RESEARCH REPORT

Institute of Transportation Studies | UNIVERSITY OF CALIFORNIA

Evaluating Universal Basic Mobility Pilot Programs in Oakland and Bakersfield, California

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October 2024

UC DAVIS Institute of Transportation Studies

Report No.: UC-ITS-2022-20 | DOI: 10.7922/G2Z31X0K

Technical Report Documentation Page

Report No. UC-ITS-2022-20	**2. Government Accession No.** N/A	**3. Recipient's Catalog No.** N/A
4. Title and Subtitle Evaluating Universal Basic Mobility Pilot Programs in Oakland and Bakersfield, California		**5. Report Date** October 2024 **6. Performing Organization Code** ITS-Davis
7. Author(s) Angela Sanguinetti, https://orcid.org/0000-0002-9008-7175; Eli Alston-Stepnitz, https://orcid.org/0000-0001-9675-4445; Leslie Nelson; Emily Searl; Ashley DePew		**8. Performing Organization Report No.** UCD-ITS-RR-24-53
9. Performing Organization Name and Address Institute of Transportation Studies, Davis 1605 Tilia Street Davis, CA 95616		**10. Work Unit No.** N/A **11. Contract or Grant No.** UC-ITS-2022-20
12. Sponsoring Agency Name and Address The University of California Institute of Transportation Studies www.ucits.org		**13. Type of Report and Period Covered** Final Report (September 2021 – November 2023) **14. Sponsoring Agency Code** UC ITS
15. Supplementary Notes DOI: 10.7922/G2Z31X0K		

16. Abstract

Pilot programs in California and beyond are exploring universal basic mobility (UBM), which calls upon government actors to ensure that everyone can access transportation services for basic needs. UBM addresses the problem of transport poverty, which is defined in various ways but is generally when transportation spending puts one below the poverty line or transportation is exceedingly time-consuming, unsafe, or unavailable. This research evaluated UBM-inspired pilot programs in Oakland and Bakersfield, via pre- and post-pilot surveys and interviews during the programs. Both pilots provided free-fare transportation services (shared micromobility in both cities and public transit services in Oakland) to populations vulnerable to transport poverty (residents of a low-income, minority-majority community in East Oakland and current and former foster youth in Bakersfield). Participants replaced car trips and/or walking with shared mobility and/or public transportation and reported improved access to jobs, food, health care, and social and recreational opportunities. They were able to go more places, more efficiently, and perhaps even enjoy the trip. The services helped participants carry out activities with more comfort and dignity and yielded social and cultural benefits. Lessons learned for program design and administration include the need for: providing some car-based services; clear communications throughout the program; training/support components for new mobility options; troubleshooting operations; and planning for turnover in program staff and fast changes in micromobility services.

17. Key Words Mobility, transportation disadvantaged persons, low income groups, travel behavior, public transit, shared mobility, micromobility, pilot studies		**18. Distribution Statement** No restrictions.	
19. Security Classification (of this report) Unclassified	**20. Security Classification (of this page)** Unclassified	**21. No. of Pages** 58	**22. Price** N/A

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

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Acknowledgments

This study was made possible with funding received by the University of California Institute of Transportation Studies from the State of California through the Road Repair and Accountability Act of 2017 (Senate Bill 1). The authors would like to thank the State of California for its support of university-based research, and especially for the funding received for this project. The authors would also like to thank Spin for supplementary funding (and Ford who owned Spin at the time), Dream Center (Jayme Stuart and Rachel Sanders) and Spin staff (Josh Johnson and Phuong Bui) for integral support on the Bakersfield pilot evaluation, and the City of Oakland Department of Transportation (Quinn Wallace, Kevin Diep, Michael Randolph, and Kerby Olson) for integral support on the Oakland pilot evaluation. We would also like to thank Kate Hirschfelt for her design contributions to this report and associated project website (https://ubmpilots.sf.ucdavis.edu/) and Mollie d'Agostino for her feedback on the report and support of the project website.

Disclaimer

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Acronyms

BART	Bay Area Rapid Transit
BRT	Bus Rapid Transit
K10	Kessler Psychological Distress Scale
MHI-5	Mental Health Inventory
SWLS	Satisfaction with Life Scale
T1	Time 1, refers to the first survey in Oakland and Bakersfield, conducted when the pilot program participant joined the program (in Bakersfield) or shortly after (in Oakland)
T2	Time 2, refers to the second survey in Oakland and Bakersfield, conducted toward the end of the pilot in Bakersfield and implemented in stages in Oakland as participants had spent down their prepaid cards
UBM	universal basic mobility

Executive Summary

Executive Summary

Pilot programs in California and beyond are exploring *universal basic mobility* (UBM), which calls upon government actors to ensure that all residents–regardless of their socioeconomic status and abilities—can access transportation services for basic needs like work, food, and healthcare (Comeaux, 2019). UBM addresses the problem of transport poverty, which can be broadly defined as occurring when transportation spending puts one below the poverty line or when transportation is exceedingly time-consuming, unsafe, or unavailable. Consequences include stagnant economic mobility and diminished quality of life (Churchill and Smyth, 2019; King et al., 2019; Shah, Mullainathan & Shafir, 2012). Those particularly vulnerable to transport poverty include low-income households, communities of color and unauthorized immigrants (Sanchez, 2018); persons with disabilities (Bezyak, Sabella, & Gattis, 2017); and disconnected youth (i.e., those neither working nor in school; Lewis, 2019, 2022).

Funded by California Senate Bill 1 and shared e-bike and e-scooter company Spin (now owned by TIER), this research evaluated UBM-inspired pilot programs in two major California cities: Bakersfield and Oakland. The central component of both pilots was free fare transportation service, though each consisted of very different service offerings. The Bakersfield pilot included up to five free 30-minute rides per day during one year on Spin's shared, dockless e-scooters or e-bikes for 100 youth. (Bakersfield has very limited public transit service.) Oakland distributed prepaid cards ($300 for 500 selected participants) that could be used on a variety of public transportation and shared mobility services. The pilots targeted two very different populations, both vulnerable to transport poverty. In East Oakland, this was a low-income, minority-majority community with a large number of undocumented immigrants, located near a new rapid bus line. In Bakersfield, the target population was young adults with a history of foster care or other social service needs, either meeting the definition of disconnected youth or at-risk.

The research project evaluating these programs considered how participants used the provided transportation services, the degree to which they alleviated their experiences of transport poverty, and any broader impacts on participants' economic status and well-being that flowed from mobility changes. Data collection methods included pre- and post-pilot surveys and interim in-depth interviews during the pilots in both cities. The research design included within-subjects comparisons (participants' experiences before and during the pilots) and between-groups comparisons in Oakland (participants' experiences compared to a control group).

In Oakland, participants most often used their funds to ride BART (Bay Area Rapid Transit), a heavy-rail transit system, and buses operated by Alameda-Contra Costa Transit District (AC Transit). The participants benefited from the new, fast Bus Rapid Transit (BRT) line run by AC transit in their neighborhood. BART was often unaffordable to participants before the pilot. Participants in both cities replaced car trips and/or walking with shared mobility and/or public transportation. They were also inspired to try new modes (or those they did not use regularly before the pilot), sometimes for recreation or leisure, but more often for utilitarian purposes (particularly in Bakersfield).

The pilots were successful at alleviating many aspects of transport poverty. Participants reported improved access to jobs, food, health care, and social and recreational opportunities. They were freed to go more places and choose travel modes to get there more quickly and perhaps even enjoy the ride. The services also helped participants carry out their activities with more comfort and dignity and yielded social and cultural benefits. In the post-pilot survey, Oakland participants reported greater overall satisfaction with life compared to their pre-pilot responses and compared to the control group. Measures of overall health and mental health did not indicate significant change in the aggregate samples, although some individual participants reported major improvement in their mental health due to lower anxiety related to finances and travel and lower depression due to increased outdoor activity and social opportunities.

The transportation service offerings occasionally fell short of alleviating transport poverty in two main ways: they sometimes were not accessible and sometimes failed to provide a safe option. In Bakersfield, unprecedented levels of vandalism to the Spin e-bikes toward the end of the program led to poor vehicle availability as well as unreliable performance due to equipment failures. This caused great disappointment and inconvenience for participants who had come to rely on those services. Occasional equipment failures (likely often related to the vandalism) and some user behavior (e.g., not wearing a helmet) made for unsafe conditions for micromobility. However, lack of appropriate bike infrastructure was a much bigger problem in this regard. Oakland pilot participants also cited lack of safe bike lanes and poor road conditions as well as lack of vehicle availability as deterrents to using shared micromobility. Some participants who did not feel safe or comfortable using either shared micromobility (due to age, ability, or lack of familiarity) or public transit (due to fear of crime or harassment) limited their use of services to the most basic of needs (e.g., food, health care) and did not get to experience the social and recreational benefits that some participants found with the programs.

Some of these issues could be addressed with program design. The most impactful solution would be to include a car-based mode in the service offerings. Notably, Spin did consider including ridehailing credits and Oakland Department of Transportation tried to include carshare (and accidentally included ridehailing by some accounts). Further, more educational and communication strategies (e.g., fairs, ride-and-drive events) in Oakland might have helped some participants feel comfortable using micromobility, and perhaps they could even provide training on how to respond to crime and harassment on public transit. Bakersfield had a strong training component (easier to do when the focus is on a single service). And, of course, both programs would have been more successful in terms of supporting micromobility had they been able to create and maintain high levels of vehicle access to participants.

Pilot participants in both cities were universally appreciative of the service offerings and reaped significant benefits, a testament to the value of universal basic mobility. These benefits occurred despite challenges in program administration in both cities and interviews revealed that participants were already accustomed to imperfect transportation services. Cities and mobility providers should be inspired by these findings to continue to develop and implement UBM-*inspired* programs—they don't need to be perfect to make a difference in people's lives. That said, designers of future programs should heed lessons learned from these and other pilots and include evaluation components to eventually make UBM a reality.

Contents

Introduction

Transport poverty has become increasingly prevalent in developed countries (Churchill & Smyth, 2019). Europe and the UK define transport poverty as a condition in which 10% or more of a household's income is spent on mobility-related costs (Energy Cities, n.d.; RAC Foundation, n.d.). By this definition, most Americans are transport poor. According to the Bureau of Labor Statistics (2024), the average American household spent 16% of its income on transportation in 2021.

Beyond affordability, transport poverty can describe other mobility challenges related to travel time, accessibility (to travel modes or destinations), and safety. According to Lucas et al., (2016, p. 356), transport poverty applies if any one of the following conditions are met:

- The necessary weekly amount spent on transport leaves the household with a residual income below the official poverty line.
- The individual needs to spend an excessive amount of time traveling, leading to time poverty or social isolation.
- There is no transport option available that is suited to the individual's physical condition and capabilities.
- The existing transport options do not reach destinations where the individual can fulfill his/her daily activity needs, in order to maintain a reasonable quality of life.
- The prevailing travel conditions are dangerous, unsafe or unhealthy for the individual.

Those particularly vulnerable to transport poverty include members of low-income households, persons of color, and unauthorized immigrants (Sanchez, 2018); persons with disabilities (Bezyak, Sabella, & Gattis, 2017); and disconnected youth (i.e., those neither working nor in school; Lewis, 2019, 2022).

Transport poverty has far-reaching detrimental consequences for individuals and communities. It may be difficult to access basic needs, such as jobs, food, and healthcare (Ahmed et al. 2001; Seyd et al., 2013; Silver et al. 2012). Opportunities for education, community participation, recreation, and leisure may also be constrained (Crabtree, 2017). Those with less access to transportation may struggle to attain upward economic mobility and can experience a diminished quality of life, including physical and psychological health and happiness (Churchill and Smyth, 2019; King et al., 2019; Shah, Mullainathan & Shafir, 2012).

Several pilots in California and beyond are exploring universal basic mobility (UBM), which calls upon government actors to ensure all residents—regardless of their socioeconomic status and abilities—can access transportation services for basic needs, such as work, food, and healthcare (Comeaux, 2019). UBM is based on the broader concepts of universal basic services (Coote et al., 2019) and universal basic income (Ghuman, 2022). Funded by California Senate Bill 1 and shared e-bike and e-scooter company Spin (now owned by TIER), this research evaluated UBM-inspired pilot programs in two major California cities: Bakersfield and Oakland.

The evaluations considered how participants used the provided transportation services, impacts on their experiences of transport poverty, and any broader impacts on participants' economic status and well-being that flowed from mobility changes.

Background

The following sections introduce the pilot locations and programs. First, overviews of each city, target population, and transportation landscape are provided. The pilot programs are then described.

Oakland

The City of Oakland is in Alameda County in the San Francisco Bay Area in California. Home to just under 434,000 people, Oakland is the state's eighth most populous city. The median annual household income is just over $80,000 and about 15% of the population is living in poverty (U.S. Census Bureau, 2021-b). Oakland's cost of living ranks high compared to other cities in the state, nation, and world[1]. According to the Center for Neighborhood Technology's (CNT) Housing and Transportation Affordability Index (HTA) (2023) an average household with 80% of the area median income in Oakland spent 24% of their income on transportation, compared to the above-referenced 10% threshold for transport poverty and the 16% national average.

