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American Micromobility Panel: Part 1

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American Micromobility Panel: Part 1

April 2023

A Research Report from the National Center for Sustainable Transportation

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16. Abstract

This report presents preliminary findings from the American Micromobility Panel, the largest study of shared micromobility services in the United States incorporating riders from multiple major operators. Micromobility services (bike-share and scooter-share) have recently emerged in many U.S. cities. Given that the substitution of bicycling, scooting, and other small vehicle travel for car travel will help cities reach numerous planning goals (e.g., accessibility, emissions, climate, health, equity, etc.), there is a need for understanding the effects of these mobility services. The purpose of this study was to examine the impact of micromobility services on travel behavior and outcomes such as mode shift, car ownership, access, equity, safety, and physical activity. The authors surveyed shared micromobility service users in 48 U.S. cities with two different surveys in Summer 2022: a 21-day smartphone-based travel diary (2206 participants with 183,483 trips), and an online follow-up survey of travel diary participants (657 valid responses). Car substitution rates, including private car and ride-hailing, show strong variation by city size and micromobility vehicle type. Through self-report, micromobility seems to have had at least a partial influence on the decision to purchase a car, perhaps as a part of a long-term car use reduction effort/plan. Participants showed positive attitudes toward using public transit, but a small portion of trips to access or egress from transit facilities were made by the participants. Instead, the participants more generally showed a transit substitution effect when using micromobility services. Results also suggest that bike-share and scooter-share use may be influenced in opposing ways by participant income. Half of participants had at least once experienced that they could not find an available vehicle nearby, suggesting a sizeable supply constraint on demand for the services to satisfy existing micromobility user needs. The effect of micromobility services on increasing physical activity was slight given the physical activity it often replaced. Additionally, concerning safety, participants tended to agree that bike-share is safer than scooter-share, and participants tended to agree with the view that using micromobility improved their mental health.

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Disclaimer

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American Micromobility Panel: Part 1

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American Micromobility Panel: Part 1

EXECUTIVE SUMMARY

The rise in bicycling and docked bike share services in North American cities over the past decade is a sign of latent demand for bicycling. The more recent rise in dock-less bike and scooter shares (micromobility services) indicates that the latent demand for "micro" transportation options could be substantial. Given that substitution of bicycling, scooting, and other small vehicle travel for car travel will help cities reach numerous planning goals (e.g., accessibility, emissions, climate, health, equity, etc.), there is a clear need for understanding the implications of these mobility services.

In this report we examined the impact of micromobility services on travel behavior and outcomes such as mode shift, car ownership, access, equity, safety, and physical activity. This is the largest study of shared micromobility services in the United States, including multiple major operators for users in an unprecedented 48 cities. We surveyed bike-share or scooter-share users with two different surveys: a 21-day smartphone-based travel diary of shared micromobility users and an online follow-up survey of travel diary participants (post-travel diary survey). We collected 2,206 participants' data with 183,483 trips from the travel survey and 657 valid responses from the post-travel diary survey.

Our results show that most participants thought that micromobility improved their accessibility to their destinations and reduced their travel cost. We found that the participants' personal characteristics, such as income level, race, and age, were associated with key outcomes such as frequency of use and perceptions of the services. Many additional statistical analyses of this data are yet to be completed which might better inform equity and promotion programs.

Participants substituted personal vehicle and ride-hailing travel for a sizeable portion of micromobility trips, and that rate varied depending on city size. However, micromobility trips most often replaced walking. Beyond trip-level substitution, half of participants stated that they had used a personal vehicle less often than before they had started using a micromobility service, and a sizeable portion of the participants thought that micromobility had some influence on their decision to not purchase a household vehicle, suggesting a long-term influence of micromobility on car-ownership for some.

In this study, travel connections between transit and micromobility were negligible across all cities, even those with greater transit access. Although participants had favorable attitudes toward using public transit, our results showed that only a small portion of the access to or egress from public transit (i.e., first and last mile modes) were by micromobility services. Instead, a transit substitution effect of micromobility trips was more common. Additional data analysis is planned to understand the effect of micromobility services on the transit ridership and transit trip experience.

Our results show that most participants were willing to walk up to five minutes to get a micro vehicle for a 15-minute ride. One-quarter to one-third of participants perceived that bike and scooter services were not available when and where they needed them. This perception parallels the reporting that half of participants had at least once experienced that they could not find an available vehicle nearby. These results suggest a sizeable supply constraint on demand for the services to satisfy existing micromobility user needs.

In terms of safety, only a small percentage of participants reported crashing when using micromobility services. It is notable that participants in general felt that bike-share was safer than scooter-share, and further analysis will explore factors related to micromobility safety perceptions. Beyond perceived safety, the health outcomes from micromobility services are likely much broader. We observe a possible net effect of increasing physical activity because of added bicycling and scooting, although reductions in walking and mode substitution of personal bicycling and scooter may negate many of the physical activity gains.

This is Part 1 reporting of the American Micromobility Panel. Because of the lack of data cleaning and weighting at this point of reporting, we chose to keep these summaries independent of the post-diary survey data. In Part 2 reporting, we will post-process and clean additional trip data to make our dataset more robust by increasing the size of the data. We will also use distributions of personal micromobility use frequency for each city by vehicle to weigh our sample to system-level trip making to consider sample representativeness. All results in this report are unweighted and are not likely representative of all micromobility trips. For this reason we divided the reported of trip data by city size to show relative variation in results.

Introduction

The rise in bicycling and bike share services in North American cities is a sign of latent demand for bicycling. The more recent rise in dock-less bike and scooter shares (micromobility services) indicates the latent demand for "micro" transportation options could be substantial. Given that substitution of bicycling, scooting, and other small vehicle travel for car travel will help cities reach numerous planning goals (e.g., accessibility, emissions, climate, health, equity, etc.), there is a clear need for understanding the implications of these mobility services.

Many prior studies have analyzed users' behavior of bike-share services, scooter-share services, or both, regarding diverse policy goals. Most studies focus on one or a few cities to examine micromobility behavior by conducting cross-sectional surveys, resulting in lack of generalizability and many threats to internal validity (e.g., self-reporting biases). The few studies that have used reliable behavioral data (location-based) have ignored complex trip chains or trip-contexts (e.g., modes and purpose of trips in the previous and next trips of a micromobility trip) from their analyses.

In this report we examine the impact of micromobility services on travel behavior and outcomes such as mode shift, car ownership, access, equity, safety, and physical activity. We surveyed micromobility service users in 48 U.S. cities. This survey differs from other surveys of micromobility users by collecting a concurrent smartphone (location-based service app) travel diary of total travel for up to 21 days. Paired with individual characteristics and attitudes toward micromobility services and other travel modes, this data offers a deeper look at the tradeoff between micromobility use and car use, as well as individual-level connections between micromobility and transit in the U.S. This study provides information valuable for local and regional agencies in the U.S. as they plan for or promote micromobility services.

Research Design

Research Questions

This report focuses on four sets of primary research questions:

- *Micromobility Use:* How frequently do people use micromobility services? How does the COVID-19 pandemic influence micromobility use? Do people use these services for different purposes? How do types of micromobility services differ in their appeal to users?
- *Effects on other travel modes:* What travel modes do people shift from when they use micromobility services? Do those mode shifts relate to trip purpose or personal characteristics or city features? How does micromobility services impacts users' car ownership and other transportation options?
- *Facilitators and barriers:* How do attitudes and perceptions relate to the use of specific types of services? What potential barriers exist for widespread adoption?
- *Benefits of use:* How does use of micromobility services support users' physical activity and mental health? How safe do riders feel using micromobility services?

