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“Trans-cending the Gender Gap:
Gender Diverse Bicycling Experiences in Davis, California”

By

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THESIS

Submitted in partial satisfaction of the requirements for the degree of

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ABSTRACT

Transportation research has long relied on quantitative approaches to studying bicycling behavior, producing a substantial literature on the gender gap in bicycling rates. While past research has advanced understanding of how gender shapes mobility, it has tended to operate within a binary gender framework that excludes the lived experiences of transgender and gender diverse (TGD) people. Here, gender diverse refers to gender identities that fall outside of the male/female binary, including but not limited to non-binary and gender fluid identities. Using a survey of 135 TGD and cisgender women participants and 12 in-depth interviews with TGD participants, this study investigates how gender identity and presentation shape the bicycling experiences, perceptions, and priorities of TGD bicyclists in Davis, California. Participants described many of the same barriers to bicycling identified among cisgender women—including nighttime fear and traffic anxiety—as well as distinct challenges related to gender identity and presentation, such as the tension between their gender expression and the practical demands of bicycling. These findings suggest that existing research captures only a partial view of gendered mobility and point to the need for transportation research and planning that move beyond binary conceptions of gender.

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INTRODUCTION

One of the most consistent findings in bicycling research is a pronounced gender gap with women bicycling at substantially lower rates than men (Aldred et al., 2016; Emond et al., 2009; Goel et al., 2022; Heesch et al., 2012; Horton, 2007). Women bicyclists have been described as an "indicator species," whose presence signals to others that a bicycling environment is safe and accessible (Baker, 2009). Contributing factors include higher risk perception, fear of harassment, or discomfort with operating a bicycle or navigating unfamiliar routes (Ferreira et al., 2022; Garrard et al., 2008; Lawton & Kállai, 2002; Lee et al., 2015; Pearson et al., 2023; Ravensbergen et al., 2020; Wang & Akar, 2018). In addition, bicycling in public involves a degree of physical exposure and performance—through visibility, clothing, and the ability to blend in—that intersects with gendered norms and expectations in ways that may discourage participation (Handy & Lee, 2020; Horton, 2007; Janke & Handy, 2019; Lubitow et al., 2017; Ravensbergen, 2020; Ravensbergen et al., 2019; Steinbach et al., 2011). Whether TGD bicyclists face the same barriers documented among cisgender women, additional ones, or some combination of both remains largely unexamined.

While this body of research offers a useful framework for understanding gendered mobility, bicycling scholarship has largely relied on quantitative approaches that reveal relatively little about the social dimensions of bicycling—the perceptions, experiences, and identities that shape how, when, and whether people choose to ride their bike. A growing body of qualitative and mixed-methods work has demonstrated that non-infrastructure factors, including norms, social networks, perceived safety, and personal experiences, play a significant role in shaping bicycling behavior (Barajas, 2018; Dill & Voros, 2007; Kearns et al., 2019; Krizek, 2019; Lugo, 2013;

Pike & Lubell, 2016; Xing, 2018). Mobility is gendered and the decision to travel via bicycle is shaped by broader social forces rather than by infrastructure alone (Hanson, 2010).

The gendered nature of mobility is particularly evident when considering transgender and gender diverse (TGD) people, who have largely been excluded from traditional transportation research. Here, gender diverse refers to gender identities that fall outside of the male/female binary, including but not limited to non-binary and gender fluid identities. Most studies employ binary gender categories, an approach that may be practical for large quantitative datasets, but renders TGD bicyclists invisible in the data. What research does exist finds that TGD individuals report significantly higher rates of harassment and discrimination in transit environments than their cisgender counterparts, shaping how, when, and whether they choose to use public transportation (Lubitow et al., 2017; Shakibaei & Vorobjovas-Pinta, 2024; Weintrob et al., 2021). Virtually no published scholarship has examined the bicycling behavior and experiences of TGD individuals specifically.

The goal of this thesis is to center the experiences, perceptions, and priorities of TGD bicyclists, a population largely overlooked in transportation research. Because existing research on gendered mobility and bicycling has primarily focused on cisgender women, this study includes both TGD and cisgender women participants, enabling comparison between a group with documented mobility barriers and a group whose barriers remain understudied. Informed by this gap in the literature, this research asks:

1) What are the priorities and experiences of TGD bicyclists regarding bicycling safety, comfort, and accessibility?
2) How do gender identity and presentation intersect with bicycling behavior?

To address these questions, this study draws on a survey of 135 cisgender women and TGD individuals and 12 in-depth, semi-structured interviews with TGD bicyclists in Davis, California.

In the rest of this paper, I review two bodies of literature that together frame the analysis. The first, spanning feminist geography, gendered mobility, and transmobilities, establishes how gender shapes mobility and bicycling behavior—and where existing literature leaves the experiences of TGD people unexamined. The second, human infrastructure addresses what these frameworks do not: how social networks and community resources shape who can access bicycling in practice. I then provide context on the study region, describe the research methods, and present analysis of both survey and interview data before concluding with a synthesis of findings and their implications for planning and policy.

LITERATURE REVIEW

Gendered mobility

Within transportation research, Law (1999) critiqued the dominant "women and transport" literature for its narrow focus on commuting patterns and argued for more systematic engagement with gender as a theoretical concept. Hanson (2010) later argued that mobility and gender are inextricably linked, with each shaping the other, and called for future research to integrate the two more fully. Feminist geography offers three concepts that have proven central to that integration: performativity treats gender as a social behavior, not a fixed biological trait (Butler, 1990); intersectionality argues that categories of identity, such as gender, race, and class, are experienced together rather than independently (Crenshaw, 1991); and embodiment describes how gender is felt and enacted through the body (Young, 2005). These frameworks reject the idea that gender is fixed and binary, instead considering it to be something constructed and experienced differently across identities. Ravensbergen et al. (2019) linked this framework directly to bicycling research, critiquing the field's reliance on binary gender categories and arguing that feminist theories of performativity, intersectionality, and embodiment were needed to understand how gender shapes bicycling behavior.

A consistent finding across bicycling research is that women bike less than men (Aldred et al., 2016; Emond et al., 2009; Goel et al., 2022; Heesch et al., 2012; Horton, 2007). Dominant explanations for this gender gap center on safety concerns, including women's higher traffic risk perception, fear of traffic, navigation anxiety, and nighttime anxiety (Ferreira et al., 2022; Garrard et al., 2008; Lawton & Kállai, 2002; Lee et al., 2015; Ravensbergen et al., 2020; Wang & Akar, 2018). These constraints are not inherent characteristics of women, but are socially produced responses to environments designed for hegemonic male mobility. Bicycling in public requires physical exposure and a form of bodily performance—managing how one's body is seen while bicycling in public, where one is exposed in a way that a driver is not—that intersects with gender norms through harassment, appearance, and heightened awareness of one's body (Janke & Handy, 2019; Horton, 2007; Ravensbergen, 2020; Ravensbergen et al., 2019; Steinbach et al., 2011). Abord de Chatillon (2021) extends this analysis to the relationship bicyclists form with their bicycles as objects, introducing the concept of velonomy, defined as "the level of autonomy of an individual with their bicycle, that is to say the ease they show in repairing, maintaining and adjusting it" (p. 3). Abord de Chatillon (2021) found that women tend to be less experienced with bicycle repair and are more likely to seek outside help when a mechanical issue arises. From these patterns, Abord de Chatillon (2021) conceptualizes the idea of feminine velonomy, characterized by "low self-confidence, discomfort in spaces of repair and maintenance and an inhibition regarding bicycle repair" (p. 25). Pearson et al. (2023) found that a lack of mechanical confidence can directly impact travel behavior: women who were less comfortable performing repairs on their bicycle reported reduced confidence riding their bike alone.

The body of work has operated almost entirely within a binary gender framework, centering the experiences of cisgender women while leaving transgender and gender diverse bicyclists unexamined (Giacomantonio et al., 2024; Ivanova & O'Hern, 2024). The transmobilities

framework, developed by Lubitow et al. (2017), examines how gender shapes mobility for TGD people and introduces cissexism—the systemic assumption that cisgender identities are more legitimate than those of transgender or gender diverse people (Serano, 2007). In transportation contexts, cissexism shapes environments in ways that expose TGD individuals to harassment and discrimination (Shakibaei & Vorobjovas-Pinta, 2024). Lubitow et al. (2017), describe transmobilities as “the ways that transgender and gender nonconforming individuals experience a form of mobility that is altered, shaped, and informed by a broader cultural system that normalizes violence and harassment towards gender minorities” (p. 1398).