East Oakland is a geographical subsect of Oakland with about 90,000 residents and is one of the most economically disadvantaged communities in Alameda County (Marcelli & Pastor, n.d.). Seventeen percent of East Oaklanders are estimated to be unauthorized immigrants (largely Latino) and their poverty rate is higher than native born residents. East Oakland is also considered a food desert (USDA, 2009, McClintock, 2008, Short, Guthman, and Raskin, 2007). The ratio of grocery stores to residents in the East and Downtown Oakland "flatlands" is one to every 93,126 residents, a stark contrast to the more affluent Oakland "hills" neighborhoods, where the ratio of grocery stores to residents is one to 13,778 (Oakland North, n.d.).

As part of the bustling Bay Area, Oakland is served by a variety of public transportation and shared mobility services. The Bay Area Rapid Transit (BART) heavy-rail public transit system connects Oakland and other East Bay cities with San Francisco and South Bay cities, and the Alameda-Contra Costa Transit District (AC Transit) operates buses across Alameda and Contra Costa counties (Pan & Shaheen, 2021). The Metropolitan Transportation Commission (MTC) partners with Lyft to operate Bay Wheels docked bikesharing in the East Bay and San Francisco, and a variety of private shared mobility services have cycled in and out of agreements with the city; currently GIG provides carsharing and Lime, Link, and Veo provide stand-up and/or seated e-scooters.

However, East Oakland has historically had some of the lowest levels of access in the area. BART can be prohibitively expensive for low-income households and AC Transit stations are sparse and their buses can be crowded and unreliable (Pan & Shaheen, 2021) for many residents. AC Transit started operating a new Bus Rapid Transit (BRT) line in East Oakland, called Tempo or Line T1, in August 2020, to address some of these issues (Cabanatuan & Swan, 2020). There is also a popular low-income public transportation discount program

[1] https://livingcost.org/cost/united-states/ca/oakland

run by the Metropolitan Transportation Commission called Clipper START, offering 20% off BART and AC Transit to residents with income under 200% of the federal poverty level, and there have been a number of shared micromobility discount programs for low-income community members in Oakland, including some administered by the service operator as a condition of the city's permitting process (Pan & Shaheen, 2021).

Bakersfield

The City of Bakersfield is located in Kern County in the California Central Valley (USGS, n.d.). The median annual household income is $65,687, and 17.2% of the population is living in poverty (U.S. Census Bureau, 2021-a). An average household with 80% median area income in Bakersfield spends 34% of their income on transportation, compared to the 10% threshold for transport poverty and the 16% national average (Center for Neighborhood Technology, 2023).

Bakersfield is California's ninth largest city, home to roughly 407,000 people, almost 30% of whom are under 18 years of age (U.S. Census Bureau, 2021-a). Bakersfield has the second highest rate of disconnected youth in the country at 20%, compared to 13% nationally (Lewis, 2022). Factors associated with disconnection in the California Central Valley include dropping out of school, involvement with the foster care system, juvenile crime, teenage pregnancy, and poverty (Erbstein and Heckman, 2007).

Bakersfield epitomizes urban sprawl, with its suburbs encroaching on the surrounding productive agricultural land (Davis, 2016). The city has no light rail or subway system and only a few bus routes (https://kerntransit.org/; GET). The bus system (Golden Empire Transit) often suffers from inadequate funding, leading to limited service hours, infrequent service, and overcrowding. Uber and Lyft both operate ridehailing services in the city. According to the 2020 American Community Survey (ACS), 93% of the workforce travel to work by car, truck, or van and less than 1% use each of the following: public transportation, walking, and bicycling (U.S. Census Bureau, 2020). The Kern County Health Assessment and Information Plan (2019) identifies lack of transportation as a barrier for their residents to access healthcare and grocery stores. Bakersfield also ranks worst in the nation for air pollution owing largely to its valley geography.

Oakland's Universal Basic Mobility Pilot

Funded by a grant from the Alameda County Transportation Commission, the City of Oakland Department of Transportation (DOT) designed their UBM pilot to provide 500 East Oakland residents with $300 to spend on transportation services. The funds were provided in two installments of $150 on a prepaid card (from vendor Usio; usio.com) that worked like a debit card but could only be used to buy passes or trips on public transit and shared mobility. Specifically, eligible services included, public transit options: BART, AC Transit, Amtrak, WETA ferries (connecting Oakland to San Francisco); and shared mobility options: Bay Wheels docked bikeshare and Lime, Link, and Veo dockless e-scooters. The original plan included GIG carshare (listed in the outreach materials at program launch), but the cards did not work for this service. Spin was a partner in the pilot

planning but removed their e-scooter fleet just prior to pilot launch due to high rates of vandalism. Ridehailing was not included, but several pilot participants interviewed in this research said that their card worked to pay for Lyft or Uber.

Oakland DOT recruited participants within a quarter-mile of the new Tempo (Line 1T) Bus Rapid Transit (BRT) corridor east of the Lake Merritt Bay Area Rapid Transit (BART) rail station. Oakland DOT partnered with community-based organizations, tabled at transit stations and events in the area, and mailed out flyers to local businesses and residences. Prospective participants were directed to the program website to fill out an application available in English, Spanish, Chinese, and Vietnamese. The Oakland DOT received over 1,000 applicants and used random stratified sampling to select the 500 recipients (participants) to represent the area geographically and in terms of race and income. There was no minimum age and no maximum number of applicants or recipients per household.

Pilot participants were selected in Fall 2021, and prepaid cards initially distributed in December. Likely due to a lack of recognizable branding on the mailing materials, many replacement cards had to be distributed and many selected applicants never received their card (and likely never knew they were selected). As of early October 2022, 233 cards had been activated out of the 500 selected applicants. The cards expired in November 2022, after which participants lost any remaining funds. Other elements of the program included two community bike rides led by East Bay non-profit, Cycles of Change, and a program website[2].

Spin's Mobility Pilot in Bakersfield

The Bakersfield pilot was spearheaded by Spin, an operator of shared dockless electric scooters and bikes. Spin was a subsidiary of Ford Motor Company at the time and is now owned by TIER. Spin partnered with the Kern County Network for Children's (KCNC) Dream Center, a comprehensive social services resource center for current and former foster youth up to the age of 25, to design a pilot program targeting youth in the community who were disconnected (i.e., neither employed nor in school) or at risk of being disconnected.

Spin designed the service package for the pilot in consultation with KCNC. The plan was to provide limited free micromobility services and bus passes to 100 disconnected or high-risk youth for one year. Spin attempted to purchase the bus passes from Golden Empire Transit (GET) but they were unable to complete the transaction, seemingly due to GET's limited resources at the time. They also considered including ridehailing services since this was a mode often used by Dream Center clients, but the final design included only Spin vehicles. The city made an agreement with Spin to launch e-scooters in January 2022, and the plan was to later add e-bikes. When the agreement was reached for e-bikes, it excluded e-scooters, so the scooters were removed and 125 e-bikes launched in May 2022. For both e-scooters and e-bikes, participants were given a daily allotment of 5 rides of 30 minutes or less in duration.

[2] https://www.oaklandca.gov/topics/universal-basic-mobility

Participants needed access to a smart phone with the Spin app installed to use the services but were not required to provide credit card information. Dream Center staff and participants were provided with training videos and a map of operating zones. Spin also visited the Dream Center to train staff and donate helmets and provided avenues for free trials for their clients to try the services before enrolling. Staff introduced pilot participants to the vehicles one-on-one upon enrollment. While accounts could be shut down due to ride overages, there was no limit to the number of account reinstatements for participants if they or Dream Center staff communicated about a problem or need.

Dream Center staff identified and recruited their clients who they believed would be a good fit for the program based on their demonstrated motivations and abilities to reap benefits from the program (e.g., newly located in supportive housing, seeking employment, emotionally stable, without known substance abuse issues). Dream Center administration also reached out to other organizations providing services to disconnected youth to invite them to refer their clients for the mobility pilot, including a program for low-income students at Bakersfield Community College and one for homeless high school students. Spin ended up enrolling 125 participants in total. Most enrollment occurred between January and March 2022, although about 14 participants were enrolled later, as late as mid-May, because the Dream Center recruited replacements when participants moved away or discontinued use. Due to the long enrollment period, Spin extended the program through March 2023. However, they experienced unprecedented levels of vandalism to the e-bikes that resulted in the program effectively ending in the fall of 2022 because virtually all vehicles were either missing or held up in maintenance.

Literature Review

The following sections provide a brief literature review. First, the general types of transportation services offered (or not offered) in each of the pilots are discussed in relation to transport poverty issues. Subsequently, comparable mobility programs and evaluations are reviewed.

Mobility Services and Transport Poverty: Cars, Transit, and Micromobility

A leading contributor to transport poverty in the auto-oriented US is the high cost of owning, maintaining, and driving a car (King et al., 2019). Low-income communities have lower rates of car ownership than middle-income communities, despite longer commutes (Glaeser et al. 2008; Kodransky & Lewenstein 2014; Yu 2014). Among low-income car-owners, many may not be able to afford to drive regularly or may have older vehicles and cannot afford necessary maintenance and repairs, leading to unreliable and unsafe transportation options, in line with Lucas et al.'s (2016) multifaceted definition of transport poverty.

Mitra and Saphores (2020) found that involuntarily carless households in California are less mobile than others (i.e., with less than half as many trips and over shorter distances) and argued that "'carlessness' may be the most vivid expression of mobility disadvantage in a car-centric society such as ours" (p. 2837). King et al. (2019) demonstrated that carless households fall behind economically in auto-oriented areas and argued that planners should consider vehicles essential infrastructure in most of the US. The Oakland pilot's offerings included carshare, but no car-based services were included in the Bakersfield pilot.

Low-income communities and carless California households—even those who benefit from carsharing (Mitra, 2021)—rely on public transportation (Glaeser et al. 2008; Kodransky & Lewenstein 2014; Mitra & Saphores, 2020; Yu 2014). While California is well-known for its freeway system, public transit services fall short of residents' needs, particularly outside of large metropolitan areas (Cervero et al., 2002). Bakersfield is a prime example, and the pilot provided participants no affordances for using the city's limited public transit system.

However, even where public transit is relatively accessible and affordable, issues like reliability (including transfer timing, delays, and prohibitive crowding; Carrel, Halvorsen, and Walker, 2013), crime, and harassment can contribute to transport poverty (Scauzillo, 2023). Oakland's pilot afforded participants with access to a wide range of public transit services, but the degree to which these can address transport poverty is subject to these other issues. Safety concerns related to crime and harassment on public transit may be particularly relevant in East Oakland. Newly proposed legislation (Senate Bill 434) would require the top ten transportation agencies in California, including BART and AC Transit that serve East Oaklanders, to survey users about safety, harassment, and discrimination experiences while using their services, with a focus on women of color who seem to be targeted at higher rates.

Shared micromobility (on-demand bike, e-bike, and e-scooter services) has recently emerged as a potential solution for addressing accessibility and reliability issues with public transit, e.g., first- and last-mile connections to public transit for underserved communities to access jobs and other basic needs (DuPuis et al., 2019; NABSA, 2014; Smith & Schwieterman, 2018). Shared micromobility can also make active transportation and its associated benefits for health and well-being (e.g., Musselwhite et al., 2015) accessible to more people (Lee, Sener, & Jones, 2017; Shaheen & Cohen, 2019; Shaheen et al., 2014; Shaheen et al., 2012; Smith et al., 2017), although users remain typically young and male (Meng & Brown, 2021; Shaheen et al., 2014). Despite some evidence of significant interest in shared micromobility among low-income communities and communities of color (McNeil et al., 2017), actual usage rates among these populations are generally relatively low (Dill & McNeil, 2021; Stowell, 2020). Barriers that inhibit traditional active modes (e.g., walking and biking) may be a factor, such as lack of safe street infrastructure and the distance between housing and jobs and services (Kodranksy & Lewenstein 2014), as well as inequitable access to micromobility services (Aman et al., 2021; Ursaki & Aultman-Hall 2015). Shared micromobility services were provided in both pilots, and were the exclusive offering in Bakersfield, creating an opportunity to examine the degree to which, and conditions under which, disadvantaged youth will adopt shared micromobility if some of these barriers are addressed.

Mobility Programs and Evaluations

Only about a third of the US's largest transit agencies have low-income reduced-fare programs (Darling et al., 2021) and they often are not structured to ensure fare equity for all riders (e.g., stringent eligibility requirements for income relative to poverty level and undifferentiated fare reductions). Darling et al. estimated recipients of these means-based programs still spend up to 6% of their income on transit and very-low-income people may spend much more.