Data Collection

Design Analysis

Prior to data collection, we conducted a design analysis aimed to ensure data collection included a large enough sample to measure expected vehicle miles traveled reduced from micromobility services.[1] This analysis used existing survey data of bike-share users in Sacramento, California, describing trip frequency and trip distance, and driving data from the 2019 Puget Sound Regional Travel Survey (GPS diary) describing mode choice and trip distance.[2] Although the data was from different populations, we assumed they represented general travel behavior and pooled them. We used a copula model to string together estimates of bike-share use, bike-share trip distances, and mode substitution to estimate vehicle miles of travel reduced. Results suggested that longer travel diaries per person (21 days) were the best way to ensure a measurable car use reduction from bike-share use at a person level. The results also suggested that "super users", people who used micromobility services at high rates, were much more likely to show a car use reduction. At the time of this design analysis, city selection was expected to include between 15-20 medium to large US cities and include a sample size of 2000 users and 1000 non-users, given the budget of the project. This recruitment plan was expected to achieve greater than 0.8 power for observing a car use reduction effect. However, due to the limitation of our sample frames and low expected response rates, we decided to expand the number of cities and reduce the per-city sample size. This decision was based on the pragmatics of maximizing the sample size per dollar and not motivated by the results in the design analysis. While the eventual study design did not follow the design analysis exactly, the eventual design still followed the goals of maximizing diary duration per person and still focused on "super users" to ensure a measurable car use reduction.

City Selection

City selection went through several phases. In the design analysis we assumed an infinite sample frame in each city. We originally proposed to recruit in 16 cities to balance the goal of a collecting data in a diverse set of cities (e.g., by biking environment, walk score, bike score, transit score, percentage of transit commuters, percentage of bicycling commuters, and population density) with the practicality of ensuring we did not miss a lot of micromobility users from operators whom we did not partner with (all operators other than Bird, Lime, Lyft, Spin, and Superpedestrian). Based on these parameters and the geographical distribution of the cities, we discussed and selected a long list of potential cities. Along with this selection, we also communicated with the micromobility operators in these cities. Overall, presence of partner operators was one of the most important factors in the initial city selection.

As the launch of the survey approached, we set recruitment quotas based on target sample sizes and expected recruitment rates (see next section). However, it became clear that the sample frames in the selected cities were not large enough to satisfy the overall sample size.

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[1] https://github.com/bicyclingplus/micromobility-VMT-sim

[2] https://www.nrel.gov/transportation/secure-transportation-data/tsdc-2019-puget-sound-travel-study.html

This caused a rapid evolution of the city selection protocol in the period of about one month. We decided to expand the city selection by asking each operator to provide a list of their largest markets that were not in our study. With those lists we selected cities to fill the gaps in our sample frame size and to ensure a similar diversity as originally planned. Because we didn't know the exact sample frame size for each operator in each city (that was considered sensitive data), we decided it was better to add more cities (risk poor city-level inferences) than too few (too small of sample size to make general inferences). We settled on adding 32 cities to our list, totaling 48 cities for recruitment to help ensure our sample frame was as large as possible to achieve a 2000 user sample (Figure 1).

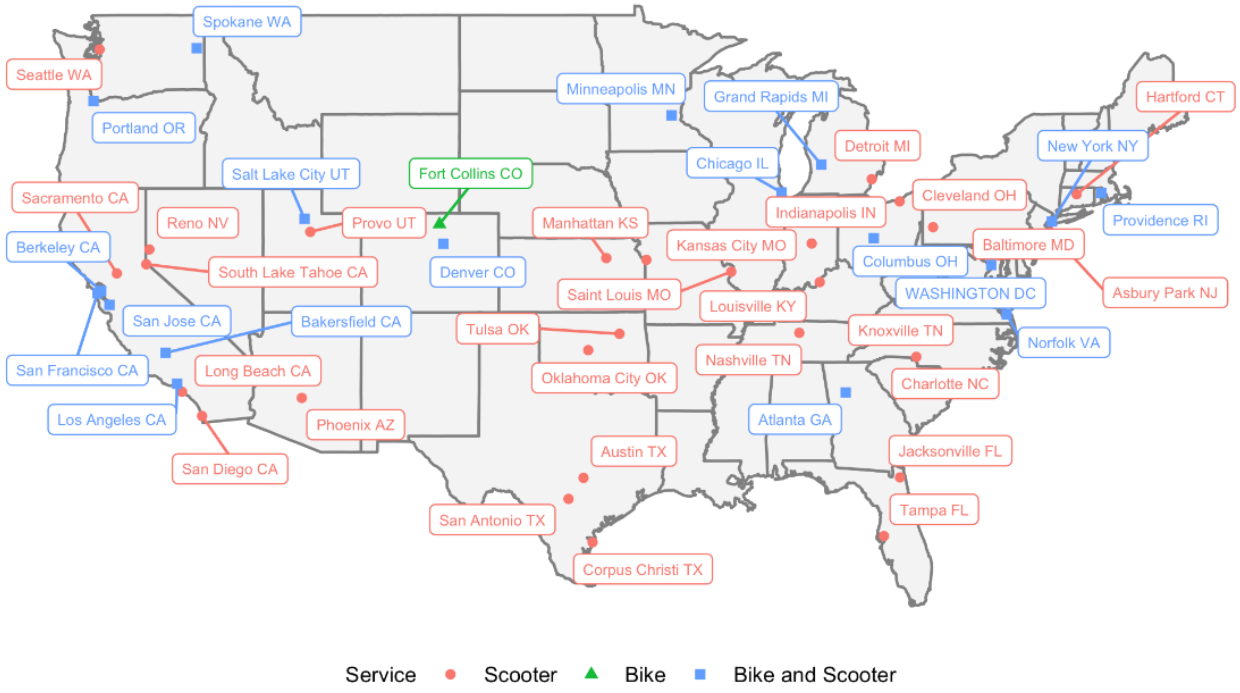

Figure 1. Location of selected cities and type of services

Travel Diary Recruitment

We conducted a 21-day smartphone-based travel diary of shared micromobility users in Summer 2022. We used a third-party vendor (RSG) to monitor the travel diary survey. Invited participants were required to install a smartphone app (rMove) that tracked their trips and asked them trip-associated questions during the study period. We attempted to recruit 2000 micromobility users (800 bike-share users and 1200 scooter-share users) based on the targets of the design analysis. To recruit users, we partnered with five micromobility service companies (Bird, Lime, Lyft, Spin, Superpedestrian). Based on the city selection, we set a quota by city, operator, and vehicle type (bike-share or scooter-share). Operators recruited users in three waves. In wave 1 we attempted to recruit half the sample while assuming conservative recruitment rates from similar studies based on guidance from RSG. After adjusting quotas to wave 1, in wave 2, operators attempted to recruit the remaining quota. Because we did not reach our quotas in most cities, we used a third wave (wave 3) to fill our quotas.

In the sampling process, we gave a probability weight to each user based on the square of the number of bike-share/scooter-share trips in their prior four weeks.[3] We used recruitment weights to avoid recruiting too many infrequent micromobility users which would have resulted in a small number of micromobility trips in our dataset. This technique also helped us recruit frequent users in the beginning waves of survey recruitment, allowing us to adjust weights and quotas for more precise recruitment in the two follow-up waves. We weighted recruitment because we expected the distribution of the frequency of bike/scooter-share use by person would have a long right tail and a high peak at lower number of micromobility use based on conversations with operators.

We repeated the recruitment process for a total of three waves, with one reminder email each wave, to try to achieve a quota in each city. We did so to avoid oversampling and to balance the number of participants by city and vehicle type in our dataset. In the first wave, we aimed at recruiting half of the quota by city and vehicle types based on the assumption that the recruitment rate was 2% and the drop-out rate, the ratio of participants giving up participating in the middle of the survey period, was 38%.[4] We observed response rates at slightly less than 1% for most cities in the first wave. Due to very low response rates, we added additional cities for recruitment as discussed in the previous section. In the first wave for those additional cities, we assumed an average 0.7% response rate but allowed it to vary by city, operator, and vehicle type when determining the number of emails to send. We conducted a similar process for all cities in the second and third wave. In the end, 2206 participants made it to the point of downloading the rMove app.

We offered participants a $15 gift card after completing the 21-day study and the opportunity to be entered to win one of ten $250 gift cards. We sent 517,000 invitation codes to the partners to draw users from their database for the recruitment. The actual number of invited users was lower than the number of invitation codes we sent to them given many had high email bounce rates. We received reports from partners that they ran out of customers to recruit in cities with small programs (meaning these markets we recruited every active user), but most cities did not have this problem.

