explain why particular factors influence behavior. Thus, the generalizability of a qualitative study lies in providing analysis of phenomenon to inform theory and later testing through other methods.

The initial interviews were transcribed, which I then coded line-by-line in the original interview language without a prior codebook. Most initial codes were descriptive: "Bicycling: healthy," "Bicycling: environmental," "Infrastructure improvements would promote

cycling." Some were in-vivo, or directly quoted, codes ("Bicycling is freedom") and a few were analytical ("Conflicted feelings"). I searched for these same ideas in the transcribed text of later interviews and added new codes as they appeared. Once I developed the initial codes, I grouped similar codes into broader categories in an intermediate coding process. I used the intermediate codes and field notes to focus questioning in later interviews that filled in gaps in the emerging explanations and achieve theoretical saturation. The intermediate codes also formed the foundation for synthesis and further analysis, where I looked within and across categories to generate insights about the relationship between factors related to immigrant status and cycling.

Findings

Learning from community: Neighborhood organizations as cycling infrastructure

All respondents for this study described how their relationships and social circles influenced their understanding of and relationships to cycling. Several described how individual involvement with formalized cycling organizations enhanced positive perceptions or mediated negative perceptions of cycling. Those who volunteered at or received services from an immigrant-cycling organization described strong social ties and community involvement as the critical entry point into cycling on a regular basis. This often took the form of organized efforts through the cycling organization, such as group rides and events. Edgar, a young adult living in San Francisco, talked about his experience with these rides:

> That's what's cool about [this cycling organization] is it makes it so people who aren't that confronted by us get to kind of learn about being in a community—literally being a team of people until we get more comfortable and kind of see how the rules of the road are and kind of how things work.

Social rides were seen as low-pressure, low-stakes ways to learn cycling, enabling novice cyclists to build confidence in their riding skills. They helped connect individual personal networks with a broader network of cyclists, providing ways to build social resources within an immigrant-focused cycling community. Most rides were open to people of all ages and skill sets, allowing parents to ride with their children and young adults to take leadership roles in organizing events. Several interviewees talked specifically about how the events affected their children. Donaji, a mother of two who lived in San Francisco's

Mission District, spoke about how the events affected her children:

> My son first got a bike and later, a good thing that happened is that here in [this cycling organization] they began to organize these rides with different people from the community where we could go out to places together, and this helped my son a lot to gain confidence.

In other words, these community organizations and the recreational events they arrange act as supplements to physical infrastructure. In places that lack quiet streets or ample park and backyard space where people of all ages would otherwise be free from danger to develop their skills on a bicycle, organized events create a social environment by which parents feel comfortable that they and their children will be safe. Recreational events thus become entry points into cycling for other purposes as well.

Several community organizations operated programs where low-income individuals could earn a bicycle by committing volunteer hours to various activities, such as bicycle repair cooperatives, or "bike kitchens," where people learn how to build or fix their own bicycles. These programs allowed participants to leverage social resources in exchange for mobility and access when they would otherwise be unable to afford a bicycle, thus supporting utilitarian cycling. Eduardo, a San Francisco resident in his 50s who lived in a single-room occupancy hotel, described how this worked for him:

> Oscar from [this organization] gave me this bicycle as a gift, but I fixed it up…. He said to me, that because he saw that someone stole mine from me, he said, "Fix it," and he gave me some money to fix it. "Have it, fix it because the tires are broken." So I took it, I fixed it, and here I have it. I've already had it for three years.

Without this intervention, walking would have been Eduardo's only alternative to get around. Some respondents who were not regular cyclists or involved in these types of community organizations also were aware of how the programming would bolster their ability to cycle if they chose to take it up. The material and social infrastructure that the organizations supply through programming targeted to Latino communities is key to fostering cycling behavior and identity to these groups.

Friends and family ties

While community organizations acted as important supplements for infrastructure and personal resources, close-knit social networks played the primary role in knowledge about and encouragement of cycling for those not closely involved in community

activities. In some instances, friends encouraged respondents to join organized cycling events. For example, a young woman named Alejandra joined a community program to learn to cycle so she could participate in more activities with friends. When asked what motivated her to cycle, she responded:

> Oh, I say by seeing people. Some of my coworkers and friends go out on bikes and post pictures, like "I was here" and "I went to this place" and I don't know what. And I say, "Oh, I'd like to go out like that" and not take so much time because walking is beautiful but it does take more time to go somewhere.