Many places have experimented with fare-free transit programs (FFTPs), which typically produce an increase in public transit use, including among low-income recipients (Brough et al., 2022). This increase is often sustained long-term after fares are reinstated (Boyd et al., 2003; Cats et al., 2016; Studenmund & Connor, 1982); however, this effect has not been demonstrated with low-income transportation subsidy recipients in particular (Brough et al.). Studies of FFTPs also have mixed results regarding mode shift and impacts on transport poverty. For example, some have found a decrease in car trips (Cats et al.), as well as walking and biking (Boyd et al.), and others found increased transit use was due to new trip generation (Bull et al., 2021; Studenmund & Connor). Trip generation could be a positive sign of improved mobility for the disadvantaged (Cats et al.), but some programs have found that the impacts are mainly on those living near transit stations/stops (Boyd et al.; Bull et al.) and not particularly benefitting the transportation disadvantaged (Studenmund & Connor). As previously mentioned, other transport poverty issues moderate the impact of FFTPs. McDonald et al. (2004) evaluated an FFTP for low-income youth in the San Francisco Bay Area and found that safety at bus stops was a major issue in inhibiting the program's impact on after-school program attendance (particularly in the winter months when it would be dark when the youth traveled home).

Cities, for-profit shared mobility operators, and other partners have also created programs to increase lower-carbon and more supportive transportation access among underserved communities, including means-based fare approaches. One unique program, Miocar (miocar.org) offers electric car share in the California Central Valley (Kern and Tulare Counties); 27 EVs are stationed at 8 affordable housing complexes (none in Bakersfield).See McNeil et al. (2019) for bike share equity program strategies and case studies; approaches include price discounts and payment schemes to address needs of those without smartphones, data plans, or debit or credit cards, as well as communications and educational elements. Equity strategies for dockless micromobility services also include vehicle rebalancing and operations plans that target underserved neighborhoods; these are sometimes a condition of operating agreements (National Association of City Transportation Officials, 2020).

Spin's Access program provides discounted fares for low-income riders, including those without smartphones, data plans, or credit cards. In a multimethod evaluation of their Access program, which included interviews and surveys of Access riders, vehicle use data analysis, and consultation with experts (including the East Oakland Collective; eastoaklandcollective.com), Spin identified time savings, independence, and enjoyment as key benefits of their services. They also found that these users compared to other users are more sensitive to challenges that can be encountered with the services (e.g., lack of reliably available vehicles). They summarized identified challenges into key areas for improvement and suggested solutions, some of which were tested in the Bakersfield pilot. For example, they suggested providing packages of rides instead of pay-as-you-go pricing. Although the ride packages (5 daily trips, each up to 30 minutes long) were free in the Bakersfield pilot, it was an opportunity to consider what a reasonable package would be.

Pilot programs have been emerging to test the concept of mobility wallets—an electronic or card-based payment method that can be used across public transit and shared mobility services. Mobility wallets are related to the concept of UBM as they are often focused on addressing the needs of underserved communities, as well as encouraging alternatives to private car travel, and they support a range of transportation options which enables more people to access basic needs (i.e., universality). Mobility wallets are also related to the concept of mobility as a service (MaaS), which describes systems that allow travelers to plan, book, and pay for multimodal trips. These concepts all highlight the value of facilitating access to multiple transportation modes and services, an important aspect of improving mobility for underserved communities (e.g., Mitra, 2021).

Rodier and colleagues (2024) reviewed eight mobility wallet pilots (six that have been implemented and two in the design phase), including the Oakland UBM pilot evaluated in this study. They point out that only one pilot has been evaluated in a peer-reviewed publication (Tan et al., 2021). Tan et al. evaluated Portland's Transportation Wallet for Residents of Affordable Housing pilot program, which provided low-income residents a $308 prepaid Visa card that could be applied to public transit or shared mobility services, along with other incentives, such as a free bike share membership and discounted rates on several services. They surveyed program participants to understand how they used the funds and their mobility impacts. Ninety percent of respondents used at least some of their funds for public transit, 52% for ridehailing, 31% for taxis, 15% for e-scooters, and 12% for bike share. Other findings included an increase in trips and ability to access destinations,

but a decrease in car use. Some respondents also tried modes they had not used before (e.g., micromobility). Themes regarding program benefits that emerged from open-ended survey data included the convenience of the flexible payment method (prepaid Visa cards); time savings and time management; improved safety and reliability of transportation modes; and well-being/independence.

Oakland DOT (2022) conducted their own evaluation of the UBM pilot via their baseline survey in the pilot application and a mid-program survey, which respondents were asked to fill out to receive the second $150 installment on their Usio prepaid card. Data were analyzed in March 2022 before many of the cards were activated (as mentioned earlier, cards were first distributed in December 2021 and expired in November 2022). According to within-subjects analysis, comparing pilot participants' baseline and mid-program survey responses (N = 66), more participants reported that their primary transportation mode was transit while using the prepaid cards, and fewer reported the following as their primary mode: driving, ridehailing, walking, and bicycling for both commute and other travel. Usio provided a breakdown of spending on the prepaid cards which showed about 90% of spending was on public transit (80.5% on Clipper Card/BART, 9.4% on AC Transit); 6.7% of total purchase transactions at that time ($10,490.77) was for e-scooters, 2% bikeshare, and 1.4% other modes.

Methods

This research evaluated the Bakersfield and Oakland UBM-inspired pilots. Research design included a within-subject component for each pilot and a between-groups component for the Oakland pilot. Data collection methods included a pre- and post-pilot survey and interim in-depth interviews in both cities. In Oakland, there was a control group that was surveyed twice on the same timeline as the pilot participant group. Survey and interview subjects were required to be aged 18 years or older (there was no age requirement for the Oakland pilot, but Spin users and thus Bakersfield pilot participants were required to be at least 18).

Surveys

The "T1" (Time 1) survey was administered to each pilot participant before or shortly after they began the program and the "T2" (Time 2) survey was administered toward the end of the pilot in each city. Surveys were programmed in Qualtrics survey software and conducted online. The Oakland surveys were translated into Spanish, Chinese, and Vietnamese using Qualtrics translations (provided by Google Translate) and then checked by a native speaker on staff at either the research institution (UC Davis) or the City of Oakland.

All surveys (T1 and T2 in both cities) covered travel behavior (including modes, trip purposes, travel times, and distances) and experiences related to transport poverty, such as subjective assessments of affordability, accessibility, travel time, safety, and degree of ease or difficulty of getting transportation to various basic needs and incidence of missing work and health care needs due to transportation problems. The questions were inspired by previous studies that captured barriers to healthcare access (Ahmed et al. 2001) and frequency with which transportation difficulties resulted in healthcare appointments being rescheduled or canceled (Silver et al. 2012).

All surveys also included questions to gauge impacts of the pilots on broader issues, such as well-being and economic status. The Oakland surveys included Kessler 10 (Kessler et al., 2002), a 10-item inventory used to gauge the likelihood of a mental disorder (namely, characteristics of anxiety or depression). A similar but shorter instrument was used for the Bakersfield survey: the five-item Mental Health Inventory (MHI-5). All surveys in both cities included the Satisfaction with Life Scale (SWLS) question: "All things considered, how satisfied are you with your life?" Churchill and Smyth (2019) found transport poverty to be associated with decline in subjective well-being as measured by all three of these indices. The T2 survey also included retrospective questions, such as the degree to which the pilots impacted their ability to access basic needs, get or keep a job, and save money or avoid taking out a loan.

Quantitative analysis of survey data focused on inferential tests for differences in Bakersfield pilot participants' pre- (T1) versus post-pilot (T2) responses and Oakland pilot participants' versus control group members' responses at T2. Within-subjects analyses were also performed for Oakland pilot participants who completed both surveys (T1 and T2), however the larger sample sizes of pilot participants and control group members in the T2 survey afforded greater statistical power. A control group for the Bakersfield pilot would have been

difficult to identify since the participants were selected by Dream Center staff and it was more important that they offer the program to all eligible clients to maximize community benefit.

The survey data sets are referred to with the following names throughout the results section:

- **Oakland/Bakersfield T1 participant:** These data sets include responses from all pilot participants in each city who completed the T1 survey and passed attention checks (Oakland: *N* = 82; Bakersfield: *N* = 90).
- **Oakland/Bakersfield T2 participant**: These data sets include responses from all pilot participants in each city who completed the T2 survey and passed attention checks (Oakland: *N* = 52; Bakersfield: *N* = 14).
- **Oakland T2 between-groups–participant and control:** This data set includes responses from all pilot participants (*n* = 52) and control group members (*n* = 32) who completed the T2 survey and passed attention checks.
- **Oakland/Bakersfield within-subjects:** These data sets include responses to both the T1 and T2 surveys from pilot participants who completed both surveys and passed attention checks (Oakland: *N* = 29; Bakersfield: *N* = 12).

Interviews

Interviews were conducted via videoconference using a semi-structured format with 20 Oakland pilot participants and 9 Bakersfield pilot participants. Interviews lasted 45 minutes on average and focused on in-depth discussions about participants' mobility experiences before and during the pilot program. Interview questions addressed how the participants used specific mobility services provided in the respective programs, why they did or did not use specific services, and any impacts the program had on their lives.

The researchers used both inductive and deductive coding in an iterative process. A draft codebook was created based on topics in the survey and interview protocols, which were built off of existing theories of transport poverty. The first two authors (AS, EAS) used this preliminary codebook to analyze an initial subset of four interviews. In addition to using the preliminary codebook, the authors also conducted open coding, allowing key themes to emerge while reading the transcripts. This resulted in a finalized codebook which included 12 parent codes and 61 child codes, conceptual and operational definitions, and illustrative examples.

A team of three coders then used the final codebook to analyze the remainder of the interviews. Each of the 28 transcripts was independently coded by two team members. During this process, coders discussed any discrepancies in their understanding or application of codes at bi-weekly meetings. Slight refinements to the codebook to improve clarity and consistency were made as needed upon consensus. After transcripts were coded, inter-rater reliability was calculated to ensure a .75 kappa agreement was reached.

Recruitment

Oakland survey and interview participants were recruited via a contact list provided by the City of Oakland DOT. In the DOT's program application form, they included an option for applicants to indicate whether they were willing to share their contact information with UC Davis researchers. The researchers were provided with a contact list for pilot participants (selected) and control (non-selected) applicants. All provided contacts for pilot participant (298) and control (255) groups were recruited for the T1 survey in December 2021, using text or email messaging (depending on each applicant's stated preference). Pilot participants and control group members were identified in the survey data by matching their email, phone number, or address to the contacts lists provided by Oakland.

A rolling recruitment process was used for the interviews and T2 pilot participant survey, with several recruitment efforts spaced out in time for each of these methods. The researchers monitored a database provided by the Oakland DOT tracking prepaid card activation status and remaining funds. For the interviews, they recruited only those who had activated their prepaid cards. For the T2 survey, they recruited only participants who had spent down their prepaid cards (less than $10 remaining at time of recruitment). Thirty pilot participants on the UC Davis contact list had spent down their card (less than $10 remaining on their second $150 installment) by mid-June 2022 when the first T2 survey recruitment effort was conducted and only eight more had done so by mid-July when the second effort was made. Researchers then waited until November, when the prepaid cards expired, to do a final outreach to 72 more pilot participants who had spent down their funds; another 14 who had specified a preference for text message were not recruited due to an extremely low response rate to past text recruitment efforts. All provided contacts for the control group were recruited for the T2 survey in August 2022.

Bakersfield pilot participants were recruited for the T1 survey via a flyer posted at the Dream Center reception area and via verbal communication from staff. As staff enrolled participants in the pilot at the Center, they indicated the opportunity to participate in the survey by following the URL or QR code on the flyer. Dream Center staff also passed along the invitation to participate in the interim interviews and T2 survey. The interviews were conducted on a rolling basis, from September to December 2022, as Dream Center staff had a chance to invite participants when they came into the center. Most interviews were conducted with participants joining the videoconference from the center. Staff texted and called participants several times to inform them of the T2 survey.

Participation incentives for each group consisted of a $10 gift card for the T1 survey and a $20 gift card for interim interviews (Walmart for Oakland participants and Taco Bell or McDonald's for Bakersfield participants). For the T2 survey, pilot participants and control group members in Oakland were, respectively, offered $10 and $20 initially for responding. However, the amount for the pilot participants responding to the T2 survey was later raised to $50 (Walmart again) to boost the response rate. The Bakersfield participants were also offered $50 Walmart e-gift card codes for the T2 survey. Gift card locations and denominations were selected in consultation with Oakland DOT and Dream Center staff, respectively. Gift cards were distributed to Oakland

participants via email, except in a small minority of cases where participants requested they be mailed. Dream Center staff distributed gift cards to Bakersfield participants for T1 survey and interviews, but e-codes were given via text to T2 participants unless they requested the code be sent to the Dream Center.

Pilot Participants

This section describes characteristics of participants in the Oakland and Bakersfield pilot per data from the T1 survey which had the highest response rate in both cities and best represents each population. Tables 1, 2, and 3 show the distribution of demographic and mobility/health related characteristics among Oakland and Bakersfield T1 surveys.