TGD individuals report significantly higher rates of harassment, discrimination, and violence in transit environments than their cisgender counterparts, shaping when, how, and whether they use public transportation (Ivanova & O'Hern, 2024; Lubitow et al., 2017; Shakibaei & Vorobjovas-Pinta, 2024; Weintrob et al., 2021). Trans women face violence more frequently than trans men, who may receive some insulation through male privilege (Lubitow et al., 2017). Fear contributes to constrained mobility as TGD people alter their routes, modes, and times of travel in response to perceived and experienced threats (Weintrob et al., 2021). Some TGD people conceal or perform different identity characteristics during travel to pass as a more normative group, a strategy particularly reported among those facing harassment risk tied to feminine visibility (Weintrob et al., 2021). Where gendered mobility literature examines how cisgender women navigate environments built around male mobility, transmobilities scholarship documents how TGD people navigate environments built around cisgender assumptions. Transmobilities scholarship has yet to extend to bicycling.

Human infrastructure

While feminist geography, gendered mobility, and transmobilities establish how gender structures who moves and how, they do not account for the social resources that facilitate

mobility in the first place. Human infrastructure addresses that gap. Research has shown that knowing people who bike is one of the strongest predictors of whether someone bikes themselves, and that mentorship, shared knowledge, and peer support shape who bicycles (Dill & Voros, 2007; Kearns et al., 2019; Krizek, 2019; Pike & Lubell, 2016). Lugo (2018) draws on Bourdieu's account of social capital to develop the concept of human infrastructure: "how social networks make particular actions seem possible or impossible" (p. 86). In bicycling contexts, human infrastructure can be positive or negative, taking the form of route knowledge between friends, informal mentorship, or verbal harassment from drivers. As Lugo (2013) writes, "people can be infrastructure; they create networks in which they hold places of meaning and value" (p. 206). Human infrastructure shapes bicycling behavior and policy, but it rarely receives formal investment because it tends to be invisible to the people utilizing it.

Research gap

The gendered mobility and human infrastructure literatures together establish that gender shapes mobility through forces including fear, embodiment, and the management of gender expression in the public eye, and that access to social networks shapes who can participate in bicycling. Bicycling research has engaged almost exclusively with cisgender women, and transmobilities scholarship—which extends the gendered mobility framework to TGD people—has not examined bicycling. The experiences of TGD bicyclists remain absent from both bodies of work. This study addresses that gap through a survey with cisgender women and TGD individuals and in-depth, semi-structured interviews with TGD bicyclists in Davis, California, drawing on qualitative methods well-suited to exploratory investigations of the meanings, perceptions, and experiences that structure mobility decisions (Clifton & Handy, 2001).

METHODS

Positionality

I am a white, able-bodied, queer, cisgender woman, and graduate researcher at UC Davis. I am also a known bicycle commuter among friends. Several participants were already known to me, with others recruited via snowball sampling from their networks. These relationships likely shaped responses. Participants may have been aware of my views on bicycling preceding their interview, influencing what they chose to share. Although my existing relationships with TGD participants likely supported candor on gender and mobility, as a cisgender woman, I don't share their lived experiences.

Site context: Davis, California

This study uses survey data and a set of semi-structured interviews with residents of the City of Davis. Davis, California has long been referred to as the bicycling capital of the United States, and is unique as bicycling is both safe and culturally embedded in daily life for residents. The city's flat topography, mild climate, and extensive network of dedicated bicycle infrastructure have together cultivated one of the highest rates of bicycle use in the country (Buehler & Handy, 2008). Davis built the first official bike lane in the United States and was the first city to receive the Platinum Level Bicycle Friendly Community award from the League of American Bicyclists (City of Davis, n.d.). Nearly half of UC Davis students and employees who live in Davis commute to campus by bicycle (Darr, 2024). Because bicycling is broadly accessible and commonplace in Davis, the bicyclist population is not limited to the "strong and fearless" riders—those who will ride their bikes regardless of road conditions—who may predominate in less bicycle-friendly parts of the United States (Dill & McNeil, 2013; Geller, 2006). This makes Davis a particularly productive site for recruiting transport bicyclists, those who ride regularly for utilitarian purposes such as

commuting or errands, rather than primarily for recreation or sport (Dill & McNeil, 2013; Geller, 2006).

Survey data

I administered an online survey from May to August 2025 using nonprobability sampling techniques, which are recommended for "hard-to-reach, stigmatized, or hidden populations," such as TGD bicyclists (Guest et al., 2006). The survey was distributed through UC Davis and Davis community mailing lists and local networks, resulting in a convenience sample that served as the recruitment pool for the interview portion of the study. Survey responses also provided descriptive data on bicyclist experiences and concerns that contextualize the interview findings. Survey questions were informed by recurrent themes in gendered mobility literature, including wayfinding, darkness, and harassment (Ferreira et al., 2022; Garrard et al., 2008; Lawton & Kállai, 2002; Lee et al., 2015; Ravensbergen et al., 2020; Wang & Akar, 2018). Although the survey was promoted in the City of Davis, participants were not required to be city residents.

The survey sample included 32 transgender and gender diverse (TGD) individuals, encompassing all who self-identified as non-binary, transgender, or "other", and 103 cisgender women, those who identified as women and not transgender. While 19 cisgender men responded, their data were excluded from further analysis due to the low response rate. Cisgender women's responses were retained because they are the population most studied in existing gendered mobility and bicycling research, and their responses provide a descriptive point of comparison for contextualizing TGD findings against that literature. TGD participants were later contacted to participate in the interview portion of the research. While non-generalizable, this survey provides supportive data to accompany the in-depth interviews and aims to increase the amount of information about an under-studied population (see Appendix C for survey questions).

Interview data

I conducted twelve interviews for this study in Davis, California, between August 2025 and February 2026. To meet the inclusion criteria, participants must self-identify as transgender, non-binary, or otherwise gender diverse, and to have past or present bicycling experience in the City of Davis. Interviews were limited to TGD participants because the study's primary aim is to understand TGD bicycling experience in depth rather than to conduct a comparative qualitative analysis. All participants were current Davis residents at the time of interviewing. Two interviews were conducted in my home in Davis, one in a participant's home, and the remaining nine interviews were conducted via Zoom. All interviews were recorded and transcribed using Zoom's automated transcription software, which I then reviewed and edited each transcript for accuracy against its corresponding audio recording.

Interviews were semi-structured and consisted of open-ended questions about participants' bicycling histories, decision-making processes, and perceptions of bicycling. All interviews lasted 20 to 45 minutes. The interview guide was designed to encourage narrative accounts of how comfort, safety, gender, and community contexts shape bicycling experiences and travel behavior. Participants were asked to reflect on factors that encourage or discourage bicycling, including safety, navigation, harassment, and community support. They were also asked to identify changes or improvements that would encourage them to bike more frequently. Participants are identified by pseudonyms, either assigned by the researcher or selected by the participants themselves (see Appendix B for interview guide).

Table 1

Interview Participant Pseudonyms and Gender Identities

Participant	Gender Identity
Cedar	Non-binary

Celia	Non-binary
Hannah	Transgender woman
Louis	Non-binary/transmasculine
Maya	Transgender woman
Mia	Non-binary
Poppy	Non-binary/gender fluid
Riley	Non-binary/transfeminine
Rose	Transgender woman
Sophia	Non-binary
Toby	Non-binary/transmasculine
Vanessa	Transgender woman

Note. Participant names are pseudonyms. Gender identities are self-reported.

The concept of information power theorized by Malterud et al. (2016) suggests that the more relevant a sample's data is to a specific study's aim, the fewer participants are needed. This study's focus on a highly specific participant group in a localized context (TGD bicyclists in Davis, California) supports a smaller sample size. The interview data also reached saturation with later interviews producing no substantive new codes, and themes identified in early interviews were consistently reinforced and elaborated rather than contradicted or expanded by subsequent ones (Guest et al., 2006). Information power and the achievement of saturation together support a sample size of 12 as sufficient for the aims of this study.

Data analysis

Data analysis for the interview data followed the six-phase, recursive process of thematic analysis as outlined by Braun and Clarke (2006). This approach was selected due to its flexibility and suitability for identifying patterns in the participant's accounts while remaining grounded in the interview data, making it particularly appropriate for exploring the lived experiences of an understudied population such as TGD bicyclists.