Social pressure, via social media posts from her peers who painted cycling positively, acted as a catalyst for Alejandra to find opportunities to become a cyclist. Where formal organizations provide the entry point to a cycling community, social networks extend the invitation to that community for people who might not seek it on their own.

Family networks also provide important social motivation. Donaji, who earlier described how the neighborhood organization allowed her son to cycle confidently, began cycling with her family after her son challenged her to exercise more. She discovered that city-supported neighborhood events allowed her to spend more time cycling with her two sons. She said:

> Sometimes when [my family] goes out to ride, we have gone together and after that, sometimes I would take my kids over there to Sunday Streets— which is when they close the streets—because then my other son, who has Down syndrome, doesn't have to be watching out for cars and such, because my other son also had a bike with training wheels and could ride his bike.

She described the multiple layers of social connectedness important in motivating cycling: personal, community, and civic. Others who cycled regularly tended to have friends or family who did likewise, and described recreational activities they participated in together, such as cycling in a park, around a lake, or traveling somewhere to play sports. Several interviewees who did not cycle regularly still went out from time to time with family members for recreation, demonstrating how these networks promote even occasional cycling. While family and friends who identify as cyclists can provide the impetus to cycle, neighborhood organizations can provide the social infrastructure and civic or governmental organizations provide the physical infrastructure to sustain cycling.

Yet not everyone's social networks were encouraging or positive, suggesting that friends and family can deter cycling as well. In large part, discouraging stories about or

pessimistic attitudes toward cycling often coincided with neighborhood factors such as safety (see more below). And those who did not cycle, interviewed in the first phase of the project, tended to report knowing fewer people who cycled or were told frightening stories about others' cycling experiences. Manuel, a young Guatemalan immigrant living in Hayward who had given up cycling for driving, described his friends' experiences in this way:

> Yes, most of my friends have bicycles and the others have cars. They say it's difficult, that it makes them late and they come back late and there are bad people on the street—they rob them, they hit them.

Manuel had not encountered any problems himself, yet he was no longer interested in cycling either for work or recreationally. Some of the information his friends provided reflects the utility calculation of cycling as a slow mode of travel, but the rest of it illustrates how social environments influence the full calculus of mode choice decisions beyond an individual or joint household process.

Several other respondents had friends or family who discouraged them from cycling for safety reasons. Linda, a San Jose resident in her 30s, wanted to bicycle so she could save money on transportation. But her brother discouraged her from even purchasing a bicycle, influencing her perception of how safe riding in traffic would be:

> And actually, before I had this bus pass, I asked my brothers, "Ah, but at least we can buy a bicycle," but my brothers—I have a brother who lives in San Francisco and he told me, "No, because it's dangerous to ride a bike, especially with your kid." So no. Still, even right now there isn't much of a culture of respecting bicycles from those who drive and it is very dangerous—they could run me and my son over with everything.

Linda had initially perceived cycling as a viable activity for both utility and recreational travel, privileging cost savings highly in this choice. But as was the case with Manuel, new information from close social networks changed how she valued trade-offs in her decision. Mention of broader supportive communities was absent from these more negative conversations of cycling. Even when behavioral frameworks, like the social ecological model, portray mode choice as a function of both individual and social factors, the evidence here suggests that interactions between social spheres substantially shape perceptions, and ultimately travel decisions.

Foreign and domestic narratives in the immigrant experience

Habits and representations of cycling from home countries cross borders with individuals, acting as barriers to cycling even while immigrants acknowledge that cycling could be a useful form of transportation. The immigrant experience as it relates to cultural identities, the dominant narrative of successful immigrant assimilation, and continued marginalization affected how respondents approached cycling in their daily lives.

Some respondents spoke directly about the role cultural identity as Latino immigrants played in the cycling experience. Many perceived that Latinos cycled far less frequently than whites. For example, Kevin, a young Salvadoran immigrant, estimated that 90 percent of the people he saw on bicycles did not match his cultural background. He attributed the absence of Latino bicyclists both to a lack of investment in bicycle infrastructure in Latin American countries and to habit:

> I come from El Salvador but from Mexico to the rest of Latin America, people have never been incentivized to use a bicycle for transportation, only for recreation….People use it less than here, because in our countries bike lanes and safety measures for bicyclists don't exist. Neither does accessibility or having a bicycle…. Someone grows up with that and when he comes to a country like this, a first-world country like the United States, he is used to using the bus and doesn't look for other modes of transportation.