Figure 1 depicts the income distribution of the pilot participants in Oakland who responded to the T1 survey. There was a discrepancy between the income reported by T1 survey respondents in Oakland and the Oakland DOT's data on all pilot participants. Among T1 respondents, 44% reported income under $25k, 25% $25,000–$49999, 19% $50,000-99,999, and 11% 100k or more. Oakland's data on the full selected sample included 75% with income less than $39,999, 21% $40,000–$84,999 and only 4% $85k or more.[3] Thus, either the households who ended up receiving and activating their card had higher incomes on average than those who were selected but never activated their cards and/or those who completed the T1 survey for UC Davis had higher incomes than other pilot participants.

[3] https://cao-94612.s3.amazonaws.com/documents/Universal-Basic-Mobility-Pilot-Overview_Eval_2022-03-16-001945_yfow.pdf

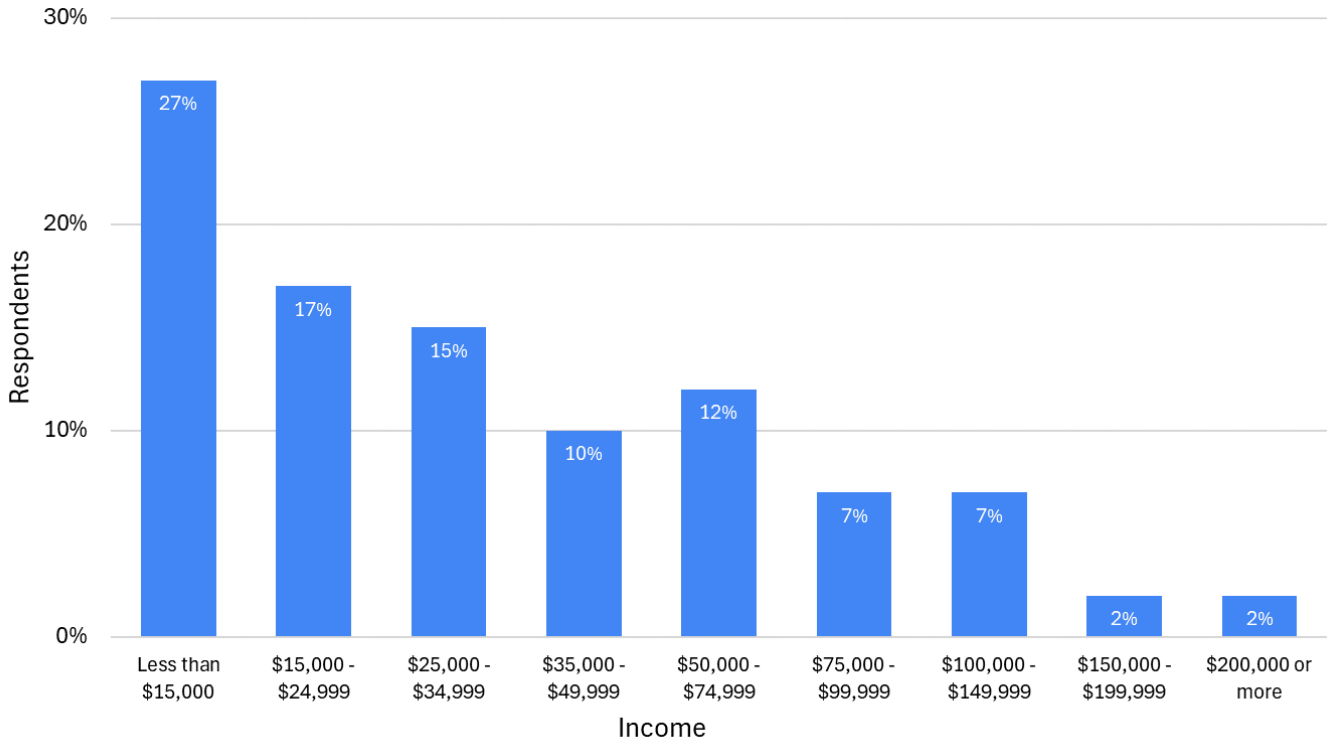

Figure 1. Oakland UBM pilot participant income

In Oakland, just over one-quarter of respondents (27%) reported that one or more other members of their household applied for the pilot in their household. Six of these 25 respondents reported one or more other household members were selected for the pilot (this number may have been higher since some applicants may have learned that they were selected after the T1 survey). Just under one-quarter (22%) of participants reported they already had access to free or reduced fare public transit through Clipper START (*n* = 15) and/or other (*n* = 5) programs (e.g., "RTC/disability clipper card" or "senior clipper card").

Table 1. Demographic characteristics of T1 survey respondents

	Oakland (*n* = 82)	Bakersfield (*n* = 80)
Age, years		
Mean (standard deviation)	39 (14)	21 (2)
Range	18–71	18–27
Gender		
Female	61%	36%
Male	37%	59%
Transgender	0%	1%
Non-binary/gender non-conforming	2%	4%
Household members		
Spouse or romantic partner	29%	13%
Children under 18 yrs	30%	16%
Race and Ethnicity		
Black or African American	30% [43%*]	43%
Hispanic/Latino	27% [32%*]	33%
White	15%	39%
Asian	15% [12% White + Asian*]	1%
Native American	3%	6%
Alaska Native, Native Hawaiian, or other Pacific Islander	1%	1%
Prefer not to answer	3%	1%

* In brackets are the percentages from the Oakland DOT description of their sample of 500 selected participants (including those who did and did not receive and activate their cards).

Table 2. Employment, income, education level, and vehicle ownership of T1 survey respondents

	Oakland (*n* = 82)	Bakersfield (*n* = 80)
Employment		
Employed	75%	35%
Full time	40%	15%
Part time		20%
Unemployed	19%	53%
Student	6%	18%
Household income		
Median	$25,000–$34,999	<$10,000*
<$25,000	44%	70%
$25,000–$49,999	25%	4%
$50,000–$99,999	19%	0%
≥ $100,000	11%	0%
Education level (T1 survey)		
High school or less	25%	69%
Some college	20%	30%
Undergraduate degree	30%	0%
Graduate or professional	22%	0%
Household cars owned or leased		
0	42%	71%
1	43%	18%
≥ 2	15%	10%

* Income reported by 56% of participants; 25% declined to answer.

Table 3. Mobility impairment, self-assessed well-being, and mental health indicators of T1 survey respondents

	Oakland (*n* = 82)	Bakersfield (*n* = 80)
Impairment relevant to mobility	44%	13%
Seeing	23%	15%
Climbing stairs	19%.	13%
Carrying or lifting items	18%.	10%
Walking one quarter mile	10%.	15%
Understanding written or spoken directions	9%; 7%	11%; 11%
Hearing	8%	4%
Talking	7%	13%
Use an assistive device	7%*	2 with service dogs
Self-assessment of well-being		
Physical health worse or much worse than others their age	19%	18%
Satisfaction with Life Scale (0-10), mean score	6.5	6.7
Mental Health Indicators		
Kessler-10		not included in survey
Well	46%	N/A
Mild mental disorder	23%	N/A
Moderate mental disorder	8%	N/A
Severe mental disorder	23%	N/A
Mental Health Inventory - 5	not included in survey	
Mean score (SD)	N/A	63 (18)†
Already have access to free transit passes through college or social service		
Yes	22%	53%

* An assistive device or animal such as a cane, walker, wheelchair, or service dog.
† <76 indicates unhealthy

Results

Evaluation results are organized into five main sections. The first section describes how participants used the provided mobility services, focusing on which services they used. The second section considers changes in travel behavior relative to baseline, including mode shifts and adoption of new modes. The third section focuses on the degree to which the pilots addressed aspects of transport poverty; this section delves more into those factors impacting mode choice. The fourth section considers potential secondary effects on quality-of-life more broadly. The final section presents findings directly related to program design and administration. Each section integrates results across pilot programs and evaluation methods (surveys and interviews).

Utilization of Mobility Service Offerings

Use of services offered in the Bakersfield pilot is a simple story since only Spin services were provided. In Oakland, based on the T2 participant survey data, pilot participants most commonly reported spending their prepaid card funds to ride BART (88%) and AC transit buses (71%), with no close third (MUNI bus: 21%, shared scooters: 17%, WETA ferries: 13%, Bay Wheels shared bikes: 10%). For context here, it is important to note some limitations of the ferry, MUNI bus, and shared micromobility services for East Oaklanders. The ferry runs between Oakland and San Francisco and MUNI bus runs only within San Francisco, so these modes could be useful for East Oaklanders who commute to San Francisco for work, school, or perhaps occasional errands, but less useful for those who live and work and/or meet most of their needs in Oakland. In addition, the ferry port is located outside of East Oakland. Conversely, shared micromobility could not be used for transbay travel due to the lack of appropriate active travel infrastructure on the Bay Bridge.

Themes that emerged from the Oakland interviews related to use of mobility services included the complex, multimodal, and idiosyncratic nature of participants' travel behavior and the related deliberative nature of their decision-making around how to use their prepaid cards. Participants discussed the transit options and routes available to them at their regular origins and destinations, which required specific, in-depth knowledge. For example, one Oakland participant described their options, featuring the new BRT line, as follows:

> I live a block away from [Lake Merritt BART station], so I take that quite a bit to either go into downtown Oakland or down to the supermarket, which is over by Fruitvale BART, which is about the next one down. But bus-wise, on the 1T [Tempo BRT line] anyway, it would be maybe five express stops away, which is quick, quick, quick compared to regular [bus] transit and it runs 24 hours a day that line, so I'll take it up to Uptown or Downtown Oakland. ... I'd pretty much rely on that one exclusively more than the other AC Transit lines. And as far as BART goes, I would ride my bike from where I live to the Lake Merritt BART. Sometimes to catch the bus, there is a bus that goes there, but it only runs every half hour, and so a lot of times you miss the connection so the bike is faster... Walking is almost faster.

This same participant explained his thoughtful process deciding how to spend program funds:

> One of my physicians was way across town, almost in San Leandro... Taking the bus involved three different transfers, so it made sense to get a pass rather than paying all those separate transfers, because AC Transit doesn't let you transfer, you have to pay for a transfer now, it used to be free.

East Oaklanders in particular often reported having multiple imperfect transportation alternatives and choosing different combinations based on their preferences and situational factors. Factors mentioned (discussed in further detail later) included cost; travel (and waiting) times and participants' own schedules; mode availability, reliability, and ease of use; distance to destination and trip purpose; and safety. Some common perceptions were: in Oakland, the high speed and high cost of BART relative to other modes as positive and negative characteristics, respectively; and in Bakersfield, the greater speed and convenience of micromobility (while the vehicle fleet was intact) compared to walking, as well as its suitability for in-town travel but not long distances.

Changes in Travel Behavior

Figure 2 shows the frequency (days per week) that Oakland pilot participants and control group members reported using each mode at T2 (where pilot participants were asked to report behavior when they were using their prepaid card). Compared to the control group at T2, Oakland pilot participants reported driving a personal car significantly less and using BART and shared e-scooters significantly more. Including marginally significant statistical relationships, pilot participants also walked and used ride hailing less. Similar trends were observed in the within-subjects comparison, though none were statistically significant.

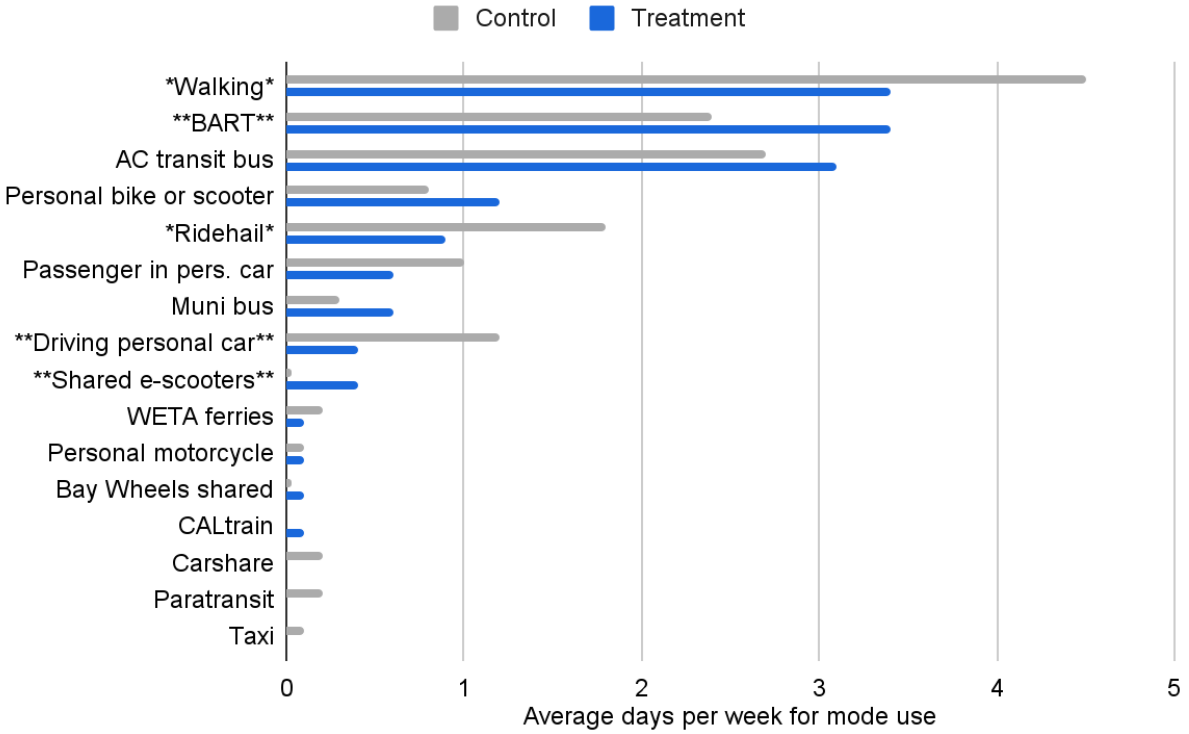

Figure 2. Transportation modes used by the Oakland pilot participants and control group.
* p < .10, ** p < .05

Among the small sample of Bakersfield pilot participants who responded to the T2 survey (*N* = 14), median frequency of Spin e-bike use was 5-6 days per week. Nine of these participants were enrolled while e-scooters were still available, so they experienced both e-scooters and e-bikes (five only experienced the e-bikes). Among those nine, median frequency of e-scooter use was 4 days per week. Some mode shift patterns similar to those reported among Oakland pilot participants were observed in the within-subjects analysis (*N* = 12). Wilcoxon signed ranks tests were performed and are reported in Table 4 (the decrease in ridehailing is statistically significant).