To familiarize myself with the data, analysis began with repeated immersion in the interview transcripts. Each interview transcript was read in full, and no formal coding was conducted during this stage. Instead, I engaged in active reading to sensitize myself to repeating patterns of meaning. Initial coding aimed to capture all potentially meaningful segments of text across the dataset. Codes were generated using an inductive approach, allowing codes to emerge directly from the data (Cope, 2016), though as noted in the positionality statement above, the researcher's prior knowledge of gendered mobility literature and existing relationships with some participants inevitably shaped what patterns were identified during coding. Both semantic and latent codes were identified in this first iteration of coding. Semantic codes captures the explicit content of what participants said, while latent codes captures underlying meanings and assumptions that were implied rather than directly stated, requiring interpretive judgement on the part of the researcher (Braun & Clarke, 2006). Through constant comparison across transcripts, codes were merged, eliminated, and clarified, resulting in a final set of 37 distinct codes. For each code, all associated text segments were read in relation to one another to ensure conceptual consistency and to develop a formal operational definition. These definitions, along with exemplary participant quotes, were compiled into a codebook to illustrate the deeper meaning of the formal definitions.

These 37 codes were then analyzed collectively and organized into higher-order categories based on shared meaning. Through iterative comparison and thematic mapping, nine overarching themes were identified. Each theme encompasses several related sub-codes. Throughout this process, coded segments of text and sub-codes were reviewed and edited when necessary to reflect an evolving and increasingly comprehensive understanding of the dataset as a whole (see Appendix A for codebook).

FINDINGS

Survey data

81.3% of TGD respondents and 77.7% of cisgender women respondents have access to a working bicycle. 65.6% of TGD respondents and 59.2% of cisgender women respondents report riding their bike at least once a week. TGD respondents reported similar levels of comfort with asserting right of way, navigating new routes, and nighttime biking to cisgender women respondents. TGD respondents reported concern about being perceived as their gender while biking nearly three times the rate of cisgender women respondents (56.3% vs. 20.4%). Additionally, over half of TGD respondents reported being concerned about verbal harassment while biking, compared with fewer than one-third of cisgender women respondents. See Table 2 for full survey responses by gender group.

Table 2

Survey Responses by Gender Group

	Transgender and Gender Diverse People (n=32)	**Cisgender Women (n=103)**
Have access to a working bicycle	81.3% (26/32)	77.7% (80/103)
Ride their bike once a week or more	65.6% (21/32)	59.2% (61/103)
Concerned with being perceived as their gender	56.3% (18/32)	20.4% (21/103)
Concerned about verbal harassment	53.1% (17/32)	31.1% (32/103)
Concerned about being physically attacked	31.3% (10/32)	31.1% (32/103)
Concerned with getting into an accident	75% (24/32)	71.8% (74/103)
Comfortable dealing with mechanical issues	71.9% (23/32)	54.4% (56/103)
Comfortable asserting right of way	78.1% (25/32)	73.8% (76/103)
Comfortable navigating a new route	71.9% (23/32)	72.8% (75/103)
Comfortable biking in the dark	53.1% (17/32)	58.3% (60/103)

Interview data

The following sections present interview findings on TGD bicyclists' experiences in Davis, California. The next two sections describe barriers and cultural context that are not distinctly shaped by gender identity and likely reflect the experiences of Davis bicyclists more broadly. Some of the barriers mirror patterns documented among cisgender women in existing research, consistent with the survey findings above. The sections that follow turn to the ways gender identity and presentation shape bicycling experiences more distinctly.

Barriers to bicycling

Physical safety was the most pervasive concern across participants, surfacing in nearly every interview. Intersections were a particular source of stress. Riley, a non-binary and transfeminine participant, described the experience of navigating intersections as disorienting:

> Intersections are so, so . . . poorly designed. And bikes are just truly not thought about. Even if there's bike lanes on the street, the bike lanes just kind of turn into turn lanes at the intersection, and it is so unclear what to do. I never know if I should be making the turn in two parts, or one part, or crossing, like, a pedestrian, or, like, a car.

Louis, a non-binary and transmasculine participant, had started using his phone flashlight as a hand signal after drivers repeatedly failed to respond to traditional hand signals: "sometimes I'll even put my flashlight on on my phone and put that on my dominant hand so that I can signal with my flashlight, and it still doesn't work." Mia, a non-binary participant, shared a counterintuitive experience in which overly deferential drivers created confusion: "sometimes they can be overly deferential to cyclists . . . it's your right of way . . . And then it causes confusion, and then you end up . . . everyone ends up idling around in the intersection, and then you just . . . you realize they're not gonna budge until, you know, you do something, and so you do something, and then .

. . that feels really insecure.” For Vanessa, a transgender woman, certain intersections became inaccessible: “I will find any way to avoid going through this area of town um just so that way I don't feel like I'm going to be hit by a car.”

Roundabouts surfaced repeatedly as anxiety-inducing. Poppy, a non-binary and gender fluid participant, described shifting into a defensive mode when approaching them. Mia put it more plainly: “God, please let me, let me through, you know what I mean? Like, let me, like, survive this roundabout.”

Nearly every participant mentioned fear or anxiety triggered by bicycling during the hours of darkness. Maya, a transgender woman, described the notable difference in lighting between campus and the residential neighborhoods during her commute home:

> I know some of the residential [areas] in . . . around Davis tends to get really, really dark. Especially . . . More noticeable here during the wintertime and springtime, because the sun sets so early. The route that I take home tends . . . it's through a residential [area], and it tends to get really, really dark . . . once you get off campus, it's nice and bright, but once you get off campus, it's . . . yeah.

Almost half of participants described accidents or near-misses, though only one described an incident that stopped them from biking. Sophia, a non-binary participant, recounted a solo fall: “I don't want to say I got into a biking accident, I just fell off my bike, and I had, cut up my elbow and knee pretty bad and that put me off biking since.” Cedar, a non-binary participant, described two serious accidents within a single year, without indicating either accident changed their behavior: “a [driver] opened his door right into me in the bike lane . . . I went over the bars, shattered my helmet.” Poppy described being almost hit “so many times with people turning right” and a bus “basically pushing me out of the road.” Near-misses were not limited to interactions with cars. Mia described nearly being hit by an e-scooter in a roundabout and Cedar

described near-misses with e-dirt bikes on bike paths. Not all fear was directed at traffic or other road users. Celia, a non-binary participant, described anxiety around navigating an unfamiliar city:

> I'm really not good at navigating in general. So I'll, like, stare at the map and be like, okay, I'm going to go this way until I get to this street and then I have to go this way and then I go very cautiously and then I want to cry. I won't recognize things and I'll be like, where am I?

Poppy described a more situational fear, the prospect of a mechanical failure on an isolated path: “I'll get scared of, like, yeah, my bike tire popping and getting kind of stuck in, you know, a place that doesn't feel as safe.”

For three participants, their fear was anticipatory rather than rooted in specific incidents. Mia summarized this directly: “I've never had a negative experience. I think it's just, like, anticipating negative ones.” Celia similarly confirmed that their sense of danger was rooted in general perception rather than any specific incident. Sophia’s anticipated risk centered around losing control of their bicycle and harming others: “I'm more worried about . . . messing up to the point that it's also harming other people.”

Two participants described secondhand narratives that initially discouraged them from bicycling in Davis. Vanessa recalled the first story she heard upon arriving in Davis: “Oh, yeah, there's a bunch of people that like to sit out in the biking circles on campus and make fun of people crashing.” She noted that hearing this narrative shaped her early reluctance to bike: “I didn't know how to approach biking and I was scared because the only stories I was like, ha, we made fun of these people who didn't know how to bike on campus.” Rose, a transgender woman, described hearing similar accounts from older students: “for the first, like, maybe two weeks, I refrained from biking because of, you know, those stories.”

Several participants also described a lack of confidence in their ability to identify or address problems with their bike. Vanessa described ongoing brake problems with her bicycle: “the brakes constantly got loose, and I didn't know how to fix it,” noting that she “would have to lean outside myself to figure out how to fix those issues, because when I would look up, specifically how to fix them, I couldn't follow the tutorials very well.” Celia described a moment of panic when their bike toppled over, causing their brake to rub against their tire: “I was freaking out . . . I was like, this is it, my bike is broken. This is the end.” Two participants described mechanical knowledge as something they felt they should have, but did not, including Sophia:

> I think that, like, that does kind of make me feel like maybe I should be more . . . knowledgeable about how the bike works, and that would help me, to some extent, with riding a bike, and being comfortable with riding a bike.