Others corroborated this perception, suggesting that bicycling in their home countries was seen as only a children's activity, used "more than anything for fun and by young people—children, basically," as Vico explained.

Women faced additional distinctive barriers to cycling. Some interviewees spoke specifically of how traditional women's roles prevented Latina women from cycling. For the women who discussed it, safety issues were the primary reasons for not cycling more (and see further below). Others also described being primary caregivers for their children, which did not afford them the time or ability to cycle. But María, a woman in her 60s who lived in a suburban area, also attributed it to outmoded cultural values:

> When I have tried to teach women [to bicycle]—adults—they say, "I'm afraid, I'm afraid. I have never done it before." And sometimes, it's that—among Latinos, among Latinos it is said a lot, "Don't ride a bike, don't ride a horse, because then you won't be a virgin and no one is going to want you." That is, they are ancestral taboos from I don't know how many hundreds of years ago. "Women shouldn't use a bicycle, women shouldn't ride a

> horse, women shouldn't do this thing." Without realizing in reality that we are in the 21st century, we are in the United States, we have another way of seeing life. For many women, we cling to our roots and we don't use bicycles out of fear.

María's description of women's reticence to cycle recalls findings from studies of the broader population of women in the United States and other similar countries (Garrard et al. 2012); that is, personal safety and household responsibilities are substantial deterrents. But habits, experiences, and cultural narratives represent additional barriers that immigrant Latina women must overcome to be welcome as cyclists.

The narrative of success in the United States among immigrant communities is often associated with car ownership and contributes an additional cultural barrier to cycling. Statistics corroborate this story: the proportion of foreign-born residents who drive and own cars increases the longer they remain in the country (Blumenberg 2009). Scholars have argued that the idea that one needs a car to fully participate in society has been entrenched in broader American culture since the mass marketing of the automobile and the development of urban transportation systems to support driving (Furness 2010; Urry 2004). Indeed, people who work in occupations dominated by immigrant labor would be challenged to carry out their duties if they could not rely on the convenience provided by automobiles. Gabriel, a car mechanic, described his coworkers as not wanting to cycle because it would tire them more after a long day of manual labor. Donaji, a caregiver, could get to work on a bicycle, but it would be impossible for some of her friends:

> For example, I work [about four miles from home] but I'm just a caregiver. I'm the only one who has to go. But I have friends who clean houses and sometimes they have to bring vacuum cleaners and things like that. How do you do that on a bicycle? Or the men who have to carry tools? Or if you have two young kids? So, bicycling is a good alternative but it's not for everybody.

And Vico, a San Francisco resident who drove only for work, talked about how this narrative specifically discouraged cycling among Latino immigrants:

> I feel that it can be economic and also cultural aspects, right? Because the idea of what it means to be prosperous and all that has taken over the media. It is having a vehicle, having, like, the ability to buy expensive vehicles and, then, that's what people look for, right? And then the bicycle is seen as something, like a hobby or simply for fun.

The perception of achieving success by owning a vehicle is a powerful anchoring refer-

ence point. Some regular cyclists we interviewed framed their embrace of cycling as op- position to this narrative, pushing back against this notion of Americanism. For exam- ple, María told us that she did not come to the United States "just to own a car." Even those who had given up cycling were conflicted about their decision, complicating a suc- cess narrative even further. They described a love for cycling, or recalled childhood joy and other positive emotions. Almost universally, participants talked about bicycling in positive, emotional language. In the words of María, bicycling enabled "freedom" and "independence"; freedom from relying on others to give them rides, or waiting on a bus schedule, or having to circle the block for a parking spot. Many interviewees concurred. When asked why he felt more comfortable riding a bicycle than using other modes of transportation, David, 20s, put it this way:

> I think that you go by yourself and you can stop wherever you want. And
> sometimes I think it's not so complicated—you go and don't have to go at
> a certain speed. You can go at the speed you want, and because of this, it
> feels good.

Cycling enabled a sense of ownership over personal welfare that counteracted any singu- lar notion of successful immigrant incorporation.