Table 4. Median frequency of mode use for Bakersfield pilot participants at T1 and T2 (days per week).

	T1	T2
Ridehail*	1-2	between 0 and 1-2
Driving	0	0
Passenger	0	between 0 and 1-2
Walking	7	3-4
Personal bike/scooter/skateboard	0	between 0 and 1-2
Spin bikes	0	5-6
Spin scooters	0	4
Bus	between 3-4 and 5-6	5-6

*difference significant at $p < .05$ ($N = 12$, $n = 9$ for scooters)

Analysis of interviews and open-ended survey questions help illustrate these mode shifts. Participants reported using provided modes—micromobility in Bakersfield and particularly BART in Oakland—to replace car trips, typically personal cars in Oakland and ride hailing or rides from others in Bakersfield. One Oakland participant summarized, "The program provided an incentive to use public transportation instead of driving my own car. Removing barriers (i.e., affordability) to using public transportation is a great start to reduce air pollution and creating less traffic." In a more specific example, one Oakland participant reported trading out BART for her personal car when driving into San Francisco, stating "Before the program, for trips to the city I would have probably driven." Another interviewee described how she replaced driving her own car with using BART for weekday commutes to both her children's school in Walnut Creek and her job in downtown Oakland (illustrated in Figure 3):

> Normally I would drive to Walnut Creek to my children's school and then drive from there back into Oakland, park at my apartment and then hop on the bus to go to work in downtown Oakland, and then come back to pick up my kids. Once I got the Clipper Card funded through the mobility card, I started parking at Walnut Creek BART, taking BART into Oakland and back to pick up my kids and that actually cut down a lot on my driving.

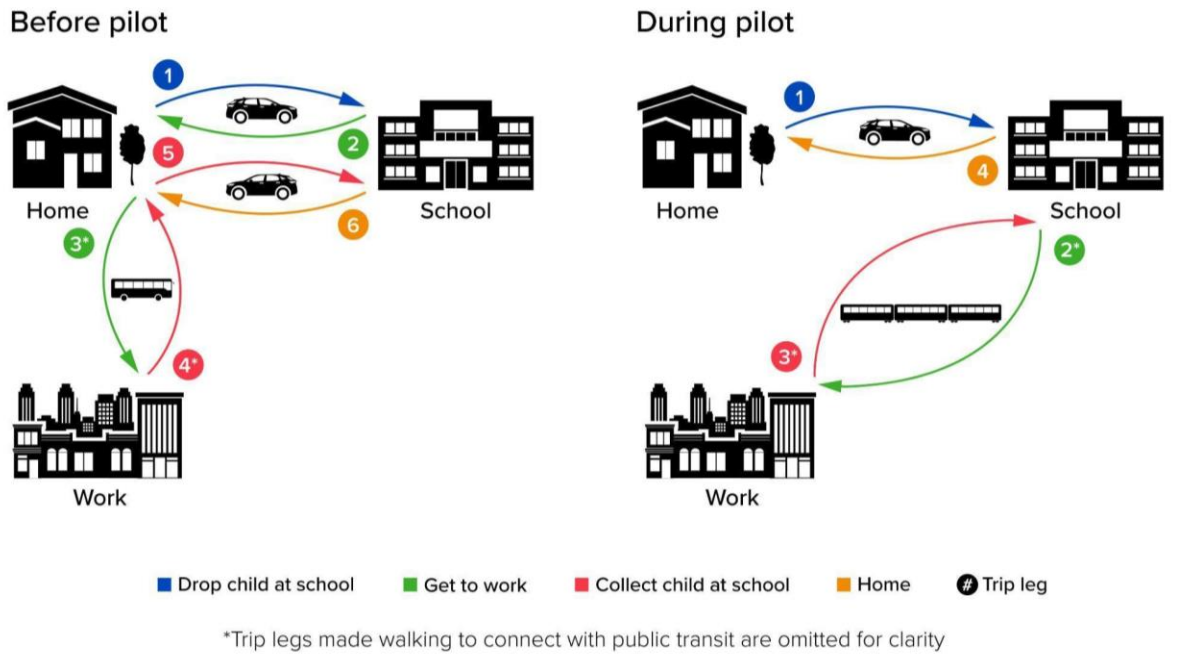

Figure 3. Illustration of modified modes and route for one participant

Bakersfield interviewees more often and more effusively described replacing walking with micromobility as their primary mode. One participant stated, "Before I had the e-bikes, I would use my feet, or get rides. I'd use my 'legsus'. Sometimes bus if it was possible, but I work with security, so I work late nights, so that's why the e-bike was better, because it was available during the night [unlike the bus]." Another explained, "Instead of walking 50% of the time, now that's on Spin bikes. So now I use 50% [public] transportation and 50% bikes." One noted they had discontinued bus usage altogether, stating "As of right now I don't take the bus no more. I used to take the bus, but those things like take a while... So I've quit using it since I have access to the e-bikes."

Some Oakland participants were motivated by the opportunity to try new modes for free during the pilot — modes that they were not using regularly before the pilot. This was the case for virtually all Bakersfield pilot participants as few of them had any prior experience using shared micromobility. Most (but far from all) Oakland participants reported that they were already using BART (72%) and AC transit (76%) prior to the pilot, most participants who used their funds to purchase ferry (86%) shared scooter (78%), and shared bike (60%) services did not regularly use those before the pilot. Some Oakland interviewees expressed interest in using micromobility (although none had tried it), e.g., "I knew about the e-scooters; that was a draw as well, knowing that I could use it on the scooters." One Oakland interviewee described trying the ferry out:

> I took the ferry because I realized I could use my clipper card on it to get to the city— I did take the ferry just 'cause it was a nice day and I was like, 'oh sure.' I was already downtown so I just realized I could take the bus down Broadway and then get to the ferry.

Addressing Transport Poverty: Travel Experience

Both pilots were successful at mitigating many aspects of transport poverty. Compared to control group members at T2, Oakland pilot participants gave significantly higher—i.e., improved—ratings on each aspect of the transport poverty scale (i.e., affordability, convenience, travel time, safety, and pleasure), indicating a lesser experience of transport poverty while using their prepaid cards (Figure 4). The Oakland within-subjects comparisons yielded similar findings, although the higher level of perceived safety while traveling at T2 compared to T1 was only marginally statistically significant. In Bakersfield (Figure 5), participants rated all aspects higher at T2 (within-subjects analysis) and most changes were statistically significant (excluding affordability and safety).

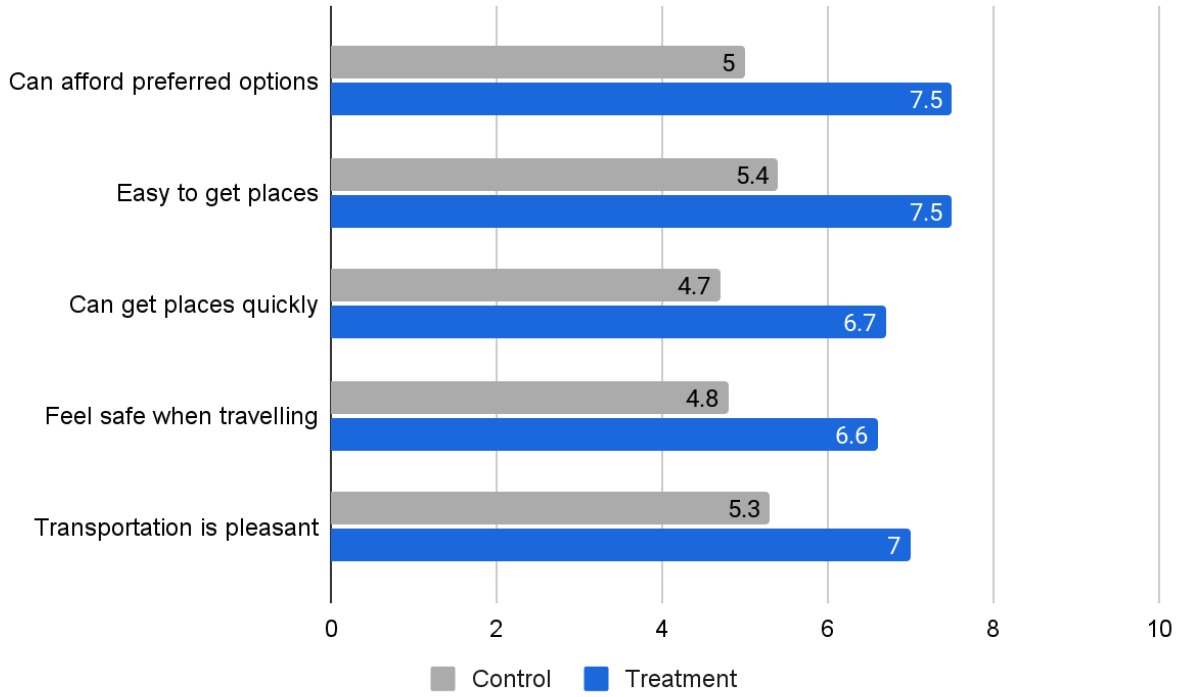

Figure 4. Oakland survey responses regarding transport poverty experience among control
*(n = 32) and pilot participant (n = 52) groups at T2; all differences significant at p < .001

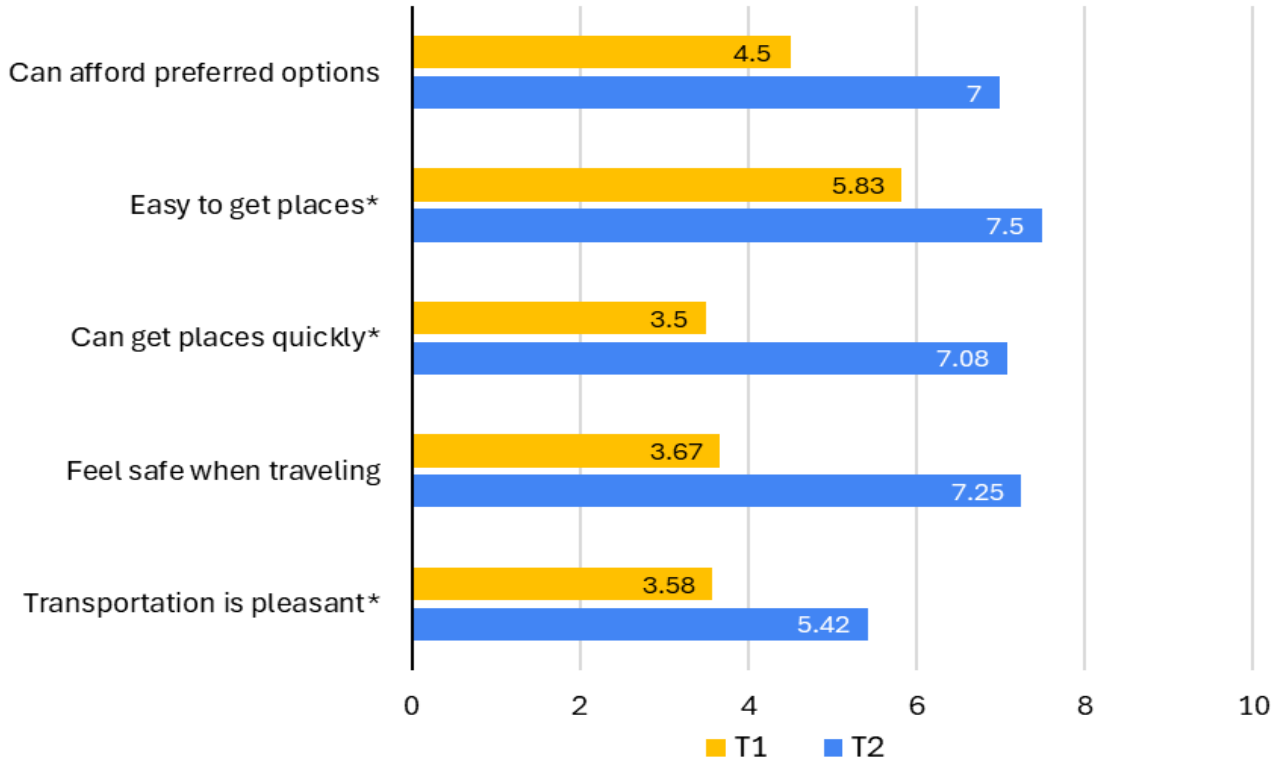

Figure 5. Bakersfield within-subjects analysis

*(N = 12) of transport poverty experience at p = .05

Affordability

Prior to the program, interviewees in both cities described having stress around transportation costs. For participants with cars, the associated expenses were a particular source of stress and at times rendered the car useless. One Oakland participant explained, "I recently got my first car this year and the week that I got my car is when all of the gas prices went up, so I was like 'I don't know if I have any money in the budget to even utilize this car.'" Oakland participants who relied on public transportation services were typically primarily cost-driven, so that many relied on bus rather than BART. Bakersfield participants sometimes chose walking instead of the bus for affordability reasons, but due to lack of adequate services many also relied somewhat heavily on costly ridehailing services prior to the pilot.