Vanessa also raised a broader concern about the accessibility of Davis bike culture for newcomers, noting that the city's infrastructure, while extensive, is “not approachable for somebody who's new to biking,” and that there was no obvious way to learn: “it's not like I can just YouTube how to bike in a town like this because this town is not normal biking.” Sophia echoed this sentiment, describing existing infrastructure as not sufficiently beginner-friendly.

Everyone bikes here: Davis as a biking city

For nearly every participant, Davis’s reputation as a bicycling city preceded their arrival. Toby, a non-binary and transmasculine participant, recalled “that was, like, the main thing I heard about Davis was, like, everyone bikes here.” Vanessa, a transgender woman, learned to ride a bike when she was eighteen in preparation for her move. Riley, a non-binary and transfeminine participant, was drawn to Davis because of its biking identity:

> I came to Davis because it's full of bikes, I wanted to be here. I really wanted to get into Davis, tried very hard to, got waitlisted, wrote Davis a letter, like, please let me in, and I eventually got in, and now I'm here, and now everyone bikes, and I love it.

Several participants described bicycling in Davis as more of a norm than a preference. Toby compared the Davis bicycling culture to that of car culture in other cities:

> I think it's very similar to, like, car culture in a lot of other places, where it's like, you need to have a car. Like, it's kind of like . . . in Davis, like, you need to have a bike in Davis.

Sophia, a non-binary participant, described the pressure this norm created: "I do think that people just kind of feel obligated to ride a bike in Davis, as opposed to being . . . I love bikes, and this is, like, a biking town, so I'm gonna bike." Rose, a transgender woman, described the norm shaping city planning as much as individual behavior: "it's car culture, but for bikes . . . people will default to, like, oh, we should do bikes, we should do another, like, bike lane, we could do a bike path, but no one ever talks about bus rapid transit or anything like that here, when it would be really beneficial on a couple key corridors." Riley pointed to the tension between Davis's bicycling identity and its actual infrastructure: "fix the streets, you know, protected bike lanes. Reflect the fact that Davis is actually a bike city, and stop designing the same bike lanes in . . . that they do in every California city that just don't work."

Discussions about Davis bike culture often prompted mention of e-devices, especially when discussing the idea of authentic participation in bike culture. Toby reflected on his opinion of e-scooters in comparison to standard biking:

> I'm willing to accept the chaos of, like, regular bikes. The e-scooters come in, I'm just like, that's . . . like, I don't think that's an authentic way to participate in this bike culture. Like, if you're gonna be biking like a dick, do it on a regular bike . . . I try not to be too much of a hater, but I think that's the one area that I'm like, I'm so done with e-scooters. Davis . . .

> Davis does have a bike culture, and I think there is a sort of communal sense of, like, we're all on our bikes.

Mia, a non-binary participant, connected this discourse to a problem with education: “I think people need to think of e-scooters like they think of bicycling, and maybe that just means more education.” Poppy, a non-binary and gender fluid participant, commented on rider behavior: “people just . . . their frontal lobes are not developed, and they're on these e-bikes and e-scooters and stuff, and going all crazy fast, and not looking.” Several participants did acknowledge the accessibility value of e-devices for people with mobility limitations.

Most participants described the biking community as welcoming. Hannah, a transgender woman, noted: “it's super, like, welcoming. Like whenever I've been around someone who's brought up, oh, you know, should I buy a bike or where should I go? Like, everyone's like, oh, yeah, you should go, you know, this guy's great, you should definitely buy a bike.” Vanessa noted a similar sentiment regarding the collective feeling of Davis bike culture: “I feel like I could stop and ask most people, like, hey, do you have, like, a hex key or something?”

Gender, identity, and the bicycling body

The most frequently discussed intersection of gender and biking was related to clothing and presentation. For several participants, the physical act of bicycling created tension with their desired gender expression. Maya, a transgender woman, noted that riding a road bike limited her wardrobe options: “a dress is gonna be very difficult, like, or I'll have to wear shorts under the dress . . . cycling does make it harder to have, I guess, more possibly diverse wardrobe options.” Rose, a transgender woman, similarly described wearing a skirt as a deterrent to biking:

> It brings me joy to dress more femininely. Part of my wardrobe involves, like, skirts and stuff like that. So I feel like biking in a skirt is definitely a detractor. I would try and avoid it, if possible, just because it's a little awkward.

Vanessa, a transgender woman, found it difficult to find clothing that felt both functional to bike in and gender-affirming: “there's not as many good choices if you are transfeminine and you are looking for feminine [biking] clothes that can still fit a larger body.” She also described a bicycling-related source of gender dysphoria: “I've never expected to experience dysphoria out of a helmet, but god damn a helmet can be utterly ugly at times,” noting that she had delayed buying a new one because she had yet to find one that did not make her feel, in her words, “absolutely ugly.”

Louis, a non-binary and transmasculine participant, noted the gendered design of standard road bikes, describing seats made for men as “obnoxiously painful” for anyone riding farther than a mile and a half. Sophia, a non-binary participant, described the experience of feeling unable to control a bike that was too large: “not only was it too big for me, but, like, I couldn't even . . . handle it.” Riley’s experience of biking while tucking, a practice commonly employed by transgender individuals to manage the appearance of genital anatomy beneath clothing, added a more personal dimension to her experience with a bicycle:

> It was really uncomfortable to bike, especially with the type of bike that I had . . . It had, like, the . . . the men's seat, and it was, like, just the most . . . truly uncomfortable experience. Sometimes I'd arrive at school crying, and then hide in a bathroom stall for a while, just because it hurts so bad . . . that [tucking] was . . . an invisible barrier that, like, I couldn't really talk to people about, because it felt too personal.

Several participants related their gender presentation to their physical safety and experiences of harassment. Vanessa described carrying clothing to conceal her chest when biking through areas where she felt at risk due to previous verbal harassment:

> I'll bring a cover so that way you cannot see my chest when I bike through areas that I feel like I could be threatened at, because I have been like legitimately threatened, like biking

through the Arboretum late at night . . . you could hear a yell about it, and you could tell it was towards you.

Hannah, a transgender woman, planned her routes through well-lit areas and carried mace: “the times that I have had to bike, like, after sunset or whatever, being out late, I have planned like well-lit areas and you know, [and] stuff to defend myself.” Vanessa also described a night when she was pulled over by police while biking, reflecting on how her presentation in that moment shaped her sense of safety: “I was really happy that I was very masculine presenting at the time because I was, like, covered head to toe in cloth, because of how cold it was.” Celia, a non-binary participant, noted: “I'm more afraid to bike at nighttime, just because I'm perceived female.”

Several participants described an internalized awareness of how they were being perceived while biking. Sophia described a fear of being seen as incompetent while being female-presenting: “I think I just don't want to look . . . inexperienced, or . . . stupid in any kind of way, so I feel like maybe the fact that I do come off a little bit more feminine . . . I'm just kind of . . . not meant to do . . . to bike.”

Toby, a non-binary and transmasculine participant, offered a nuanced account of how their gender shaped their perception of nighttime safety. Early in college, before he realized that others were viewing him as a man, Toby described feeling like a visible target and characterized biking as a way to exercise his independence:

> I've been sort of, like, passing as a guy for, like, a hot second, but it wasn't . . . when I first got to college, I don't think I realized that's how I was, like, perceived by everyone. I was still in the mindset of, like, oh, well, everyone can tell I'm trans . . . I don't want to be, like, perceived as a visible target . . . and I think biking was, like, a way to, like, have a lot more

> freedom over my movement and not have to, like, wait to walk home with a friend, or, like, wait for a ride.

Mia offered a more affirmative account of the relationship between biking and gender, describing bicycling as a context in which they had become more comfortable with the uncertainty of their own gender presentation:

> I feel a little bit more comfortable with the uncertainty of my gender and my gender presentation, or how people read me. I feel like . . . now I can really engage with my body, and biking brings that out . . . it reminds me that I have this body, and that it matters to a lot of other people what I look like, and how they perceive me, but also how I feel about myself is just as important.

Navigating risk and the work of staying safe

Across nearly every interview, participants described choosing routes based on safety and familiarity, prioritizing separation from traffic even when it meant longer or more demanding trips. Maya, a transgender woman, put it plainly: “I like to avoid busy roads, and riding alongside busy roads, and I'll take alternative routes if I could.” Mia, a non-binary participant, described the same logic:

> I prefer bike paths, even if it takes longer . . . I try to avoid places that don't have bike lanes that are, like, very explicitly bike lanes. Even if it means taking a longer route, it's fine.