We also attempted to recruit those who had not experienced any shared micromobility service before to understand the difference of travel behavior and attitude toward transportation in general and micromobility service. We used a snowball sampling technique to recruit these participants. Snowball sampling is a technique that uses current participants to help recruit new participants. In our survey, we asked participants to send our survey link to those who they know even if they have never used a micromobility service. Our goal was to collect half as many non-micromobility users as users. However, our recruitment technique failed as we were only able to collect 32 participants from this approach. Because of such a small sample size, we did

[3] This data was not obtained by UC Davis. UC Davis wrote a procedure for the operators to run on their end to determine the person weights for recruitment.
[4] Rates based on prior rMove recruitment by RSG and our sample design.

not include any comparisons of users and non-users of micromobility in this report. Table 1 shows quota and final sample size for each city by vehicle type.

Table 1. Quota and sample size by city and vehicle type

City	Vehicle Type	Quota	# of participants in travel diary survey	# of all collected trips	# of all collected trips with trip info	# of participants in post diary survey
Micromobility User						
Asbury Park, NJ	Scooter	8	3	224	153	1
Atlanta, GA	Bike	22	4	187	101	1
Atlanta, GA	Scooter	81	34	2647	1351	9
Austin, TX	Scooter	80	27	2358	1384	10
Bakersfield, CA	Bike	5	1	10	0	0
Bakersfield, CA	Scooter	27	0	0	0	0
Baltimore, MD	Scooter	74	25	2230	1425	5
Berkeley, CA	Bike	43	30	2309	1702	12
Berkeley, CA	Scooter	5	0	0	0	0
Charlotte, NC	Scooter	82	29	2292	1426	9
Chicago, IL*	Bike	200	224	18924	11492	78
Chicago, IL*	Scooter	80	60	4302	1493	11
Cleveland, OH	Scooter	36	16	1408	675	1
Columbus, OH	Bike	50	37	2932	1531	10
Columbus, OH	Scooter	86	29	2450	1193	8
Corpus Christi, TX	Scooter	10	3	531	413	0
Denver, CO	Bike	119	70	6537	3746	30
Denver, CO	Scooter	97	73	5546	2481	15
Detroit, MI	Scooter	41	13	1164	678	2
Fort Collins, CO	Bike	38	5	487	348	2
Grand Rapids, MI	Bike	23	14	1251	598	2
Grand Rapids, MI	Scooter	16	6	324	237	2
Hartford, CT	Scooter	40	4	187	149	0
Indianapolis, IN	Scooter	117	27	2026	897	5
Jacksonville, FL	Scooter	19	0	0	0	0
Kansas City, KS	Scooter	10	4	176	131	1
Knoxville, TN	Scooter	6	0	0	0	0
Lake Tahoe, CA	Scooter	30	11	1159	609	1
Long Beach, CA	Scooter	55	28	2638	1610	12
Los Angeles, CA	Bike	100	60	5117	2686	22
Los Angeles, CA	Scooter	221	148	11321	3826	23
Louisville, KY	Scooter	44	27	2486	1154	8
Manhattan, KS	Scooter	6	3	231	23	0

City	Vehicle Type	Quota	# of participants in travel diary survey	# of all collected trips	# of all collected trips with trip info	# of participants in post diary survey
Minneapolis, MN	Bike	61	52	4485	3176	20
Minneapolis, MN	Scooter	74	52	4493	2354	16
Nashville, TN	Scooter	79	15	1273	544	3
Norfolk, VA	Bike	38	8	503	261	1
Norfolk, VA	Scooter	33	13	686	369	2
New York City, NY*	Bike	225	199	16714	9349	62
New York City, NY*	Scooter	86	35	2224	1143	11
Oklahoma City, OK	Scooter	20	13	1233	621	1
Phoenix, AZ	Scooter	18	9	615	242	2
Pittsburgh, PA	Scooter	35	16	1100	468	2
Portland, OR	Bike	80	59	5095	3046	21
Portland, OR	Scooter	75	37	2850	750	6
Providence, RI	Bike	57	12	1789	652	6
Providence, RI	Scooter	65	14	1180	659	4
Provo, UT	Scooter	14	5	520	161	1
Reno, NV	Scooter	25	16	1382	388	2
Sacramento, CA	Scooter	42	32	2855	1689	6
Salt Lake City, UT	Bike	10	4	112	43	1
Salt Lake City, UT	Scooter	22	9	721	391	2
San Antonio, TX	Scooter	18	4	122	1	0
San Diego, CA	Scooter	78	24	1745	765	6
San Francisco, CA*	Bike	150	139	11698	7230	59
San Francisco, CA*	Scooter	85	52	4572	1455	13
San Jose, CA	Bike	43	16	1465	773	5
San Jose, CA	Scooter	75	37	3597	1410	8
Seattle, WA	Scooter	90	53	3790	1206	11
Spokane, WA	Bike	10	6	332	47	0
Spokane, WA	Scooter	15	10	740	431	5
St. Louis, MO	Scooter	53	4	348	94	1
Tampa, FL	Scooter	24	11	839	516	4
Tulsa, OK	Scooter	17	11	772	71	1
Washington D.C. *	Bike	195	111	10153	6312	58
Washington D.C. *	Scooter	106	81	6428	3487	23
Subtotal		*3889*	*2174*	*179885*	*93616*	*643*
Non-User						
		1000	*32*	*3598*	*3049*	*14*

City	Vehicle Type	Quota	# of participants in travel diary survey	# of all collected trips	# of all collected trips with trip info	# of participants in post diary survey
Total						
		4889	*2206*	*183483*	*96665*	*657*

* We categorized micromobility trips into two groups based on trip locations as a preliminary analysis to understand the effect of city size. The symbol, *, represents cities categorized as "Big and Dense cities." The rest of cities was labeled with "Other cities."

In this report, we summarized statistics of trip data prior to detailed data reviews and other cleaning processes on location information. To minimize the risk of including invalid trip data in our analysis, we first used flags assigned by RSG about each trip's probability of being kept, dropped, or reviewed based on their proprietary code-based classifier with some important factors (trip speed and distance, accuracy of trip locations points, trip path attributes, and user interaction with the trip). As suggested by RSG, we assigned "Keep" for trips with 0.8 or higher probability of being kept and "Drop" for trips with greater than 0.7 probability of being dropped. We assigned "Review" for the rest of trips. We included trips labeled with "Keep" as likely valid trip data. However, we observed some "Keep" data with unreasonable trip characteristics (e.g., a 1000-mile distance trip by walking and car trip speed of 200 mph). Such issues occur due to incorrect reporting or GPS error. To avoid including such data in our analysis, we made a simple rule-based classifier by setting lower and upper bounds of trip speed by travel mode. Trip speed is derived from trip distance and duration, so filtering out trip data with unreasonable trip speed resulted in dropping most trip data with unreasonable durations and distances. In the end, our valid trip dataset in this report (only the "Keep" trips with reasonable trip speeds by mode) includes 51,088 trips with 3,141 bike-share trips (6% of trips) and 2,202 scooter-share trips (4% of trips) made by 1,511 participants in 45 cities (excluding Bakersfield, CA, Jacksonville, FL, and Knoxville, TN) (Table 2). We plan to review and clean the remaining data in future reports. Table 3 shows individual characteristics of participants in the travel diary survey.

Table 2. Number of trips with trip information by level of data validity

	Total	Keep	Review	Drop
Number of trips with trip information	96,665	51,088	44,480	1,097
Bike-share trips (Primary mode)	6,932	3,141	3,757	34
Scooter-share trips (Primary mode)	3,875	2,202	1,614	59

Travel Diary Instrument

We included a series of survey questions in the smartphone app rMove as a part of the travel diary. In a preliminary survey, we collected one-time measures of variables that do not change or are unlikely to change during the diary period (e.g., residential/workplace/school location,

socio-demographics, etc.). When travel for the participant-specific 21-day period began, so did the primary data collection. The rMove application is a prompted-recall travel diary, where participants are asked questions to confirm details of their trips (Safi et al., 2015). In some cases, rMove estimates survey question answers based on prior trips at the person level. In those cases, the participant is asked to confirm or edit the rMove estimated data.

The primary diary included each trip collected by rMove using location services, prompts from the app for user-input data or confirmation of app-estimated data at the trip level (e.g., mode, trip purpose, mode substitution, parking, etc.), and short daily surveys.

Post Travel Diary Survey

We conducted an online follow-up survey of participants to measure the effect of micromobility services on their travel behavior and attitudes. This survey was implemented in September 2022.