Using the cheapest modes often involved longer travel times, less pleasant travel experiences, and decreased feelings of safety. For example, one Oakland interviewee noted, "Before the program I was using just the AC transit, the bus, because it was cheaper, but it was kind of slow." After enrolling in the program, participants in both cities discussed being able to prioritize other aspects of travel beyond cost, such as travel time,

convenience, or safety when selecting modes. Returning to the interviewee who chose to take AC transit because it was cheaper, although slow, they described choosing BART once cost was no longer an issue, "With the mobility program, I use it to ride BART because it's faster and also because I have the resources to do it after the program. Yeah, so I started to use it more, the BART, because of the program." Other Oakland interviewees shared how they didn't have to worry about being able to afford the bus fare home after going shopping or just generally had more freedom to use public transit more. One older woman shared how the ability to use a card instead of cash made it easier to go places because she did not have to find the right change to pay for fares.

However, the programs could not totally compensate for affordability issues related to transportation infrastructure (e.g., sparse bus stops) or service design (e.g., hours of operation and operating zones). Some of these issues continued to contribute to transport poverty for participants during the pilot. One Oakland interviewee described:

> When I'm going from the airport home late at night when BART is not available, they know [ridehail drivers] they can surcharge me because they know I have no other way of getting home because AC Transit like only comes every hour whenever I need to get home and so the [ridehail] prices are pretty ridiculous.

Convenience

Convenience, in terms of easily accessing transportation, was another influential factor on participants' mode choices before and during the pilots. For example, many Oakland participants lived further from BART but (relatively) near AC transit stops or stations, so switching to BART was not always preferred. As one East Oakland participant described:

> Most times I take the bus just because of where I'm located. The closest bus to me is like seven blocks away so it's easier for me to get to a bus that is on a main thoroughfare. BART is really hard for me to get to, I would have to take a bus to get to BART. Um, so a lot of times I try to figure out how to get there by bus just because it's easier to get to.

Thus, the variety of services provided in the Oakland pilot met the needs of participants with different preferences and living situations, even if access to preferred options was not improved per se. However, the versatility of the prepaid card also allowed for more flexibility in travel when needed, which did seem to improve convenience. For example, one interviewee said:

> Depending if that bus isn't running all the time, then I may catch AC Transit to the BART station and get on BART and then get off because I kind of live a little far from where I worked and where my daughter goes to school at, so I do have those two options, if one bus is late, I can always get on another bus and then get on the BART. Like I said, it {the program} just kind of gives me that flexibility like if one bus is not showing up, I can always get on another bus that's going to take me to like be able to use the BART. You know because most times, like, I

> just have enough just to get me and my daughter a clipper card so with this program it also helps, like, you know.

Bakersfield participants often discussed improved convenience and mobility access. For example, not bound by strict hours of operation, micromobility was seen as a solid option for participants who needed to travel outside of bus operating hours. Participants also noted the reliability of micromobility compared to their other options (ridehailing and the GET bus). One participant noted that it was not uncommon for ridehail drivers to cancel his ride: "It's like you're waiting, relying on this person to come, and they cancel at the last minute, and that's frustrating." The same man explained reliability issues with the bus: "I have to keep waiting on the bus just to come because somebody's going off, or if I get on the bus, someone's already going crazy, or they won't get off the bus..." Referencing the positive impact of the e-bikes, he continued, "I don't have to rely on that [those modes] now. I could just get on the bike and just go." Another Bakersfield participant summarized, "You know, I have the bike whenever. It's easier, accessible."

However, the programs could not totally compensate for inconvenience related to transportation infrastructure (e.g., sparse bus stops) or service design (e.g., hours of operation and operating zones). Some of these issues continued to contribute to the inconvenience/poor access aspect of transport poverty for participants during the pilot. For example, Bakersfield and Oakland interviewees noted issues with availability of micromobility. An Oakland participant stated, "I think the city put stops on where you could place the bikes or the scooters, and there just aren't that many around. So if I want it [micromobility], I have to really look for it. They used to be at every corner." A few Bakersfield participants that lived outside operating zones (typically due to a move during the program) required some form of transportation to reach available bikes and scooters. One described:

> Since I have moved from downtown Bakersfield, which is the only place where I could really find Spin anything, now I've been having to walk and walk and walk. Walk to the bus stop, walk from the bus stop, and it's extremely hot here... and I currently live by a major high school and California State University Bakersfield is not too far from me, it's like a major city point.

A couple Oakland interviewees who had used the ferry during the pilot, or considered it, described that it was not in contention for regular usage because of the difficulty in getting from East Oakland to the port. One interviewee explained that she had decided to ride the ferry after ending up in downtown Oakland running errands, but it would be difficult to incorporate as part of her normal routine: "From my house, it would have been totally out of the way and then hard like to figure out how to get there."

Travel Time

The pilots in both cities enabled participants to take faster modes, avoid delays, reduce connections, and take more direct routes. Oakland participants who increased their use of BART or the new BRT line noted decreased travel time. One participant described using BART instead of bus for his commute to work: "I was using the bus, I needed to get up early [because] it's going to take me longer to wait for the bus. But now that I'm taking

BART, I know that I'm going to be there in five minutes to my work, because it is just one stop away from my home."

Bakersfield users found that the e-scooters and e-bikes saved them significant time compared to walking, and could also be faster than car (personal or ridehailing) and bus due to traffic, wait times, and delays. One participant said, "If I just take the e-bike, I'll just go quickly. I don't have to take the car." Comparing the expediency of micromobility versus the bus, one participant noted, "To get to the main part of downtown, I use the bike instead of the bus. I feel like, with the bike, I don't have to wait every thirty minutes for the bus." Again, the exception to this was for a few participants who lived outside operating zones, in which case they would have to add connections and travel time to get to a Spin vehicle.

Safety

Prior to the program, it was not uncommon for participants to feel unsafe while traveling. Safety as discussed by interviewees related to the potential for crime as well as accident, injury, or illness. Across both cities, a decrease in the feeling of safety was often attributed to not being able to afford a preferred mode, or not having a safe option. For example, one Bakersfield participant who works a security job and gets off work when buses are no longer running, stated they were often left to walk home through unsafe neighborhoods in the late night and early morning, "Usually I work 'til twelve or to one o'clock and I have no transportation to take me back home. I work in security... I'm working in areas that are very dangerous, and prone to be very violent." An Oakland interviewee discussed her feelings of vulnerability driving a car in the Bay Area. "As far as physical safety, car accidents are a really major thing and I've been rear-ended twice in the last year and a half driving around the Bay." Referring to the unsafe condition of walking in Bakersfield during the summer, one participant noted, "We're in a desert, it gets to one hundred plus degrees. I have to walk in that. And it gets incredibly hot. I got sick a few times from the heat because I got too hot."

During the pilots, many participants felt they could use forms of transportation in which they felt safer. The Oakland participant who had been involved in recent car accidents described feeling much safer taking public transportation over driving, stating "Getting out of the car in many ways does feel safer. I know there have been some safety issues on BART and AC transit before, but personally I have felt safe on both of those." Another Oakland participant perceived greater safety using the prepaid card on public transit rather than cash, "I don't like to carry around cash, so I feel more secure using the card so that's why I go to the bus and use the pass to pay for the transportation." A Bakersfield interviewee who had experienced heat issues talked about his preference for traveling by bike on hot days, explaining, "Taking the Spin bike because out here it's been a lot like, really, really hot. So yeah, it helps to lessen the time outside when I'm riding my bike. I actually go pretty fast."

At the same time, not all modes offered by the programs increased participants' feelings of safety. Micromobility in particular stood out as something that gave participants safety concerns. In many cases, these concerns weren't necessarily about the equipment itself, but the lack of safe infrastructure. One Oakland participant explained, "I read that I could use it for the bicycles and then the scooters, but I don't feel like really

confident to do it like on the streets. So that's why I'm still taking the BART and the bus, because I feel safer than going on the bicycle in the street or on the scooter." Another participant summarized, "Everything is way too car oriented in East Oakland, so that needs to change, because if people don't feel safe they won't choose biking or public transit. It is scary to go in the streets because you can easily get run over by a car. I feel like I'm in a jungle each time I go out." For others, concerns stemmed from insecurity about their own abilities. One participant explained, "I probably will try it at some point just because I have the card, but yeah I'm not, I don't feel physically that safe on those type of transportation. Something I don't do that often. I'm not super coordinated, so, yeah, I don't really want to risk falling." And some felt concerned about the equipment itself, for example, the following Oakland interviewee who stated:

> I wonder if they're safe like if there's any kind of like a safety factor on them like maybe like that the mechanism will like fail to stop or something like that or you're going too fast and you slipped or fell off or something like that, I wonder how safe they are, or if the battery were to go dead on them at some point... and there's no helmet, you know so...

Interviewees in both cities also discussed safety concerns with public transit services related to crime. For example, one older woman in Oakland shared how she would only use the bus for necessary trips and go straight home due to safety concerns. She shared that she would have used the prepaid card for social trips if she could have used it for carshare or ridehailing services. Even though bus service was not a part of the Bakersfield pilot, it is worth noting that participants there also discussed safety concerns about dangerous people or situations on the bus, including one alluding to the danger of running into people from his past (possibly gang-related). Feelings of safe often intersected with age, race, and gender. For example, one Oakland interviewee stated:

> We're in Oakland so people drive crazy as hell out here, but BART can be really unsafe for young black women. There were some key points in the last couple of years, there was a woman killed on BART and I did not take BART at all, not even a little bit. And every time I did get on BART during that period, Imma be honest, I had a knife in my pocket, I was not comfortable sitting on the train. So when I got my car, I just felt like I could relax, I could get all of my tasks done super quickly in a day, instead of it taking me an entire day taking BART and bus and walking to all these different places, so I feel a ton safer being in my own vehicle.

Pleasant Experience

Participants described the unpleasantness of many transportation options that they were frequently using before the pilots. Oakland participants reported stressful experiences while traveling, including crowding. As one Oakland interviewee described, "That's something that annoys me about BART–at peak times they'll be super crowded and with COVID, I'm not trying to be around that many people." Bakersfield participants described the unpleasantness of walking as a primary mode in poor weather conditions (e.g., extreme heat).

Participants in both pilots related stories about improved pleasantness of their travel experiences during the pilot, related to the modes they were able to use. Several Oakland participants described increasing their bus

usage or beginning to use the bus during the program duration and that this had enabled them to explore areas of Oakland they had not been to prior to the program. For example, one Oakland participant said:

> I've seen, the great thing about getting off the freeways and getting on the bus, even though it takes longer, is you go through all these neighborhoods you haven't, I hadn't seen before, and I know where I know where some, I was able to discover, you know restaurants or stores that I didn't know existed, places that we could go eat. And I just like being on the bus, because you can talk to people.

Oakland participants who used the ferry for the first time also described how much they enjoyed the experience. One participant described her first time on the ferry:

> It was dope. I was like 'oh man like, if I had to commute into the city I would figure out a way to take the ferry more.' It was just nice, it wasn't crowded... And then also that you could be outside on the ferry and that it had a bar, that was the selling point for me. I was like well, I can get a drink, you know. Yeah and number one was it wasn't crowded. It was like really nice.

Bakersfield interviewees were often effusive about the pleasant experience of riding e-scooters and e-bikes relative to other modes. One participant stated, "It [riding the e-bike] was so fun, that's all I wanted to do." Another participant described his elation riding the e-bikes for the first time, stating, "My first-time riding, it was pretty fun. I was laughing, I wasn't really thinking of anything. I even took a little video while I was riding it." And another described the enjoyment of using e-bikes versus walking:

> They're more enjoyable than walking. You get to go through puddles, and you get to feel that breeze– like I don't know if you have ridden it– but I love feeling the breeze like a car, we roll down the windows. You feel the breeze. On an e-bike you feel the breeze hitting you, and it feels so good.