Celia, a non-binary participant, avoided roads shared with cars entirely: “if I have to bike on the street, I'm really scared . . . I just don't bike on the road.” Vanessa, a transgender woman, described taking a bike overpass even when it required more physical effort: “I take the bike overpass instead of the intersection, even though it is theoretically harder to go over the overpass and more exhausting to do that, it is far safer to do that.” Riley, a non-binary and

transfeminine participant, described how strongly she preferred off-street facilities when planning her route:

> I'll try to keep a route on as many trails as possible. I prefer dealing with off-street bike facilities, even if they have a lot of hills. I'm very used to going up and down hills, and I'll take that over flat streets shared with cars, kind of anytime.

Several participants described a high degree of confidence navigating traffic while biking, including a subset who also communicated a preference for off-road facilities. Rose, a transgender woman, was comfortable taking up a full car lane at moderate speeds. Poppy, a non-binary and gender fluid participant, attributed their ease asserting right-of-way partially to the volume of bicyclists in Davis: “there's just so many bikes, people are like, oh yeah, the bike can just go.” Riley described their approach to confidently navigating intersections: “oftentimes, there's a 4-way stop, and there's more cars than I can realistically count, so I don't know who has the right of way, and I'll just go. Yeah, I'm used to it.”

Several participants described preferring familiar routes, especially at night. Hannah, a transgender woman, noted that she had never biked somewhere unfamiliar after dark. Toby, a non-binary and transmasculine participant, described how he changed his approach when biking off-campus: “if I'm biking off campus, there's a whole other, like, preparation I need to do, where I'm like, I'm wearing my helmet, and I've got my bike lights, but if I'm on campus, it's kind of like . . . the roads are relatively safer for bikes.”

The speed of a bike also made participants feel safer at night. Celia described biking as safer than walking after dark specifically because “I can go fast.” Toby described the same calculation: “if there's any, like, sort of sketchy situation, it's like, I'm just gonna zoom away.” Rose similarly stated: “I actually probably would feel more concerned walking, just because there's less opportunity to get away.”

The presence of other bicyclists provided reassurance. Hannah described riding with others as something that would make her feel safe even at night, and noted its particular benefit at intersections: “it's nice that there's multiple other people on the road that are riding bikes when I am because it's easy to merge when there's three people in the left turn lane.” Poppy put it simply: “biking with friends definitely makes me feel much more safe.”

If they can do it, I can do it: social networks as bicycling infrastructure

All participants in this study described bicycling as supported by an informal network of mentorship, shared knowledge, and material assistance that made riding more accessible. For many, this social infrastructure is what first got them to ride a bike in Davis. When asked what would have made her transition to biking easier, Vanessa, a transgender woman, said:

> I feel like I would have entered biking far earlier if I was invited out by my friends in a way that felt like a safe environment to learn to do so. And I would have enjoyed it a lot more, having somebody to talk to and somebody who I know could immediately help support me if I, like, ate shit or if my bike has a problem.

Hannah, a transgender woman, recalled a roommate orienting her to biking in Davis: “when I moved here, he and I would ride around and like, oh, here's downtown, here's the campus, here's whatever. So I think that probably helped a lot.” Celia, a non-binary participant, who hadn’t biked since childhood was also oriented by a social ride: “I haven't ridden a bike in 10 years . . . and that felt good because I was biking with other people and I was like, okay, if they can do it, I can do it.” Maya, a transgender woman, was similarly drawn into the biking culture by a social group: “we rode around Davis, and I was like, wow, that was really fun! And that kind of kick-started my . . . cycling as a hobby rather than just transportation.”

Several participants described paying this mentorship forward. Maya described inviting friends on social rides and encouraging them to have their bikes serviced. Cedar, a non-binary

participant, described a deliberate effort to introduce their friends to biking: “I'm slowly trying to influence all of my friends to get on bikes more, because it's just . . . it's affordable, it's fun, and it's good for you.”

Several participants mentioned getting bicycles through informal networks in Davis. Mia, a non-binary participant, received a bike from a friend who was leaving Davis: “she was like, oh, just take mine . . . I feel like that's another kind of Davis-y thing, you know, you can just come across things like that.” Louis, a non-binary and transmasculine participant, had received multiple free bikes over five years through a combination of family connections and roommates. Cedar ran an informal bike recycling program, rebuilding bicycles and giving them to friends.

Participants used both formal and informal repair support resources, including the Bike Collective, the Bike Barn, local shops, friends, and family members. Toby, a non-binary and transmasculine participant, described the security provided by having a community support system for bicycle repairs:

> The people I know who know how to fix bikes make me feel a little bit more in control of my bike . . . I feel like it's a different relationship to your bike when you're like, oh, something's off, but let me take a look at it, as opposed to, I don't know what's going on with this, and I don't want to find out.

Vanessa described maintaining a mental map of everyone in her daily life who might have tools: “I kept, like, a mental map of where they would generally be . . . there were, like, a few bike shops I knew in town that had, like, friends that would do stuff for free.” Several participants wanted a more formalized bike education. Vanessa framed bicycle education as an institutional responsibility:

> The campus [UC Davis] should be teaching these people how to better use their bike infrastructure. They are a part of your community, you should help serve

them.

Rose, a transgender woman, suggested that even a brief training could help: “Maybe, like, even a 30-minute course of, like, here are the rules of the road . . . I think that would make biking less stressful, because then I at least have some baseline-level confidence that people will . . . do the same things that I'm doing.” Sophia, a non-binary participant, considered the benefits of biking licensure: “I almost kind of wonder if you should have, like, a biking license in some degree . . . have it be easy to get one . . . I feel like stuff like that would make everybody on the same page of, like, what is not okay to do when biking.”

Why people bike: motivations, affect, and meaning

Utility was the most frequently cited reason to bike. Hannah, a transgender woman, arrived in Davis without a car or driver’s license and described her biking as her default: “everywhere is super bikeable . . . biking to school and back it's just so convenient, so fast.” For Mia, a non-binary participant, the appeal of riding a bike was its immediacy: “If I need to be somewhere on short notice, like, it's the bike, you know? I gotta take the bike.” Louis, a non-binary and transmasculine participant who does own a car, found that biking quickly displaced driving for him: “moving my car was so much more work than just going to get my bike . . . I could put a lot more stuff into my day if I used my bike.”

Cost savings is one of the main considerations for participants. Cedar, a non-binary participant, described this plainly: “that's a huge thing that attracts me about cycling, is that it's, like, free.” Mia framed biking as an explicit rejection of car ownership: “I don't want a car, I don't want to pay for parking, I don't want to pay for gas, I don't want to pay for car insurance.”

Several participants identified both physical and mental health benefits as significant motivations to bike. Cedar stated this clearly: “It's like, it's mental health, it's saving money, it's physical health.” Maya, a transgender woman, noted that biking fit with her goal “to be more

active," and Louis described it as "a great way to get exercise in." Mental health benefits were mentioned as often as physical health benefits. Louis described biking as a way to "get out of my head in between things." Poppy, a non-binary and gender fluid participant, similarly described biking as a way to decompress:

> It relieves a lot of . . . you know, stress from, like, if I'm working at school for a long time, then I bike home, it's like, oh, decompression. It's, like, the convenient decompression time, while also moving from point A to point B.

Several participants described bicycling as a means to socialize and connect with others through a shared activity. Cedar noted that incidental contact with other bicyclists during a commute even carried a social quality:

> When you're cycle commuting, even if there's other people on the path, it's people that want to be there . . . it's like a more fun shared space, and it just . . . brightens your day.

Mia reflected: "it took me a couple years to realize, like, biking is . . . convenience, and it's transportation, but it's also, like, community." Other participants described biking as embedded in their social routines, such as weekly group rides, bike commuting, or biking with a partner on a date night.

Several participants spoke of their bicycling behavior and how it connected to their childhood. Poppy, a lifelong bicyclist, still rides the bike they had in high school. Cedar, a Davis local, described returning to the landscape as an adult:

> I think a huge part of it has just, like, been recapturing, like, that childlike whimsy. Like . . . I'm now going back to the same spots that I was going when I was 15, jumping my bike on the way home from school, and being like, oh, I remember this spot, like, this is sick!