In a post-travel diary survey, we sent a recruitment e-mail to those who answered that they were willing to continue to participate and complete the travel diary survey for at least one day. We offered participants a $5 gift card and the opportunity to be entered into a drawing to win one of ten $250 additional gift cards. Additionally, on behalf of our micromobility company partners, participants received $5 in promotional micromobility ride credit from one operator of their choice (from among Bird, Spin, and Lime) at the end of the survey. We invited 940 participants (the original sample size of participants willing to be recontacted), received 693 responses (74% of the response rate), and decided to use 657 valid responses for further analysis. We included 14 non-users in our analysis because they answered that they had never used bike- or scooter-share services before. On the other hand, we excluded 9 participants recruited through the companies because they answered that they had never used any shared service, even though the company's records indicated otherwise. Table 1 shows the number of participants in the post-diary survey for each city by vehicle type.

Questions in the post travel diary survey included experiences with micromobility services, use of different transportation modes before the COVID19 pandemic or at present, the effect of micromobility use on other transportation use, collision or almost collision experience on or with micromobility vehicles, attitudes towards micromobility services and other aspects of transportation, and additional individual characteristics the travel diary survey did not include, such as types of living place and residential ownership. Table 3 shows individual characteristics of participants in the post-diary survey.

Table 3. Individual characteristics of participants in travel diary survey and post-travel diary survey

Variable	Subcategory	Travel diary (n=1511)	Post-travel diary (n=657)
Race	White	62%	68%
	Black	8%	4%
	Asian	12%	13%
	Other	18%	16%
Gender	Woman	35%	38%
	Other	65%	62%
Employment Status	Yes	86%	88%
Income (n=1558/624)	Less than $50,000	33%	24%
	Between $50,000 to $100,000	28%	28%
	Between $100,000 to $150,000	17%	20%
	$150,000 or more	22%	28%
Driving license	Yes	77%	81%
Car ownership	Yes	56%	57%
Student status	Yes	18%	18%
Having children	Yes	12%	11%
Age	Less than 35	58%	55%
	Between 35 to 55	35%	36%
	55 or more	7%	8%
Micromobility User Category	Bike-share use only	-	28%
	Scooter-share use only	-	20%
	Bike and scooter-share use	-	52%

*Some variables have different sample size due to missing values.
** The total percentage may not be 100% due to rounding.

Limitations

The data in our analysis have several limitations. First, our sampling method failed to recruit sufficient sample size of non-users. We lack the ability to understand how individual characteristics and their attitudes toward general travel options and micromobility services of micromobility users are different from those of non-users.

Our sampling method for micromobility users may not have produced a representative sample. Without a census or summary statistics of micromobility users from governmental bodies or operators, it is difficult for us to discuss the degree to which our sample represents overall users in the U.S. cities. In this report, we reported summary statistics of our dataset focusing on micromobility use and behavior without any weight to consider sample representativeness. In our future work, we will use distributions of personal micromobility use frequency for each city

by vehicle (from our partner companies) to weigh our sample to system-level trip making. Essentially, we will assign a weight at the person level for their representativeness based only on trip frequency.

Our summary statistics of rMove trip data may be biased due to the exclusion of potentially valid (but needing review) trip data and potentially invalid data given we did not validate the trips identified as “Keep” by RSG. Nonetheless, because of the size of the data, and because of the potential for errors to be random distributed in the trips, we are confident the summaries hold valid insight for the participants in our study and for micromobility services in the U.S.

Results: Travel Diary Survey

In this results section, we summarize the data from the smartphone recall travel diary survey alone. Because of the lack of data cleaning and weighting at this point of reporting, we chose to keep these summaries independent of the post-diary survey data. In future reports we will integrate the two datasets.

Micromobility use

Distance and duration of micromobility trips

Our data shows that most bike and scooter trips were shorter than 5 miles (Figure 2). As shown by other studies (Fukushige et al., 2022; NACTO, 2022), bike trips with a mean of 1.8 miles and a median of 1.5 miles tend to be longer than scooter trips with a mean of 1.2 miles and a median of 1.0 miles. Correspondingly, a mean and median duration of bike trips were 15 and 13 minutes while scooter trips were 9 and 8 minutes.

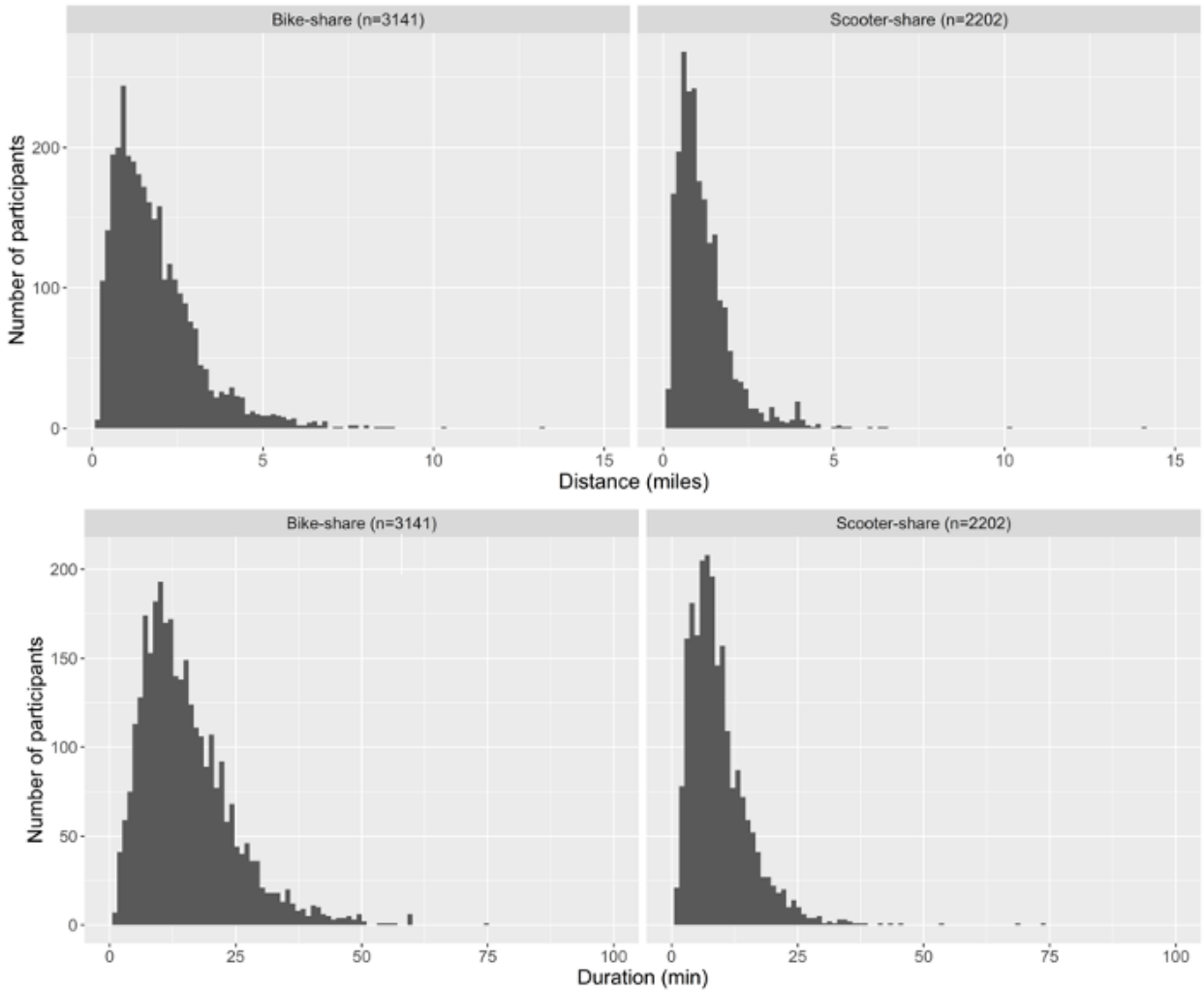

Figure 2. Distribution of bike and scooter-share trip distance and duration

Who uses micromobility services?

To understand the different types of micromobility users, we divided our participants into four categories based on their travel diary data (Table 4)[5]. We termed minimal users those who recorded using the service less than once a week, regular users those who recorded using the service between one to five times a week, frequent users those who recorded using the service between five to ten times in a week, and super users those who recorded using the service more than ten times in a week.