Addressing Transport Poverty: Accessing Basic Needs

In Oakland, there were statistically significant differences in reported difficulty accessing particular basic needs (e.g., work, healthcare) between pilot participants and control group members (Table 5; Figure 6). Again, similar trends were observed in the within-subjects analysis, although fewer relationships reached statistical significance. For example, 38% of the control group reported missing work due to transportation problems in the two months preceding the T2 survey, compared to only 8% of pilot participants (reporting for the period of time they were using their prepaid cards). Forty-eight percent (48%) of participants in the within-subjects analysis reported missing a healthcare appointment due to transportation problems in the two months preceding the T1 survey, compared to only 24% of these same individuals during the pilot program (i.e., while using their prepaid card). Similar trends were observed in the Bakersfield within-subjects analysis, although the small sample sizes (less than 10 in many cases after excluding "Not applicable" responses–which participants would have selected if they did not travel for the specified trip purpose) preclude valid statistical tests with these variables (Table 5; Figure 7).

Table 5. Median responses for difficulty getting transportation to access basic needs (Easy, Not too hard, Hard, Very hard), comparing control and pilot participant groups for Oakland and pre- v. post-pilot responses for Bakersfield

Color Code:	**Easy**	**Easy/Not too hard**	**Not too hard**	**Hard/Not too hard**	**Hard**
		Oakland (n = 11 - 70)		Bakersfield (n = 5 - 12)	
		Control	Treatment	T1	T2
Work		Not too hard	Easy***	Hard/Not too hard	Not too hard
School/college		Not too hard	Easy*	Hard	Easy
Groceries		Not too hard	Easy**	Hard/Not too hard	Not too hard
Banking, paying bills		Not too hard	Easy*	Hard	Not too hard
Restaurants		Not too hard	Not too hard*	Not too hard	Easy
Healthcare		Not too hard	Easy/Not too hard****	Not too hard	Not too hard
Social services		Hard	Easy**	Hard/Not too hard	Not too hard
Hobbies, sports, rec		Not too hard	Easy/Not too hard**	Hard	Easy
Social, religious events		Not too hard	Not too hard	Hard	Not too hard
Visiting family, friends		Hard	Not too hard****	Hard	Not too hard

* < .065, **, < .05, *** < .01, **** < .001

Note. Bakersfield participants at T2 were reporting experience while micromobility vehicles were available. Bakersfield samples for T1 and T2 may differ since participants may have reported regularly making trips for each purpose at one time point and not the other.

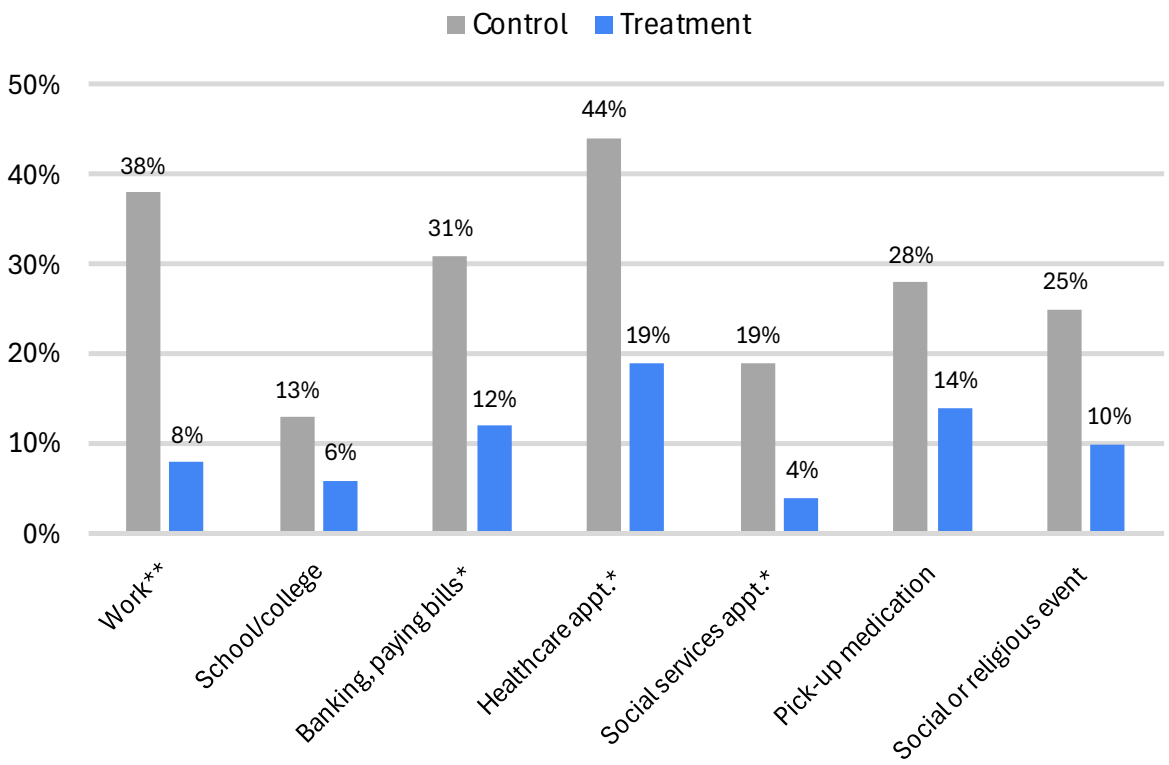

Figure 6. Oakland survey responses regarding missing out on services/events in the past two months among control (n = 32) and pilot participant (n = 52) groups at T2; differences significant at

*p < .05, **p < .01

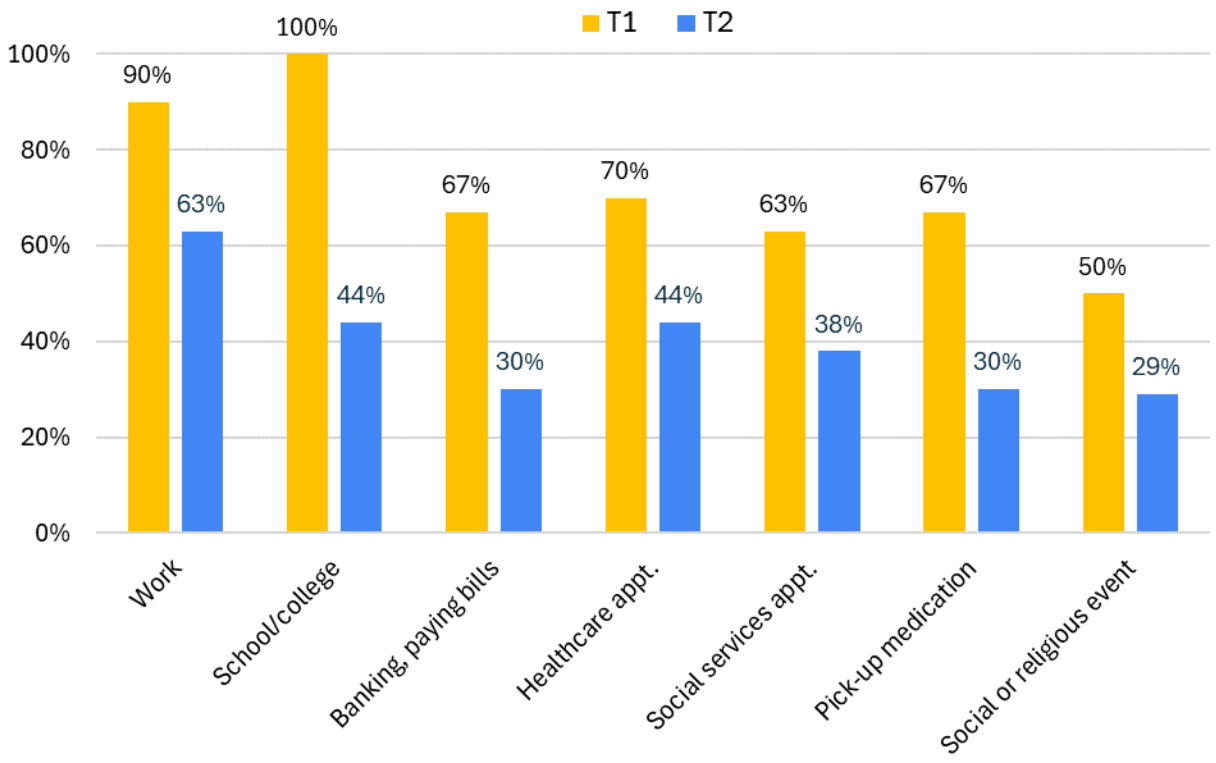

Figure 7. Bakersfield within-subjects analysis (N = 12) of missing out on services/events in the past six months at T1 and T2. Note. Samples for T1 and T2 may differ since participants may have reported regularly making trips for each purpose at one time point.

Interviewees' discussions illustrated this impact of programs on improving access to basic needs. With regard to accessing work, one Bakersfield participant said, "I didn't have to worry about either calling a ride or anything. I would just be like, okay, I have Wi-fi, I have internet, I have my e-bike account..." Bakersfield participants generally found the e-bike basket sufficient to facilitate grocery shopping, e.g., "[The e-scooters helped me] get groceries faster and home faster." Another explained, [The e-bikes] made getting food easier. I have that basket, so I don't have to worry about getting [only] a little bit of groceries because I can't carry them all." An Oakland participant with physical impairments limiting her mobility explained how the pilot increased her independence by helping her accomplish errands:

> Usually en route to or from healthcare because I'm doing healthcare things so often, I've been able to pick up groceries on the way home and go to the pharmacy, so it has helped me with some of those basic needs, other than healthcare [too]. I didn't used to go to the grocery store on my own, I would just wait for my husband to be home to do it, and it's really helped because you know he works, and so, but then he's usually in charge of all of the errands because I have difficulty driving and pushing a cart and lifting and so with the universal basic mobility I've been able to pick up a few things here and there, when I need them when I'm already out.

Another Oakland participant described his improved access to culturally preferred groceries thanks to access to the BRT line:

> Before the mobility card... like grocery stores, I would only go somewhere where it was walkable or bikeable. And since the mobility program the biggest change is probably going to the grocery store. Because now I can take a bus there. And that opened a lot of like different markets I can go to, for example, I could go to all Mexican ones, because now they're just a bus ride away and now in Oakland they have the bus rapid transit line. And so I could just take a bus and then come back you know, taking the bus also with all my groceries. Before I couldn't do that.

Bakersfield interviewees in particular described better access to social and recreational activities during the pilots. For example, one Bakersfield participant said, "I go to the park and play basketball every Tuesday now. I couldn't before because I didn't really have a way to get over there." Another explained, "Instead of worrying about [things] like 'oh I only have this much money to get there, I'd rather use it to get to work,' [now] I see relatives more instead of just worrying about how much money I would have to go over there and how that impacts me going to work."

Broader Impacts

Improved transportation experiences and access due to free-fare transportation services led to broader impacts on participants' lives in terms of economic aspects as well as general health and well-being. A majority of participants in both pilots (per the T2 participant survey data) reported that the mobility programs improved their:

- Ability to save money (Oakland: 94%; Bakersfield: 86%)
- Ability to get or keep a job (Oakland: 50%, or 58% when excluding NA responses; Bakersfield: 64%)
- Ability to take care of basic needs (Oakland: 86%; Bakersfield: 79%)
- Opportunities for recreation or exercise (Oakland: 56%; Bakersfield: 71%)
- Social relationships (Oakland: 56%; Bakersfield: 86%)

Interviewees spoke about what they were able to afford because of saving on transportation costs during the pilot. One Bakersfield participant observed, "It's a money saver. I don't have to waste no money for Uber, don't have to wait for anyone, not paying anybody to like to try to give me these favors or anything. Instead, it was used for rent." Another had a similar story: "I could just spend that money on, you know, more groceries, or you know something to do for fun. I go to the movies or something like that. I saved a lot more money. Before it's like, you know, 'I'm broke. You know why? Because I've been in Uber and Lyft this week just going to work. That's why!'" Similarly, Oakland interviewees often said that they had more money to spend on basic items–some named rent, food, toilet paper, and pet food–with the money they saved on transportation. Of note, one Oakland participant reported using the money saved on transit to fuel their car and travel more by car.

As far as other financial impacts, about one-third of participants (35% in Oakland and 29% in Bakersfield) said the programs kept them from needing to borrow money from friends or family, and another 10% in Oakland said they were able to avoid taking out a loan (0% in Bakersfield). A small minority (two participants in Oakland and one in Bakersfield) said the program led them to spend more money. In Oakland, these participants explained: (1) "I couldn't use it for rideshare so I would have to spend more money on places BART couldn't take me"; and (2) "Probably spent more money when I was out" In Bakersfield, the participant said, "Had to spend on transportation last minute when service not reliable."

Better access to jobs also led to economic benefit for many. For example, one Bakersfield participant described, "It [the e-bike] made work a little bit better, because I had something to rely on... I was even able to pick up more shifts." In addition to this newfound independence, another explained a different type of impact on their work life related to improved comfort and dignity, "[Before the e-bikes] I was pretty late [to work] sometimes. Sometimes the lights would take forever, and you know, especially if I have stuff, or if I have a backpack on, I would have to run, and I would have to get sweaty... It just feels nasty, and I have to work like this, and customers are just looking at me crazy like, 'Why is this man sweaty?'"