Toby, a non-binary and transmasculine participant, described riding the same bike his mother had rode in college: "this bike has carried me through 4 years of college, and, like, carried

my mom through her college, and so I'm, like, you know, the bike takes care of me, and I try and make it okay." Mia connected biking in Davis to their early memories of riding with their father: "he got me, like, a legit bike as a kid. And it was always meant to be, like, something that we did together, so I just . . . I live here now, and I feel like I get to connect with that part of my upbringing."

Most participants had a positive attitude towards biking. Celia described their surprise at enjoying biking: "I love it. It's very fun. I didn't think I would like riding my bike, but I really, really, really like it. And I just, I love the feeling of just flying." Maya described the bike as an extension of herself: "bike riding to me is . . . an extension of . . . myself, right? It's a mobility aid, in a way, where expands what I can do, and the places that I can go . . . it's like a sense of freedom, feeling the wind in my face." Mia described how a bicycle made them feel independent: "it makes me feel, like, responsible and independent . . . I'm a hyper-independent person, so the bike helps me be hyper-independent."

Participants across the confidence spectrum described wanting to bike more than they currently did. Cedar, one of the most experienced bicyclists interviewed, described their interest in biking for a majority of their trips: "I'm taking steps to be able to, like, take a bike everywhere, because . . . getting back on a bike, I was just, like, this huge thought where I was like, oh, fuck, I forgot, I love this." Sophia, a non-binary participant, who has never biked regularly, expressed the same aspiration: "I fully see the benefits of it, and I do, like, I so strive to have that, like, freeing, air going through my hair, and I can just kind of do whatever."

DISCUSSION

This study asked two questions: (1) What are the priorities and experiences of TGD bicyclists regarding bicycling safety, comfort, and accessibility? (2) How do gender identity and presentation intersect with bicycling behavior? Survey data confirmed a similar level of comfort

with right of way, navigation, and nighttime biking between TGD and cisgender women respondents, suggesting that they share many of the same safety concerns and comfort levels. Interview data revealed where the two groups diverge: TGD bicyclists in Davis navigate bicycling environments by avoiding risk, managing how their identity is perceived, and drawing on informal social networks. Gender identity and presentation shape bicycling behavior in ways existing gendered transportation literature, focused primarily on cisgender women, has not documented. Two findings emerged that haven't been documented in existing literature—bicycling functioning as a safety strategy and TGD participants calling for formal adult bicycling education in Davis, California.

Gendered mobility

Many of the barriers participants raised—fear of traffic, nighttime fear, and a strong preference for infrastructure separated from traffic—closely resemble those already documented among cisgender women bicyclists (Ferreira et al., 2022; Garrard et al., 2008; Lawton & Kállai, 2002; Lee et al., 2015; Ravensbergen et al., 2020; Wang & Akar, 2018). These barriers can be understood as gendered, produced by environments and norms built around hegemonic male mobility rather than by any inherent trait of women bicyclists. Survey data support this continuity, with TGD and cisgender women respondents reporting comparable comfort with asserting right of way, navigation, and biking at night.

Nighttime fear was rarely separable from gender for TGD participants. Hannah paired her route planning with carrying mace, and Celia stated plainly, "I'm more afraid to bike at nighttime, just because I'm perceived female." This nighttime vulnerability also produced its inverse with some participants framing bicycling itself as a safety strategy rather than only a source of risk, often in reference to nighttime travel. Toby and Celia described the speed of the bicycle contributing to their sense of security after dark. Rose made the comparison explicit, stating that

she would "probably feel more concerned walking, just because there's less opportunity to get away." Existing literature treats nighttime bicycling primarily as a source of personal security risk for women bicyclists (Horton, 2007; Ravensbergen et al., 2020). These accounts suggest that for some TGD bicyclists, bicycling functions as a nighttime safety strategy rather than only a source of nighttime risk.

Presentation shaped this gendered vulnerability in more complicated ways. Early in his transition, before others consistently perceived him as male, Toby described feeling like a visible target while bicycling. Once he was read as masculine, that sense of vulnerability receded. This is a real-world illustration of Butler's (1990) account of gender as performative, produced through perception and enactment, rather than fixed identity. Perceived safety and security on a bike in Davis may depend more on how masculine or feminine a rider is presenting or perceived as much as it depends on gender identity itself. Existing gendered-mobility literature, built around a cisgender/transgender or male/female binary, is not designed to anticipate this.

Within this broader pattern of gendered risk, TGD respondents also reported concern tied to gender perception itself. TGD respondents were nearly three times more likely to report concern about being perceived as their gender while biking (56.3% vs. 20.4%), and over half reported concern about verbal harassment, compared to fewer than one-third of cisgender women respondents (53.1% vs. 31.1%). This aligns with the transmobilities framework from Lubitow et al. (2017), which describes how a cultural normalization of violence toward gender minorities constrains TGD mobility. Vanessa's practice of carrying a garment to cover her chest on certain routes is a bicycling parallel to the concealment strategies Weintrob et al. (2021) document among TGD transit riders. Transmobilities scholarship has so far focused on transit; these findings suggest that the same dynamics extend to bicycling. Given a TGD subsample of 32 in the survey

data, this gap should be understood as a meaningful signal rather than a precise, estimated difference.

Gender presentation also shaped bicycling through the body itself. Maya and Rose both described tension between feminine dress and the practical demands of bicycling—echoing the literature's description of the performance work bicycling requires, managing how one's body is seen while exposed in public in a way a driver is not (Handy & Lee, 2020; Horton, 2007; Ravensbergen, 2020; Ravensbergen et al., 2019; Steinbach et al., 2011). For TGD participants, this performance carried the added weight of gender identity legibility, the bicycle's exposure made it harder to control how their gender was read by others, with consequences ranging from dysphoria to harassment. For Riley and Vanessa this tension produced gender dysphoria. Riley described the physical and emotional toll of tucking while riding a bicycle, and Vanessa described being unable to find a helmet that did not leave her feeling "absolutely ugly." Embodiment did not only produce distress. Mia described a different relationship to gender ambiguity while riding: "I feel a little bit more comfortable with the uncertainty of my gender and my gender presentation, or how people read me… it reminds me that I have this body." Riley and Vanessa's accounts describe the bicycle heightening an unwanted awareness of the body; Mia describes bicycling as a way of settling into that awareness. Cissexism (Serano, 2007), the assumption that bodies should present legibly within a binary, shaped both participant's experiences of harassment ad their relationships to their own bodies while biking.

Abord de Chatillon's (2021) concept of feminine velonomy, characterized by low mechanical confidence and discomfort with bicycle repair, was not clearly reflected in this study. TGD respondents reported higher mechanical comfort than cisgender women (71.9% vs. 54.4%). Interview accounts suggest this comfort coexisted with a separate concern: whether the bicycle itself aligned with their gender presentation. This divergence from Abord de Chatillon's (2021)

framework may also reflect differences in sample composition rather than a genuine break from feminine velonomy; TGD respondents willing to take the survey may be more mechanically engaged than TGD bicyclists generally, and a subsample of 32 limits how confidently this gap can be interpreted as substantive. Whatever the source of this divergence, participants' accounts of mechanical confidence were closely tied to the informal repair support they could access.

Human infrastructure

Access to bicycling in Davis depended heavily on informal social networks: free or donated bicycles, mentorship from friends and roommates, shared repair knowledge, and orientation to routes and norms were all notable resources. This pattern reflects what Lugo (2013, 2018) describes as “human infrastructure,” the ways that social networks make certain actions seem possible or not. It also parallels Barajas’s (2018) finding that immigrant bicyclists in the Bay Area relied on similar community networks and shared identity to navigate barriers that formal infrastructure did not address. For participants like Vanessa and Hannah, a friend’s willingness to ride alongside them or teach basic maintenance was what made bicycling in Davis feel accessible. Several participants, including Maya and Cedar, described actively paying this support forward by inviting friends to ride or servicing bikes for others. This reliance on informal networks carries an important equity implication because this support is built through informal relationships; it is more readily available to those already embedded in bicycling networks than to newcomers seeking to join them. Vanessa’s account illustrates this gap directly. She described Davis’s bicycling infrastructure as extensive, but "not approachable for somebody who's new to biking," noting that unlike other cities, "it's not like I can just YouTube how to bike in a town like this because this town is not normal biking." Sophia echoed this concern, describing existing infrastructure as insufficiently beginner-friendly. This barrier was compounded for some participants by negative secondhand narratives about Davis bike culture. Vanessa and Rose both

described hearing stories of people mocking inexperienced riders before they had biked in Davis themselves, stories that initially discouraged them from riding at all. Someone who arrives in Davis without an existing social connection to the bicycling network may therefore face a much steeper barrier to entry than the city's reputation as a bicycling capital would suggest, regardless of how extensive its physical infrastructure is.