[5] To categories participants, at the person-level, total micromobility trips were divided by the number of complete travel days recorded in the travel diary and then multiplied by the seven days to estimate weekly patterns. As many people recorded less than seven travel days, those people were still included in the categorization assuming the travel they did provide could generalize to weekly behavior. This approach ensured that all the user data from the travel diary is included in the analysis.

Lower-income (less than $50,000 household) participants were more likely to be super users. A portion of the lower income users are students, some of whom used a student discounted membership. Less clear trends in micromobility use were observed by race. Finally, Non-students were more likely to be super users than students.

Table 4. Individual characteristics of participants by use frequency of micromobility (n=1511)

Variable	Minimal Micromobility User (57%)	Regular Micromobility User (23%)	Frequent Micromobility User (14%)	Super Micromobility User (6%)
Household Income				
Less than $50,000	55%	19%	17%	8%
Between $50,000 to $100,000	54%	26%	12%	6%
Between $100,000 to $150,000	57%	24%	13%	3%
$150,000 or more	58%	23%	13%	4%
Gender				
Woman	59%	23%	11%	5%
Man	55%	22%	16%	5%
Other	58%	20%	15%	5%
Race				
White	56%	24%	14%	6%
Black	55%	18%	18%	7%
Asian	53%	26%	14%	6%
Other	68%	15%	13%	2%
Age				
Less than 35	59%	23%	12%	5%
Between 35 to 55	57%	23%	13%	5%
55 or more	48%	21%	22%	7%
Student Status				
Student	64%	22%	11%	2%
Non-student	55%	23%	15%	6%

Why do people use micromobility services?

Participants used micromobility services for many trip purposes, but “return home” trips were the most common (Figure 3). Participants used bike-share for social/recreation and work-related purposes more often than they did using scooter-share. On the other hand, participants used scooter-share for work, and going for a meal more often than when using bike-share. However, in general, trip purposes were similarly proportioned for bike and scooter services. This suggests that trip purpose may not be a strong predictor of selected micro-mode. Instead, selection of micro-mode may be due to other factors like personal preference, availability, cost, etc.

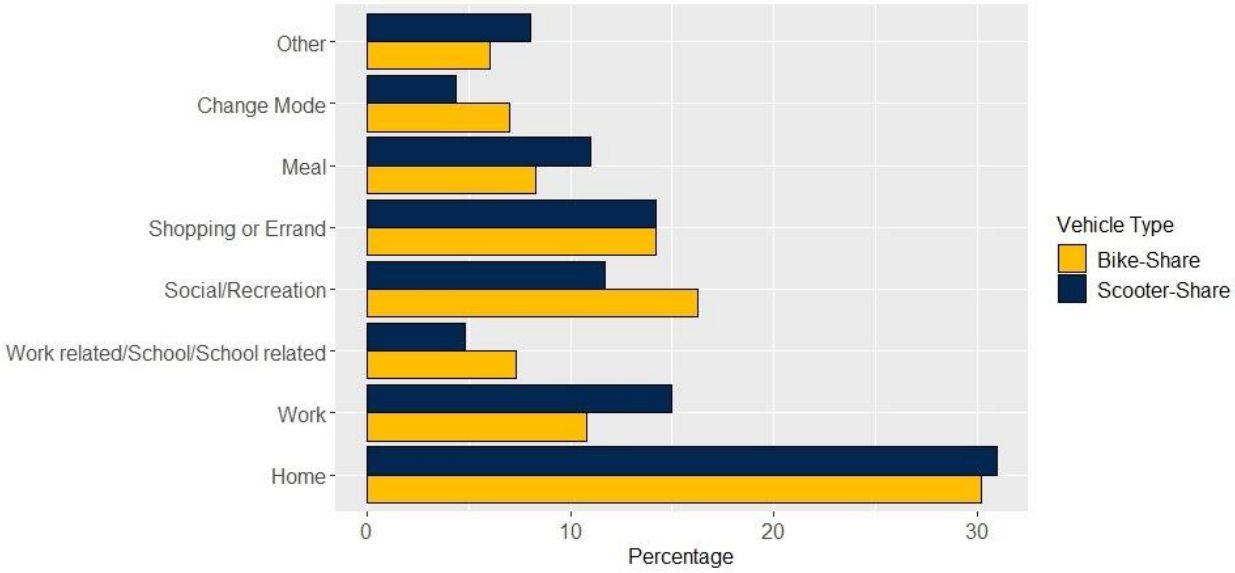

Figure 3. Trip purpose of different types of micromobility services

Where do people park micromobility vehicles?

Participants nearly always parked bikes at bike racks (Figure 4). This is likely because a large portion of bike trips in our data were made from docked bike-share systems, requiring users to return bikes at stations. On the other hand, 28% of scooter trips by the participants parked at scooter racks or designated parking areas/stations, while 56% of scooters were parked on the sidewalk/free-standing or adjacent to sidewalk. Parking behavior is likely strongly linked to local regulations. Given our study covers a wide variety of cities and regulations, it is not clear from this data how much of the parking behavior was compliant with local regulations until further city-level analysis (to be conducted in the future). What is clear is that these participants parked scooters in a much wider variety of ways and locations compared to bikes.

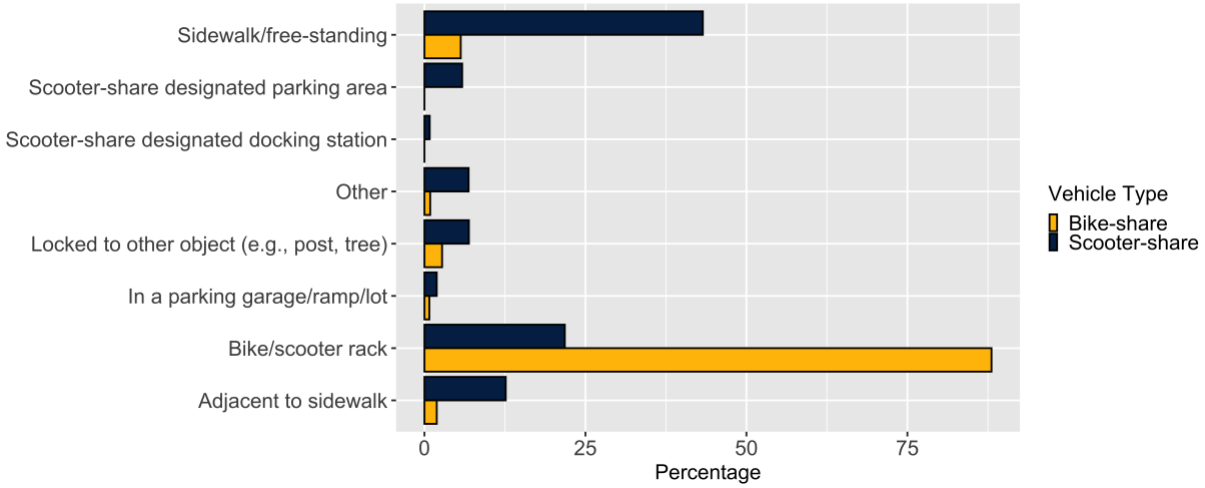

Figure 4. Micromobility park location

Mode substitution of micromobility trips

General substitution

Participants reported some variation in mode substitution by type of micromobility service (Figure 5). Participants were much more likely to replace rail trips when using bikes compared to using scooters. To a lesser degree the same was true of replacing personal bike or e-bike trips. The opposite was true of replacing walk trips, scooter trips replacing walking more often. The participants were also more likely to report their use of scooters spurred new travel ("no trip" category) compared to their use of bikes in Other cities. Both bikes and scooters had similar mode substitution of taxi/ridehail trips in any city size. Considerable differences between the mode substitution patterns for bike-share and scooter-share is seen in terms of replacing bus and household vehicles with respect to city size. We observed higher household vehicle substitution rates for bikes compared to scooters in Big and Dense cities. In the smaller cities, both micromobility services showed greater vehicle substitution. Our results showed that bus substitution rates of scooter trips were higher in Big and Dense cities than in Other cities while those of bike trips in any type of city had a similar pattern.

These car substitution percentages suggest scooters and bikes may have different effects on reducing vehicle trips depending on location of trips. Further investigation is needed as prior research shows that mode substitution varies largely by city (Fukushige et al., 2021; Wang et al., 2022; Krauss et al., 2022), and trip-level substitutions do not account for the differences in trip distance, the key factor for understanding sustainability gains.