In other ways, cycling was the mechanism by which some respondents could achieve eventual success. Those who were day laborers worked only sporadically and identified cycling as necessary way to save money on household expenditures. One such respon- dent found bicycling necessary because he did not work a regular schedule and could not afford to use an alternative, saying "I don't have stable work and I don't have money to pay for the bus all the time…. I use my bike the most" (Francisco). Others spoke of the sacrifices they would have to make for their families if they relied on public transit more of- ten. One participant spoke about how saving money on transit fares allowed him to send money back home for his children's food and university tuition, while another spoke of the "milk and eggs" she could buy with the five dollars she saved on transit fares. Most people readily calculated the savings of a bicycle relative to public transit, suggesting precise accounting of household budgets for transportation expenditures. Nevertheless, those who had the means to drive no longer cycled because they found driving easier— apart from the constraints of traffic and scarce parking that come from living in an urban area.

Discrimination, even within the cycling community, formed part of the cycling experience for some Latino immigrants. In some instances, marginalizing practices led community members to find ways to create spaces where they could empower themselves to be part of a larger cycling community. Edgar talked about his negative experience in bringing

young people to a bike kitchen:

> We brought like a bunch of youth, a bunch of brown youth to the bicycle kitchen—bikers are predominantly like white, kind of hipsters and techies. We brought them and they were kind of like, "Oh, you guys can't all be here right now." We're like, "Oh, that's weird. Like, why can't we be here?" Then, they're like, "Oh, it's because there's not enough helpers." I was like, "Oh, but it's okay. Like, me and my friend Poncho—" and they knew Poncho because he's like one of the guys who was always there as one of the helpers. Right? We're like, "We've got it." They're like, "Yeah, but the girls can't be alone." We're like, "Huh, but there's like white girls right there being alone and they're like teens, too. Like, what's the difference." It's just like that, too, which is why these spaces are happening because it's like, "Okay. We need a place for people of color to have access to free bikes and have access to repairs and also being affordable and just accessible."

Even spaces meant to welcome, to create a community, and to provide opportunities for empowering cyclists through material resources and training turned away some people based on ideals of who fits as a cyclist. This observation ties back to Kevin's point that cycling was not an activity that belonged to him; it was something that mostly other people of privilege did. Marking cycling in this way may make it difficult for Latino immigrants to sustain cycling practices. In other words, the pull of the successful, car-owning immigrant narrative grows stronger when a cycling-supportive community does not surround an individual. To be sure, car ownership is a pervasive notion of achievement for US-born residents too and in many cases is necessary for economic advancement. But often, cities normalize cycling by planning infrastructure and providing programming that demonstrate there are alternatives to car ownership. These efforts do not always reflect the additional needs of cyclists outside the mainstream and may neglect the diversity in their lived.

Safe for him, not for her: Fear, identity, and neighborhood effects on cycling perceptions

Beyond identity as Latino immigrants and connections to cycling organizations, what linked many interviewees together was residential location. We spoke with people from a handful of neighborhoods who usually chose them for social ties and inexpensive housing. Consistently across all interviews, respondents recognized unsafe conditions for cycling in their neighborhoods, such as lack of bike lanes in certain neighborhoods or along

particular streets and potential interactions with cars. And safety was the paramount barrier to cycling that interviewees thought needed to be addressed first before there would be a significant increase in the number of people cycling:

> I would recommend cycling to people, but always and only if it's safe, if it's safer than it is now. Because if everyone were to go out on bikes tomorrow, with the insecurity the way it is now, that would also be a disaster. After making the streets better and all that, I think it would encourage people to ride bikes more often. (Francisco, 50s)

These neighborhood effects are enough to overcome the positive influences that neighborhood organizations and close social networks provide. Lupe, a woman in her 50s who did not cycle but was interested in it, described how an acquaintance invited her to a bike kitchen to build her own bicycle. The invitation did not ultimately translate into her taking up cycling, however, because factors such as fear and personal preference were stronger deterrents.

Reactions to the quality of cycling conditions varied largely along gender lines, even when describing the same neighborhood. Men tended to describe cycling conditions as either good or low-risk, while women and the youngest interviewees tended to associate cycling with fear, regardless of how often they cycled. For example, Gabriel, a regular cyclist in his mid-40s who worked in Oakland, described his experience traveling on International Boulevard, a heavily-trafficked thoroughfare through the eastern section of the city:

> **Interviewer**: Do you feel safe riding your bike along International?

> **Gabriel**: It's good. In the past it used to be a bit more dangerous, many years ago. Right now, it's not so dangerous. Well, because of the traffic, here there is a lot of traffic. Possibly, maybe on this side of the street they wouldn't use it because it's risky. But I feel it's not risky.

Meanwhile, Gabriela, a woman who used to cycle regularly described how she felt about the same street and neighborhood much differently:

> I don't know what's going on these days but many people who are driving are distracted or I don't know because several times cars have passed me so close. Thank god nothing has happened to me, but it's happened that cars pass very close to a person and this frightens me as well.