Limitations

This study has several limitations. First, it did not include an intersectional analysis accounting for participants' race, age, class, sexuality, or disability, each of which likely interacts with gender identity to shape their bicycling experience in ways this study cannot capture. This gap runs counter to Crenshaw's (1991) argument that identity categories should be studied together rather than independently, and to Giacomantonio et al.'s (2024) more recent intersectional analysis of gendered bicycling behavior, which this study's design was not able to replicate for a TGD population. This study also does not account for differences within the TGD population itself, transmasculine and transfeminine participants may face distinct mobility barriers shaped by how their gender presentation is perceived in public spaces. Second, findings are geographically limited to Davis, California, a city whose bicycling culture is unusually strong relative to most U.S. cities. The dynamics described here, particularly around human infrastructure, may not generalize to less bicycle-friendly contexts where informal mentorship networks are less developed. Aldred (2010) raises the same concern about her own study of bicycling in Cambridge, a high-bicycling enclave within the low-bicycling UK, noting that her findings "may relate specifically to local environmental factors" (p. 41). Whether the patterns identified in Davis would appear in a city without an established bicycling culture is an open question. Finally, the sample skewed towards university-affiliated participants, who are likely younger than the broader TGD population.

University affiliation and the age skew that accompanies it may limit how broadly these findings apply to TGD bicyclists outside of a university context.

Future research

These limitations point toward several directions for future research. An intersectional study examining how race, class, disability, and sexuality interact with gender identity to shape TGD bicycling experiences would address the most significant gap in this study's design, extending Giacomantonio et al.'s (2024) intersectional approach to gendered bicycling into TGD-specific research. Age warrants attention as its own variable—participants' accounts of gender presentation and concern about public perception may reflect the predominantly young composition of this sample as much as TGD identity specifically, a question this study was not designed to answer. Transmobilities scholarship on transit has documented compounding effects of intersecting identities on mobility that this study was not equipped to capture for bicycling (Lubitow et al., 2017; Weintrob et al., 2021). Future research should also examine how masculine and feminine presenting TGD bicyclists experience bicycling environments differently. Replicating this study in a city with less developed bicycling infrastructure and culture than Davis, following the comparative logic Barajas (2018) applied to immigrant bicycling networks in a different urban context, would help clarify how much of the human infrastructure gap identified here is specific to unusually bike-friendly environments, versus a more general feature of TGD bicyclists' access to informal mentorship networks. Research directly comparing how cisgender men, cisgender women, and TGD bicyclists access and use human infrastructure and social networks would also clarify whether the mentorship gaps described here are TGD-specific or reflect a broader gendered pattern in who benefits from informal bicycling networks.

CONCLUSION

TGD bicyclists in Davis share many of the same barriers documented among cisgender women—fear of traffic, nighttime anxiety, route avoidance, mechanical insecurity—reflecting a shared pattern of constraint. Gender identity and presentation also shape the experience of bicycling itself in ways the existing literature does not capture, and two findings did not fit existing frameworks. Some participants described the bicycle as a means of escape rather than a source of exposure, and several called for formal instruction for adults learning to ride a bicycle. Extensive infrastructure did not, on its own, translate into an accessible starting point for newcomers without an existing social network.

These findings point to a distinction that gendered mobility research built around a binary framework may not fully capture: how masculine or feminine a person is presenting or perceived while riding. Toby's account of feeling safer once he was read as male suggests perceived safety on a bike can track presentation as much as it tracks identity. A feminine-presenting non-binary rider and a feminine-presenting cisgender woman may have more in common with each other in this respect than either does with someone who shares their gender identity but not their presentation.

TGD bicyclists in Davis are not simply cisgender women with additional constraints, nor are they fully explained by transmobilities patterns already documented in transit research. Their experience reflects a specific combination of gender performance, physical exposure, and the use of informal social networks, along with gaps that neither formal infrastructure nor existing scholarship has fully addressed. Because informal networks are more accessible to those already embedded in bicycling communities than to newcomers seeking entry, those with institutional capacity (e.g. UC Davis, the City of Davis, bicycling advocacy groups) should consider formal, low-barrier bicycling education for adults, expanded off-street bicycle facilities that reduce

exposure to traffic, streetlight installation, and efforts to make existing infrastructure and bike repair resources more visible and approachable to those without existing ties to Davis's bicycling community. These recommendations are framed around TGD bicyclists, but infrastructure and programs designed to serve those most excluded tend to improve access for everyone—a principle central to universal design (Connell et al., 1997). As a college town, Davis sees a swell of newcomers every year, so the gap identified here is continually renewed rather than gradually closed. Community-based resources for bicycle repair and social bike riding do exist in Davis, doing the work of building community, but sustained institutional support could help extend that work to newcomers who remain outside of existing bicycling networks. Gendered mobility is not binary, and bicycling infrastructure cannot be separated from the human infrastructure that makes it usable.

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APPENDIX A

Codebook

Theme	Code	Frequency	Definition	Example
Barriers to Biking	accident/near-miss	11	Specific mentions of collisions or solo falls.	“I've had two pretty serious bicycle accidents in the last year, and they're both during the daytime.”
Barriers to Biking	anticipated risk	5	Potential danger or harassment influencing decisions, regardless of prior experience.	“I've never had a negative experience. I think it's just, like, anticipating negative ones.”
Barriers to Biking	bike theft	2	Accounts of stolen bicycles or components.	“It was annoying when my entire wheel got stolen.”
Barriers to Biking	general fear	5	Anxiety unrelated to cars, such as personal injury or mechanical failure in isolated areas.	“So yeah, I guess that that's kind of my issue, is that, like, I'm more worried about... Messing up to the point that it's also harming other people.”
Barriers to Biking	intersection fear	14	Challenges at intersections, including poor design and high-stress interactions.	“I don't have to figure out like turns between like the cars are turning right and who's turning right and left and I have to go in the middle of the intersection. So, that scares me.”

Barriers to Biking	issues with the bike itself	7	Physical discomfort or limitations due to a bike's design, weight, or proportions.	“The thing that kind of scared me off the first bike, too, was that, like, not only was it too big for me, but, like, I couldn't even... handle it.”
Barriers to Biking	learning curve	3	Challenges and skill requirements of transitioning into a biking culture.	“I think that this town does a lot for good bike infrastructure, but I feel like a lot of areas of it aren't well maintained and not approachable for somebody who's new to biking.”
Barriers to Biking	mechanical insecurity	6	Lack of knowledge or skill to perform repairs or maintenance.	“I hardly know anything about bikes and so I was like, this is it, my bike is broken. This is the end.”
Barriers to Biking	negative narratives	4	Secondhand stories of accidents or social judgment that discourage biking.	“The first story that I heard upon entering this town was, oh, yeah, there's a bunch of people that like to sit out in the biking circles on campus and make fun of people crashing.”
Barriers to Biking	nighttime fear	16	Fear or anxiety triggered by biking in the dark.	“I'm definitely conscious of like, not biking at night. If I do, I'll like have mace on me or whatever.”
Barriers to Biking	weather	6	Weather as a factor influencing the decision	“If the weather is going to be good enough, then I will bike.”

			to bike.	
Biking Logistics	auxiliary mode choice	15	Situations where bicycling is dismissed or used only as a secondary mode of transportation.	“When the bus is late, I like to bike. When I miss the bus, I like to bike.”
Biking Logistics	e-devices	17	Electric devices (e-bikes, scooters) and their role in accessibility or culture conflict.	“I try not to be too much of a hater, but I think that's the one area that I'm like, I'm so done with e-scooters.”
Biking Logistics	navigation	12	Tools and strategies used to plan or execute a route.	“Google Maps' bike layer is often wrong, so I'll have to zoom in on satellite view and see if there are bike lanes there, plot a route, and then usually I'll remember it in my head and go there.”
Biking Logistics	primary mode choice	12	Biking as the default mode for commuting and errands.	“I guess probably my default is riding my bike.”
Biking Motivations	health benefits	8	Biking for physical fitness, stress management, or mental “decompression”.	“Yeah, because it's nice to be able to... exercise, and get fresh air and, like, sunlight if it's there, or whatever.”