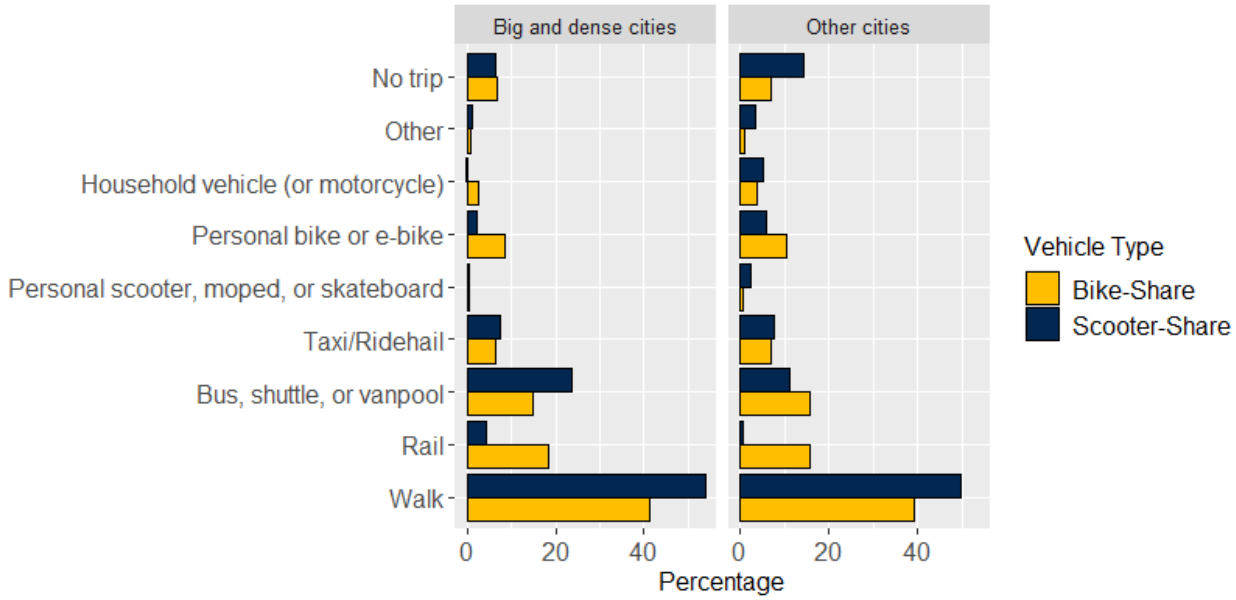

Figure 5. Overall mode substitution by bike-share and scooter-share user participants and by types of cities

Mode substitution by trip purposes

Figure 5 shows that walking is the predominant mode that the participants substituted when using micromobility services. However, the proportion of walking substituted varies by travel purpose and vehicle type (Figure 6 and Figure 7). For both bike-share and scooter-share, participants reported substituting walking more often for shopping, social/recreational activities, and going for a meal. Compared to scooter-share, bike-share users tend to substitute transit more for most of the reported travel purposes. Replacement of transit (both bus and rail) by bike-share is greater for work and work-related trips, suggesting that both commute and mid-day work travel is more convenient by bike-share than transit for many participants.

One of the largest differences in reported mode substitution by trip purpose is the use of scooters for new social/recreation trips, and to a lesser degree going for a meal. This suggests that scooter-share is creating a measurable opportunity for new social connections and recreation, a benefit that is perhaps less appreciated by cities, or at least less likely to be monitored as a transportation performance metric. This finding is aligned with a previous study (Kim & McCarthy, 2023). For many substituted modes, trip purpose does not appear to be strongly influential.

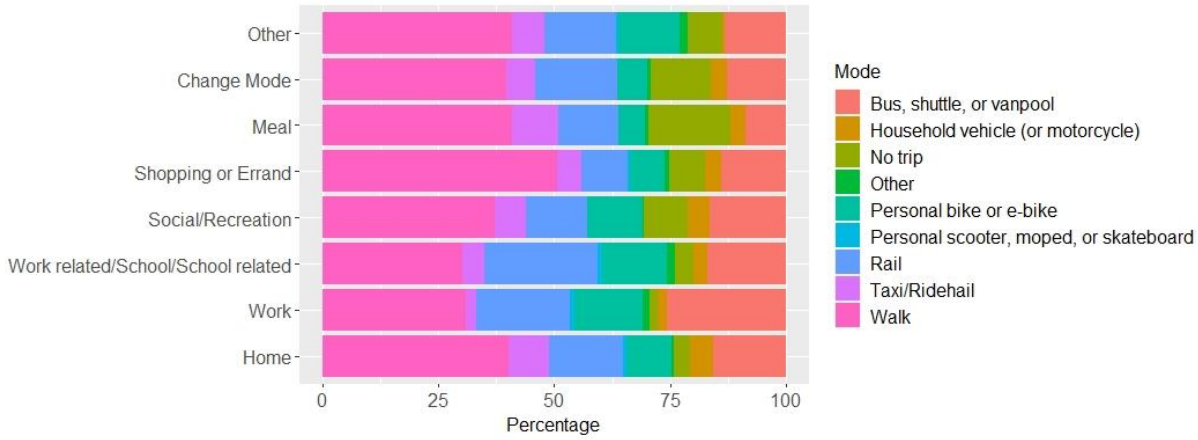

Figure 6. Bike-share mode substitution by different trip purposes (n=3141)

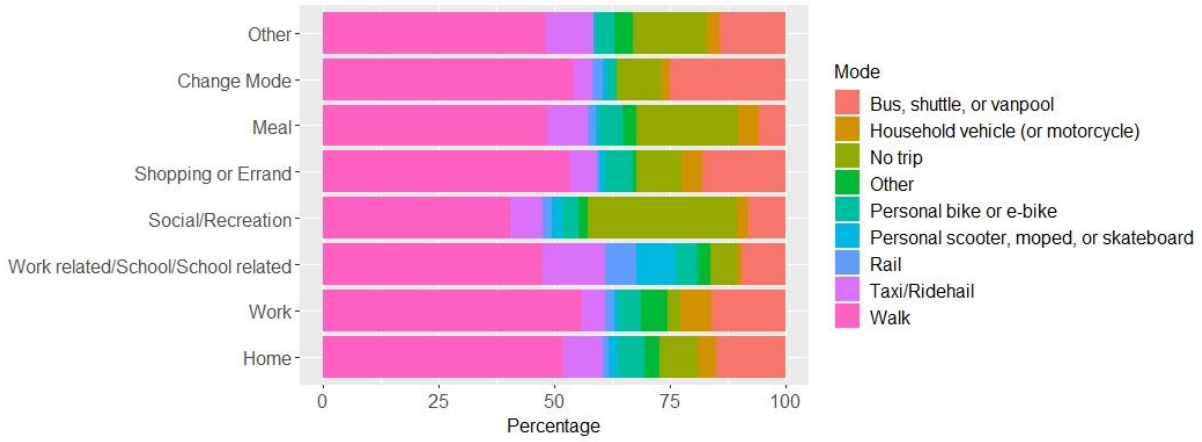

Figure 7. Scooter-share mode substitution by different trip purposes (n=2202)

Mode substitution by personal characteristics

Considering mode substitution by race, Black participants replaced walking more often than all other groups for both bike- and scooter-share (Figure 8 and Figure 9). The rate of transit substitution also varies by race. Compared to White and Asian participants, Black participants report transit replacement at a lower rate. Replacement of cars is most commonly reported by White (for both bike-share and scooter-share) and Asian (for scooter-share) participants.