Multiple fear-inducing incidents such as these caused her to stop using a bicycle. Both individuals lived in the same neighborhood and likely experienced similar physical con-

ditions but reacted quite differently. At the time of the interviews, bicycle infrastructure in East Oakland mirrored other neighborhood conditions, which is to say that quality and availability was poor. Intersecting identities and socioeconomic characteristics, namely immigrant status, gender, and income, and the way they layer on the built environment, provide necessary background information in understanding mode choice decisions.

Language ability was frequently identified as an additional barrier, particularly when considering whether Spanish speakers were documented immigrants. Although some interviewees described using a bicycle or other modes of transportation as a means to learn their way around their neighborhood when they first arrived, others found it difficult to navigate without the aid of Spanish-language signs. Donaji described the how the intersection of documentation status and language ability could discourage immigrants from cycling if they did not understand the laws, rules, and norms:

> Another thing is that there should be access, signs and all that, if they were very clear for bicyclists, so that people could understand them very well, people wouldn't be afraid. It is terrible that if you also have an immigration status that isn't up to date, then you can't go around how you like because whatever small error you commit will become a bigger complication for you and your family.

Several interviewees spoke of these issues of lack of signs and infrastructure in broader terms of social injustice against Latinos and other marginalized communities. This was particularly true for respondents who lived in San Francisco, who were reminded of the pressures of gentrification and displacement in their daily lives. Many spoke of the contrast in investment in bicycle infrastructure between neighborhoods like the Financial District and the Mission District with newer higher-income residents and workers, and the Bayview, a neighborhood that has one of the lowest median household incomes in San Francisco. By the time the city installed bike lanes in the Mission District, it had already undergone demographic changes that displaced many of the former residents who could no longer benefit from them. Donaji, who lived near Valencia Street in the Mission District, described it this way:

> My neighborhood is more [bike] accessible [than my old neighborhood] because Valencia Street has a bicycle route along the whole street but— These contradictions are very hard. Now that they have put more bike lanes in the neighborhood, the families and children that need them aren't here anymore. The same has happened with public transportation…. It is super unjust.

Efforts that embrace equity in the process and implementation of planning bicycle in-frastructure are important but can only go so far. They cannot address larger structural factors, such as gentrification and displacement, which exacerbate inequities beyond the tools available to bicycle planning.

In Oakland and Hayward, however, gentrification and displacement pressures were not as acute as they were in San Francisco. Thus, low-income neighborhoods where intervie-wees lived faced different environmental pressures that made cycling difficult. Respon-dents were more likely to describe violence and personal security as factors that affected their travel. For example, Francisco, an Oakland day laborer in his 50s, described his neigh-borhood as dangerous because he thought it to be very violent. He said, "I don't go out after 7 at night, I don't walk on the street for anything." He continued: "Yes, I know an-other person who bikes. He tells me the same thing, the same—that it's dangerous, it's dangerous but we have to use our bikes." His intermittent employment prevented him from using other modes of transportation because of cost, and reduced his enjoyment of cycling compared to other neighborhoods he lived in. Men who lived in Hayward also described being at risk for assault and robbery. Many of the women interviewed who lived in Oakland described similar conditions, primarily relying on public transportation for utilitarian travel and cycling only for recreation in nearby green spaces if at all. To mit-igate the effects of fear, cyclists reported cycling more often with friends or in a group. In other words, they resolved individual concern through collective safety. Resolving these types of conditions fall outside the domain of traditional planning but are clearly relevant in the decision to bicycle.

Discussion and conclusions

Planning efforts that aim to reduce barriers to cycling primarily focus on investing in high-quality, connected bicycle infrastructure to make it safer and more appealing. While our interviews reveal that inadequate infrastructure is a significant deterrent to cycling, non-infrastructural barriers and motivators are also substantial. The social environment un-derlies many of the reasons low-income Latino immigrants cycle. The findings provide additional evidence for the role that sociocultural environments play in cycling behavior according to social ecological models in planning and public health scholarship (Sallis et al. 2006). This study adds to the small but growing literature on obstacles and inequities in cycling that marginalized groups experience (e.g. Golub et al. 2016).