Biking Motivations	social benefits	14	Biking to socialize and connect through shared activities or group rides.	“The social aspects of bike riding definitely pushed me to get a bike. I just felt like it was... I just... it just made everything easier, it made outings easier, I could do more things in Davis socially with the bike.”
Biking Motivations	utility	31	Logistical advantages like flexibility, speed, ease of parking, and cost savings.	“If I need to be somewhere on short notice, like, it's the bike, you know? I gotta take the bike.”
Davis Culture	biking city	14	Biking as a vital part of Davis's identity and a behavior unique to living there.	“I knew that bikes were, like, the thing in Davis.”
Davis Culture	friendly bike culture	5	Perception of the Davis biking community as welcoming and supportive.	“If there's somebody else biking, I feel like I... I feel like I could stop and ask most people, like, hey, do you have, like a, do you have like a hex key or something?”
Davis Culture	normative bike culture	11	A Davis cultural norm treating biking as the default and “morally superior” transport.	“I get this overall sense that biking is good, driving is bad.”

Gender	gender presentation	22	Interaction between gender identity/clothing and biking.	“It brings me joy to dress more femininely, a lot of my wardrobe involves, like, skirts and stuff like that. So I feel like biking in a skirt is definitely a detractor. I would try and avoid it, if possible, just because it's a little awkward.”
Gender	gendered harassment	4	Experience of gender-based harassment while biking.	“I got cat called a few times.”
Gender	negative bike culture	2	Exclusionary social norms, often centered on toxic masculinity.	“I think a lot of... of cycling is very, or historically has been, like, very, like, male-centric.”
Personal Sentiments	aspirations	8	Desires or intentions to alter current biking habits.	“I fully see the benefits of [biking], and I do, like, I so strive to have that, like, freeing, air going through my hair, and I can just kind of do whatever.”
Personal Sentiments	childhood connection	19	Early biking memories and nostalgia.	“I think a huge part of [biking] has just, like, been recapturing, like, that childlike whimsy. Like... I'm now going back to the same spots that I was going when I was 15, jumping my bike on the way home

				from school, and being like, oh, I remember this spot, like, this is sick!”
Personal Sentiments	embodiment	6	Physical or psychological awareness of the body while bicycling.	“Biking, makes me feel more aware of my body, and, and I also, I mean, yeah, and it makes me think about how I move my body, what parts of my body hurt, maybe, or what parts feel good, or, like, the relief after a bike ride.”
Personal Sentiments	positive affect	10	Positive emotional/sensory experiences like joy, independence, and freedom.	“[Biking] is fun for me. It also makes me feel, like, responsible and independent.”
Risk and Stress Reduction Behavior	defensive speed	7	Using the speed of biking to reduce nighttime risk or stress.	“But if I'm gonna be, like, on campus at night, I usually do bike, just because it feels safer to, like, bike at night as opposed to, like, walk in the dark.”
Risk and Stress Reduction Behavior	safety in numbers	5	Increased sense of safety due to the presence of other bicyclists.	“It's nice that there's multiple other people on the road that are riding bikes when I am because it’s easy to merge when there’s three people in the left turn lane.”

Risk and Stress Reduction Behavior	strategic route choice	35	Selecting routes based on safety, comfort, or familiarity over speed, prioritizing separation from traffic.	“Like, if I have to bike on the street, I'm really scared. Yeah, because I have very little experience doing that. And I know that biking on the bike paths is, is a lot safer and I know it better.”
Self-Efficacy	biking confidence	6	Competence in navigating traffic and asserting right-of-way.	“Relatively speaking, I feel comfortable taking up a full lane.”
Self-Efficacy	mechanical confidence	8	Self-identified competence in bike maintenance and repair.	“I've tried to fix my bike on my own, and I definitely can... like, I can... I can fix it on my own.”
Self-Efficacy	wayfinding confidence	4	Competence in orientation, route planning, and navigation.	“If I get lost... No biggie, just... stop and... Stop and figure out.”
Social Infrastructure	bike education	6	Identified need for formalized education on safety and road rules.	“So the campus should be teaching these people how to better use their bike infrastructure. You should be teaching these people how to better use their bike infrastructure because these people are a part of your community.”

Social Infrastructure	bike mentorship	18	Informal transfer of biking literacy, guidance, or accompaniment.	“When I moved here, [my roommate] and I would ride around and like, oh, here's downtown, here's the campus, here's whatever. So I think that probably helped a lot.”
Social Infrastructure	material assistance	19	Reliance on formal or informal resources for bike maintenance and repair.	“Other members of my community...help out because I felt like I could, there was places I could if I needed immediate maintenance, I could stop by and I would feel comfortable doing that rather than being stranded in the middle of town.”

APPENDIX B

Interview Guiding Questions

Introduction

We are here to talk about your experiences, thoughts, and attitudes surrounding bicycling. Everything you say to me here is confidential, and will be reported anonymously. Your name will not be linked to any of your answers. This interview will be audio recorded, so that I can accurately represent what you say to me today. The interview should last about 30-45 minutes. If a question isn't clear or doesn't make sense to you, please be sure to ask me for further clarification.

Do you have any questions before we begin?

Demographics

What are your pronouns?

How would you describe your gender?

Guiding Questions

Could you tell me about your experience with biking before you lived in Davis?

Tell me about what went into your decision to ride your bike in Davis.

What factors into your decision to ride or not ride your bike?

What are the particular purposes, situations, or circumstances in which you ride your bike?

How does your gender impact your experience biking?

Could you share a time that your gender felt significant or visible (to yourself or to others) while biking?

Safety

Are there particular places, moments, or situations where you feel safe biking?

Are there particular places, moments, or situations where you feel unsafe biking?

Could you tell me about an experience you've had biking during hours of darkness?

Could you tell me about an experience you've had asserting your right of way while biking?

Could you tell me about an experience you've had navigating an unfamiliar route while biking?

How do you prepare to navigate a new route while biking?

What factors do you consider when choosing a bike route?

Could you tell me about a time that your bike had a mechanical issue?

What kind of support do you receive from your community for fixing or maintaining your bike?

Community & Culture

What does riding your bike mean to you?

Tell me about the people in your life who have influenced/facilitated your bike riding?

Can you share a story about biking with friends or members of your community?

What other kinds of support do you receive from your community as a bicyclist?

How would you describe the culture around biking in Davis?

Do you feel represented in the Davis biking community?

Conclusion

What would encourage you to bike more?

What particular problems related to biking would you like to see addressed?

Is there a question you were expecting me to ask, or one you think I should have asked but didn't?

APPENDIX C

Survey Questions

Q0 Thank you for participating in my study on transportation attitudes. Your responses could help shape programs and policies aimed at improving transportation conditions. The survey will take about 5 minutes to complete. Participation is voluntary, and you may exit at any time. Your responses are confidential and used only for research.

Q1 What is your email address?

Q2 What is your gender? Check all that apply. Female (1) Male (2) Non-binary (3) Prefer not to say (4) Other

Q3 Do you identify as transgender? Yes (1) No (2) Prefer not to say (3)

Q4 What is your age?

Q5 How would you describe yourself? Check all that apply.American Indian or Alaska Native (1) Asian (2) Black or African American (3) Hispanic or Latino (4) Middle Eastern or North African (5) Native Hawaiian or other Pacific Islander (6) White (7) Prefer not to say (8)

Q6 Do you identify as a person with a disability? Yes (1) No (2) Prefer not to say (3)

Q7 Do you own or have regular access to a bicycle (in working condition)? Yes (1) No (2)

Q8 In a typical week with good weather, which of the following statements most closely represents you? I ride my bike every day or nearly every day (1) I ride my bike a few times a week (2) I ride my bike about once a week (3) I rarely ride my bike (less than once a week) (4) I do not ride a bicycle (5)

Q9 In the past month, have you thought about changing how you travel, such as biking more often or starting to bike? Yes, I've been considering it seriously. (1) Yes, but I haven't thought much about it. (2) No, I haven't thought about it. (3)

Q10 Please rate your level of concern for each of the following questions related to bicycling. If you do not currently bicycle, please indicate your level of concern if you were to consider biking.

How concerned are you about being…

Involved in a collision while biking?

Verbally harassed while biking?

Physically attacked while biking?

Perceived as your gender while biking?

Q11 Please rate your level of comfort for each of the following questions related to bicycling. If you do not currently bicycle, please indicate your level of comfort if you were to consider biking.

How comfortable are you…

With handling mechanical issues that may occur while biking?

In situations where you need to assert your right of way while biking?

With navigating unfamiliar routes while biking?

With biking during hours of darkness (before sunrise or after sunset)?

Q12 Do you have any other comments you'd like to share about bicycling or this survey?