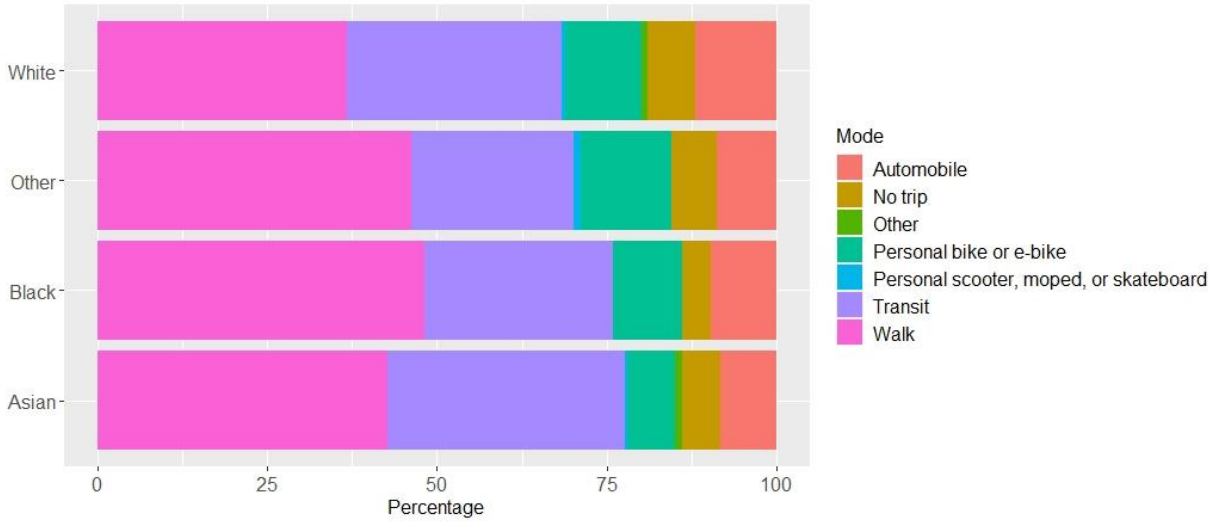

Figure 8. Mode substitution of bike-share users of different races (n=3141)

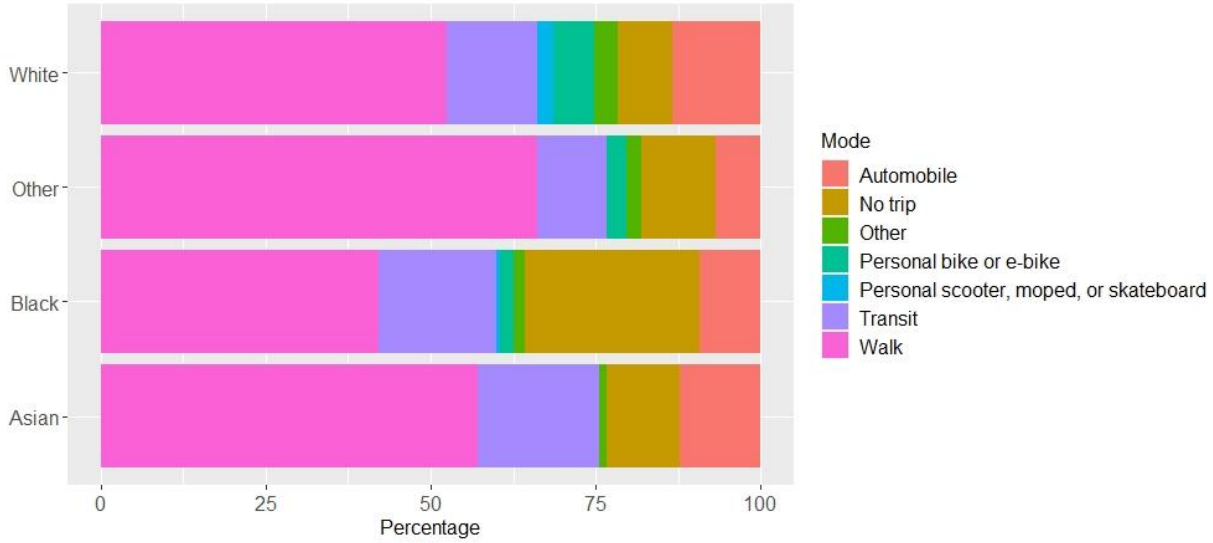

Figure 9. Mode substitution of scooter-share users of different races (n=2202)

With respect to car ownership, we observe an opposite trend for walk replacement between participants using bike-share and scooter-share (Figure 10 and Figure 11). Non-car owners replaced walking more than car owners when using bike-share. However, both non-car owners and car owners replace walking at a similar rate when using scooter-share. Non-car owners reported greater induced travel from scooter-share compared to car owners. This suggests that scooter-share may have a particular role in providing access to activity locations that those without cars never had access to without scooter-share.

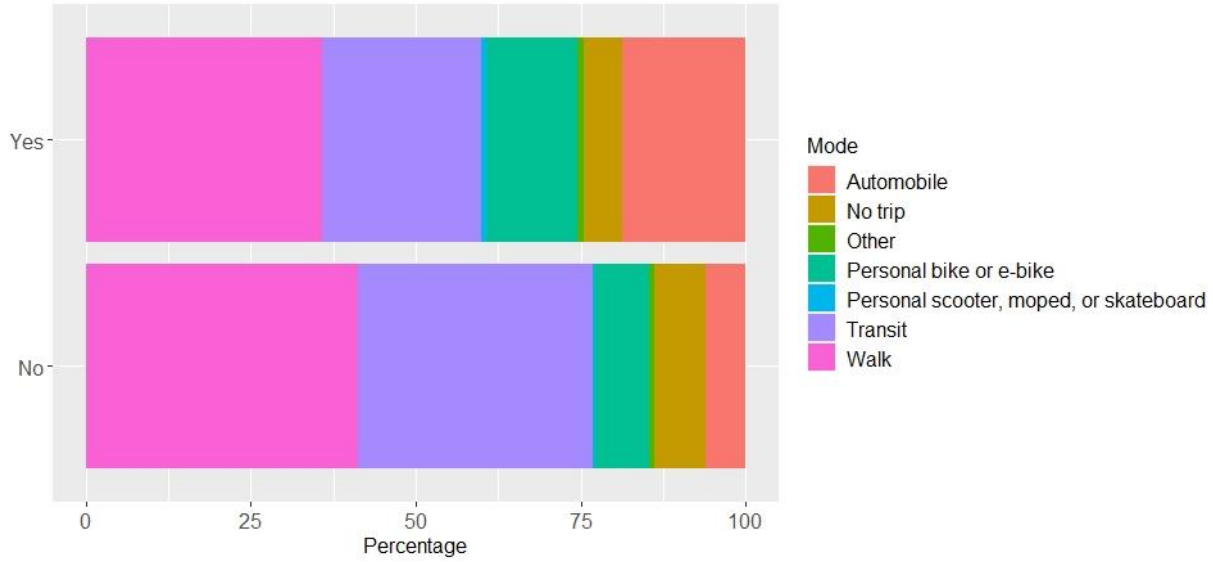

Figure 10. Mode substitution by car ownership status of bike-share users (n=3141)

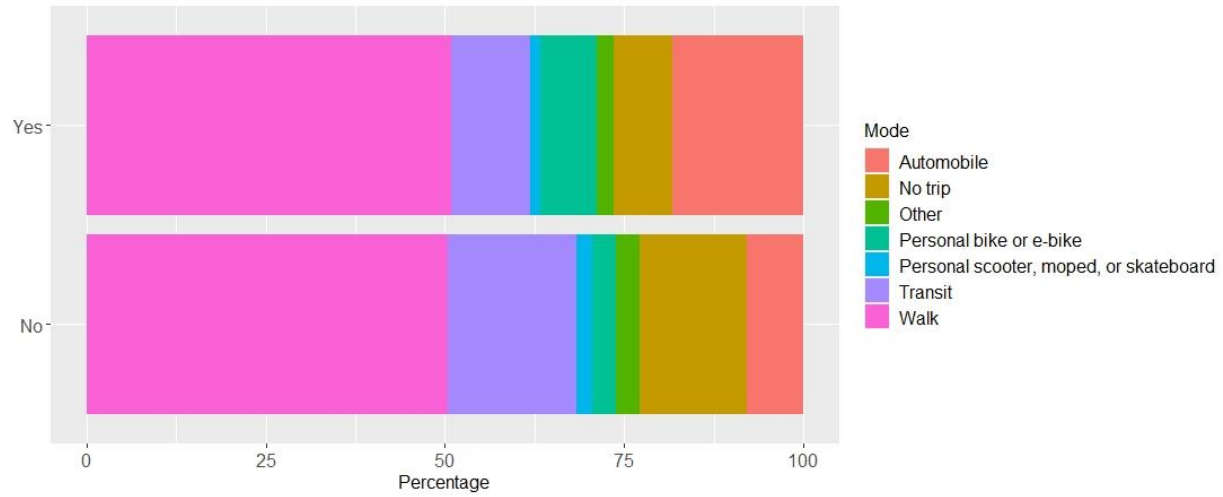

Figure 11. Mode substitution by car ownership status of scooter-share users (n=2202)

Mode substitution by trip distance

Compared to scooter-share users, participants using bike-share replaced longer walking trips (e.g., between 1 to 2 miles) more often (Figure 12 and Figure 13). In addition, compared to scooter-share users, participants using bike-share also replaced long-distance car trips and long-distance transit trips in higher proportion. For travel that would not have happened without micromobility services, bikes were used for longer trips more often in comparison to scooters, even though scooters were used more often for new travel.