The analysis reveals a deep complexity to what we mean by the social environment and how it operates. Networks of friends and family had significant influences on cycling per-

ceptions, but the more distant networks in community organizations moderated effects from both closer relationships and the built environment. As others have also found for car and transit use, social networks play an important role in how low-income individuals and immigrants travel in general (Blumenberg and Agrawal 2014; Blumenberg and Smart 2010), though the interplay among the levels with the social environments is a new finding. Interviews identified the important role of culturally relevant organizations and events specifically involving Latino immigrants for encouraging cycling. These spaces would provide buffers against discrimination they have faced at other majority white workshops or events. Not identifying as the archetypal cyclist—upper-income and white—reduces the sense that cycling is an activity an individual should pursue (Steinbach et al. 2011). Organizations provided social resources that supported the encouragement efforts of friends and family. They are a critical form of human infrastructure as supplement to physical infrastructure that is often missing in historically marginalized communities (Lugo 2013).

Broader neighborhood conditions negatively affected cycling and cycling perceptions, but in some cases the social networks lessened the power of these effects. Men who lived in neighborhoods with higher levels of violence described the undercurrent of danger but tended not to consider alternative modes of transportation because cycling was cheaper and autonomous. But women who lived in the same neighborhoods described cycling as frightening and cycled only recreationally, if at all. However, women who participated in events coordinated by the community cycling organizations felt safer when participating with a group. The formalized social networks lessened, but did not eliminate, the effects of fear on cycling participation. On the other hand, the social environment could not counteract perceptions of inequity in the planning process. People who lived in a rapidly gentrifying neighborhood raised questions of whether resources were being distributed equitably, given the sudden appearance of bicycle infrastructure. These perceptions echo arguments that advocates in marginalized groups across the country debate about how bicycle planning and infrastructure is implicated in social injustice and gentrification (Hoffmann and Lugo 2014; Lubitow and Miller 2013).

Finally, intersecting components of the immigrant experience related to identity, cultural narratives, and discrimination challenge the notion that explanations for cycling decisions can be concisely described using simple frameworks or utility maximization theory. In the interviews, women tended to be more fearful of cycling whether or not they cycled, consistent with other findings about women's perceptions of safety and cycling (Garrard et al. 2012). While women cycle less than men in the United States, the difference is starker for Latinos and Latinas (Smart 2010), and some interviews suggested cultural norms particularly discouraged women cycling. Second, navigating unfamiliar

territory—a new country with information posted in a foreign language—may induce a fear of getting lost or placing oneself in danger, as it did for some in this study. For undocumented immigrants, who already live their lives in under the precariousness of extra-legal status, the fear of committing a traffic infraction out of ignorance introduces additional, unwanted opportunities for interacting with law enforcement (Romero 2006). At the time the interviews took place, participants did not express overwhelming concern about violence and detention by local police or immigration enforcement. However, new interviews conducted in the time of stronger anti-immigrant rhetoric and immigration enforcement may yield different associations between authority and cycling.

The interview data suggest two implications for policy and planning that could reduce the barriers that low-income Latino cyclists and potential cyclists face. The first implication is the critical role that the social environment plays in cycling behavior, and effects that culturally relevant, formal organizations play in perceptions of safety and community belonging. Bicycle planning efforts should involve agencies developing lasting partnerships with community-based organizations that already have strong social ties in communities where many Latino immigrants live. For example, these partnerships could provide financial support for build-a-bike programs that enable low-income earners to obtain a bicycle for volunteer time, conduct joint outreach at cultural events and festivals, or sponsor community-specific bicycle programming. The same collaborations should yield appropriate infrastructural improvements as well, such as appropriate locations for bilingual wayfinding, and establish metrics for ensuring equity in bicycle planning. Vitally, partnership members should be co-equals to remedy critiques that bicycle planning has historically neglected or usurped the needs of immigrant communities (Lubitow et al. 2016; Moore-Monroy et al. 2016). These partnerships are critical in rapidly gentrifying communities, where the social environment for low-income residents is the most at risk for disruption.

The second policy implications relates to how community violence and perceptions of cycling safety are intertwined. Transportation planning and neighborhood safety are distinct institutional domains, yet evidence suggests that cyclists and users of other transportation modes do not draw a hard line over who is responsible for end-to-end safety along a travel route (Barajas et al. 2016). The data suggest that planners should be involved in finding community solutions for reducing violence, as they can speak to the effects of neighborhood safety on perceptions of transportation safety. Responses should be context-sensitive and extend beyond additional policing.

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JM Barajas: Conceived, researched, wrote, and edited the entire article.

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