Some of the broad impacts of the pilots were direct consequences of improved access, such as improved access to jobs resulting in ability to work more. Others were more indirect or subtle. For example, one Bakersfield participant described how time savings generated from using e-bikes instead of walking to visit his mother meant he had more time to spend with her. Several Bakersfield interviewees discussed how e-scooters and e-bikes motivated them to be more active and enjoy the outdoors. Some Oakland participants suggested the pilot contributed to enhanced cultural and community connections, e.g., the quotes above about accessing Mexican markets and socializing on the bus, and other comments in the T2 survey, "Being more connected to our regional transit system just makes you feel more part of the citizenry!"; "It showed me that the city was taking action in trying to improve our mobility."

Within-subjects analysis revealed a statistically significant increase in Oakland pilot participants' satisfaction with life, per the SWLS (0-10 rating, with 10 being the highest), between T1 and T2. Average SWLS score was 5.7 (SD = 2.4) at T1 and 6.7 at T2 (SD = 2.2); $t(28) = -3.74$, $p < .001$. The between-groups analysis (Oakland T2 participant and control) suggested a similar relationship, although the difference was only marginally significant. Average SWLS score for T2 control group members was 6.4 (SD = 2.1), compared to 7.3 (SD = 2.1) for all T2 pilot participants; $t(82) = -1.87$, $p = .066$ (all provided p-values are two-tailed). There was no change in SWLS for Bakersfield pilot participants who completed the two surveys; average score was 6.7 at both T1 and T2; $t(11) = 0$, $p = 1$.

There were no statistically significant relationships between pilot participation and participant physical or mental health per the 1-item scale for physical health compared to peers and the Kessler Psychological Distress Scale-10 (K10; Oakland) or Mental Health Inventory-5 (MHI-5; Bakersfield), respectively. That said, interviewees did express some impacts along these lines, such as Bakersfield participants' feelings of well-being and enjoyment in using micromobility and Oakland and Bakersfield participants' lowered anxiety related to being able to afford transportation and manage daily activities, along with the greater convenience and

perceived safety of using a prepaid card rather than cash (in Oakland). Other comments from the Oakland T2 survey are also illustrative, e.g., “Improved my depression by allowing me to be more independent and to get out of the house. I am alone most of the time and getting on the bus with people improved my mood”; and,

> I just felt less rushed in general. As someone who does not drive in the Bay Area and depends on public transportation to get to most places, knowing I had the option of calling on a Lyft/Uber or taking a bus/rain without having to pay out of pocket made it one less thing to stress about. Having an extra 25-30 minutes in the morning to drink coffee or eat breakfast knowing I can call a Lyft to work that will get me there in 15-20 minutes, over having to leave an hour before my shift begins because I'll either have to walk the entire way or depend on a bus that might not come when it's scheduled knocked my blood pressure down a few notches. (Thank you.)

UBM Program Challenges

As with any pilot project, both programs were not without problems. With few other projects of their kind to draw on, many of the decisions made were speculative— based on trying to anticipate needs and potential problems in each unique context. As a result, the programs faced unanticipated challenges regarding design and administration, vandalism, equipment reliability, and user misuse of equipment or project funds.

Design and Administration Problems

In Oakland, the aforementioned problem with cards—including failed mailing, lack of access, and lack of clarity about provided services—was frustrating to many participants. In a T2 survey response, a participant expressed their frustration with the short duration of and lack of communication within the Oakland program, stating:

> [There was] not enough time. I only used a small fraction of the money I was allotted. When I tried to find the email with dates of expiration of the program, I could not; I searched my email using all the terms that were logical. I should have received more email notifications, and they should have been written in a way that made them easily searchable. I certainly would have used BART a lot more if I had easier access to the date-ending information and more time.

Another Oakland participant spent more money on transportation than she would have normally after her card did not arrive. Upon receiving notification of her selection and enrollment into the program, she opted out of pre-tax transportation benefits from her job only to not receive the mobility wallet card for months. She explained:

> I was expecting this card to be able to fund some BART and stuff, and then I didn't get the card, so I was kind of in a stuck position because I had no more money left on my transportation benefits. I tried many times to contact someone just saying, can you please somehow give me a card, and they were saying “Oh well, you know we didn't get yours returned to us. You know, we can't give you a new one unless yours gets returned in the mail.” It was pretty bad, so I left a frustrated comment on a bunch of the [City of Oakland] surveys and eventually several months

> down the line I eventually got an email saying "Okay, we are going to give you a replacement card." Six months after acceptance, I finally got the card. So in the little less than a month since I've had it, it has saved me some money but as I mentioned, initially it kind of cost me a bit.

With regard to program design, insights reported earlier in this report make a case for including car-based modes in UBM programs, since they are the only safe and efficient mode in some circumstances (e.g., working night shifts or safety concerns on public transit). UBM program designers should include these participant perspectives when designing service packages. They should also be aware that prospective participants they consult may underreport their needs and be hesitant to ask for services that would meet all their needs. For example, pilot participants we interviewed appeared to not want to seem ungrateful when we asked them if there were services or adjustments in service levels that could be made to improve the programs. For example, prompted by the interviewer about how many free rideshare (e.g., Uber or Lyft) rides per week would be ideal, one Bakersfield participant who worked night shifts responded: "I don't know. I feel like one per day would be too much. So I'd say, like three a week or something. I don't know... I work five days a week, but I feel like [asking for] one per day is too much. I can't ask for what I want. You know. I gotta be reasonable." When prompted further, by the interviewer stating, "I mean, your ideal scenario. To be able to work, to be able to get your needs met, it sounds like you would need it [Uber/Lyft] five times a week," the participant responded, "Yeah."

Vandalism and Equipment Problems

Spin experienced unprecedented high rates of vandalism to their e-bikes in Bakersfield. Largely due to this vandalism, participants experienced a variety of problems with the e-bikes and service elements. Bikes were being damaged and stolen at such high rates that the fleet size shrunk significantly about 10 months into the program. Maintenance and other service elements could not keep up with the situation. For example, several interviewees reported that upon arriving at a location where the app showed an available bike nearby, they would realize the bike had either been vandalized (required maintenance to be rideable) or was not actually there at all. One user described:

> The app will tell you where there's an available bike or scooter, but if you were to go there, it could be a ghost bike or a ghost scooter, because [people] dismantled and ruined them. Like the electronic parts still work, but the bike itself wasn't there, because they dismantled it and kicked it off.

Another interviewee explained, "I can't find bikes anymore, and the last time I did find a bike, I found one pedal missing... so then I had to run and use my skateboard [to get to my destination]."

Sometimes when users did locate intact bikes, there were latent equipment issues that caused problems during their ride. One user recalled an e-bike shutting off without warning: [The bikes] have the bars where it shows the battery percentage—and the battery was on its second bar. ...and then I'm like, probably 5 min or like a mile away from my destination, and it just completely shut off, even though it still had bars." Another recounted a

failure of the bike brakes: “I almost got hit by a car because I couldn’t stop. I was going about fourteen miles per hour and I kept squeezing the brakes and it wouldn't stop.”

Though not all equipment failures were dangerous, they caused anxiety. One interviewee stated, “At least with the bus they notify you when something's going on. And it's like, okay, it's going to be late. But with the bikes it's basically like Russian roulette. You never know what's going to happen.”

Anxiety about equipment problems was not the only anxiety experienced by participants during the program. Participants reported an increase in travel anxiety due to time limits and ride limits which made them worry that they would not be able to either reach or return from a location in the allotted number of rides or minutes. One user described, “Now, I have ride-anxiety because, like, okay, I need to get here, here, and here. I only have five rides. I need to be sure I can get there in thirty minutes or less.”

User Misuse

Though infrequent, there were instances in which participants used the equipment or funds for purposes other than those they were intended. Bakersfield participants did not always wear a helmet and most rode on the sidewalks at least some of the time. They discussed how riding in the street was not safe due to the lack of protected (or any) bike lanes and lack of driver respect for cyclists. Some also engaged in behaviors that compromised their safety and the safety of others. For example, one participant discussed riding with a child in the cargo basket:

> We put her—she's light enough that we can actually put her in the basket. So we put her in the basket and put a helmet on her. Some people, they look at us, [but] I look at those people that look at me weird, and I’m like “She's laughing. She's having fun. We're on the sidewalk. She's not going to get hurt.”

Another Bakersfield participant rode the e-bike under the influence of alcohol, describing the option to take a Spin bike home from a club after drinking:

> *I've gone to the club a couple of times, and I took it [e-bike] so I don’t have to worry about having, like a drunk driver. I mean having a designated driver, I mean. I don't know a lot of people, so it helps to have a Spin bike. Before that I just honestly, I really just walked. Because, yeah, it's easier just to walk because when you're like, drunk or whatever, you get on the bus, it's like, they’re gonna kick you out.*

In both of these situations, users were unaware that they were breaking rules of the program, and even potentially laws, by engaging in such behavior. In each situation, they also explained that they thought they were, indeed, engaging in behaviors that were safer and preferential compared to alternatives.

Conclusion

The central component of the Oakland and Bakersfield UBM-inspired pilots was free fare transportation service, though each consisted of different service offerings. Both included shared micromobility, but the Bakersfield pilot only included one operator (Spin), whereas the Oakland pilot included several shared mobility services and a variety of public transportation options. This difference was largely because Oakland has a greater variety of each of those types of services available. In Oakland, participants most often used their funds on BART and AC Transit, benefitting from the new, fast BRT (bus) line in their neighborhood. BART, in particular, was often unaffordable to participants before the pilot. Participants in both cities replaced car trips and/or walking with shared mobility and/or public transportation. They were also inspired to try out new modes (or those they did not use regularly before the pilot), sometimes for the sake of enjoyment but often for utilitarian purposes (particularly in Bakersfield), with the added benefit of a pleasant experience.

The pilots targeted different populations—a low-income, minority-majority community with a large number of undocumented immigrants in Oakland, and young adults with a history of foster care or other social service needs (either meeting the definition of disconnected youth or at-risk) in Bakersfield. However, both populations are particularly vulnerable to transport poverty. The pilots were successful at alleviating a lot of the experiences of transport poverty among participants who reported the offerings facilitated their access to jobs, food, health care, and social and recreational opportunities. They were freed to go more places and choose travel modes to get there more quickly and perhaps even enjoy the ride. In many cases, the services also helped participants carry out their activities with more comfort and dignity.

The transportation service offerings occasionally fell short of alleviating transport poverty in two main ways: they sometimes failed to facilitate access to basic needs, and they sometimes failed to provide a safe option. In Bakersfield, Spin's operating zone was not inclusive of some participants' homes or other important destinations, and the dwindling of the e-bike fleet caused great disappointment and inconvenience for participants who had come to rely on those services. Also, hardware issues with Spin e-bikes (due to vandalism) as well as user behavior (e.g., not wearing a helmet) and car-centric urban design and accompanying car driver norms sometimes made for unsafe conditions. Oakland pilot participants also cited lack of safe bike lanes and poor road conditions as well as lack of vehicle availability as deterrents to shared micromobility use. Regarding mobility constraints in Oakland, some participants who did not feel safe or comfortable using either shared micromobility (due to age, ability, or lack of familiarity) or public transit (due to fear of crime or harassment) limited their use of services to the most basic of needs (e.g., food, health care) and did not get to experience the social and recreational benefits that some participants found with the programs.

Some of these problems can be addressed with program design. The most impactful solution would be to include a car-based mode in the service offerings. Notably, Spin did consider including ridehailing credits and Oakland DOT tried to include carshare (and accidentally included ridehailing by some accounts). Further, more educational and communication strategies (e.g., fairs, ride-and-drive events) in Oakland might have helped some participants feel comfortable using micromobility and perhaps they could even provide training on how

to respond to crime and harassment on public transit in addition to broader measures to address these societal problems. Bakersfield had a strong training component (easier to do when the focus is on a single service). And both programs would have been more successful in terms of supporting micromobility had they been able to create and maintain high levels of vehicle access to participants.

Other desperately needed solutions are much larger than any one program can provide. For example, for micromobility to be a real option for most people, streets need to be reshaped to prioritize these modes and make them safer. The other major problem is perceived safety on public transit and the real issue of crime. Both need to be addressed to encourage new riders and protect those who rely on public transit because they have no other options.

Pilot participants in both cities were universally appreciative of the service offerings and reaped significant benefits, a testament to the value of universal basic mobility. These benefits occurred despite challenges in program administration in both cities and interviews revealed that participants were already accustomed to imperfect transportation services. This may reflect both a dire need for universal basic mobility and that people are accustomed to imperfect transportation services. Cities and mobility providers should be inspired by these findings to continue to develop and implement UBM-*inspired* programs—they don't need to be perfect to make a difference in people's lives. That said, designers of future programs should heed lessons learned from these and other pilots and include evaluation components to eventually make UBM a reality.

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