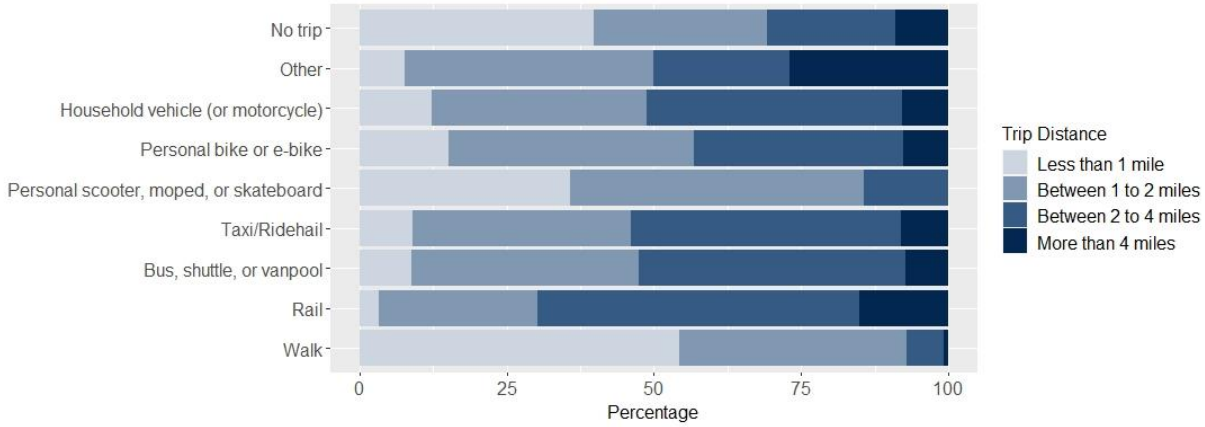

Figure 12. Mode substitution of bike-share users for different trip distance bins (n=3141)

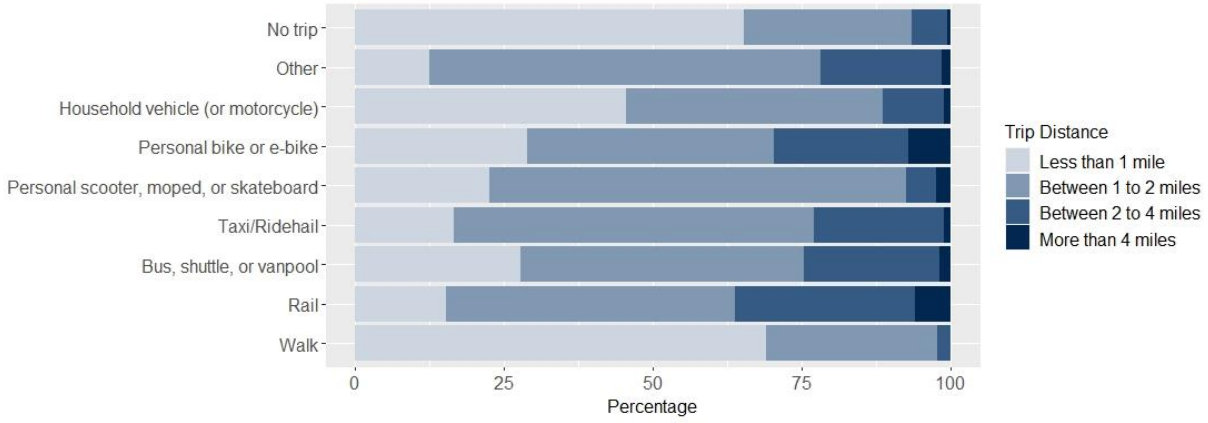

Figure 13. Mode substitution of scooter-share users for different trip distance bins (n=2202)

Mode substitution and transit connection

Along with substitution, connecting to transit is an important aspect of micromobility services providing sustainability benefits (Mohiuddin, 2021; Liu and Miller, 2022). Our results show that both bike-share and scooter-share are used as transit access and egress modes. However, they constitute only a small portion of the first and last mile modes in any size of city (Figure 14). Micromobility services tend to be used in slightly higher proportion as transit access modes than as transit egress modes. One possible reason may be that people may not always find a shared micromobility vehicle near the station after departing from the transit. Micromobility mode availability may also be an important determinant of using transit. However, this needs to be analyzed with reference to the decision process of using micromobility services described in the post-diary survey portion of the report below. Overall, the dominant first and last mile mode is walking.

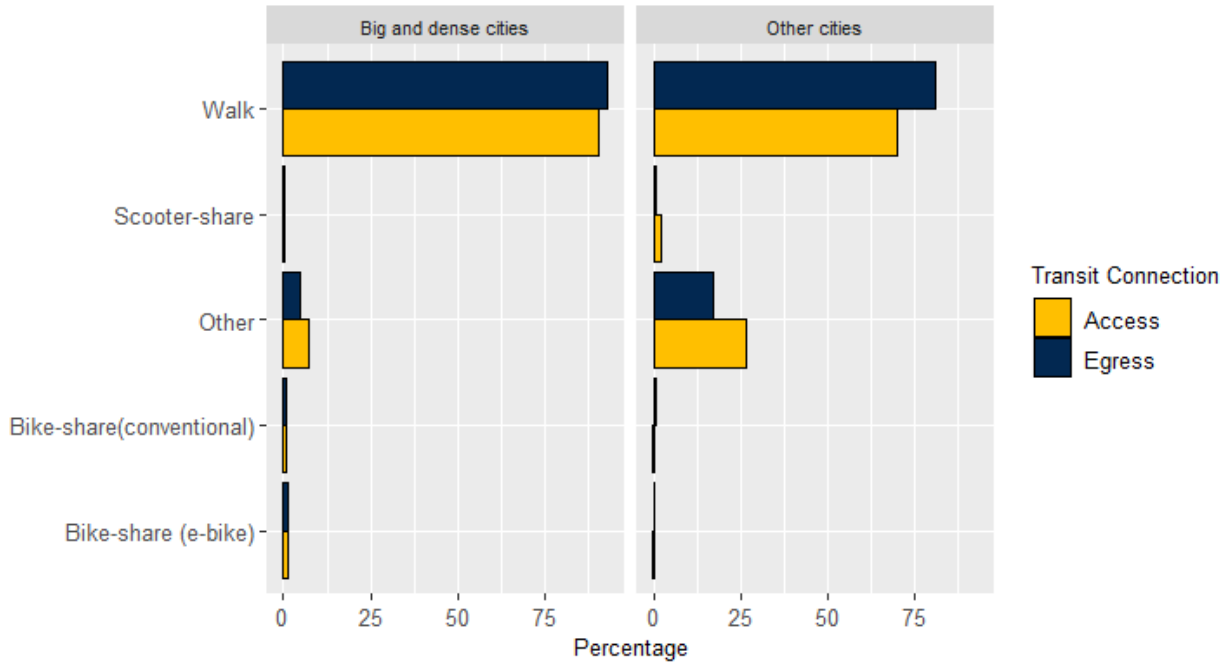

Figure 14. Use of different modes for transit access and egress (n=2108)

After separately analyzing the access and egress mode for different types of transit services, we can observe that bike-share and scooter-share tend to be used at a similar rates for local bus, and subways (Figure 15 and Figure 16). Proportion of scooter-share as an access mode to transit is a bit higher than bike-share in our dataset. However, participants used bike-share (both e-bike and conventional) as an egress mode at a higher rate than scooter-share for light rail. The potential transit-connecting benefit of bike-share over scooter share should be considered in the context of the prior result, that a higher proportion of participants using bike-share replaced rail compared to scooter-share (see Figure 5).

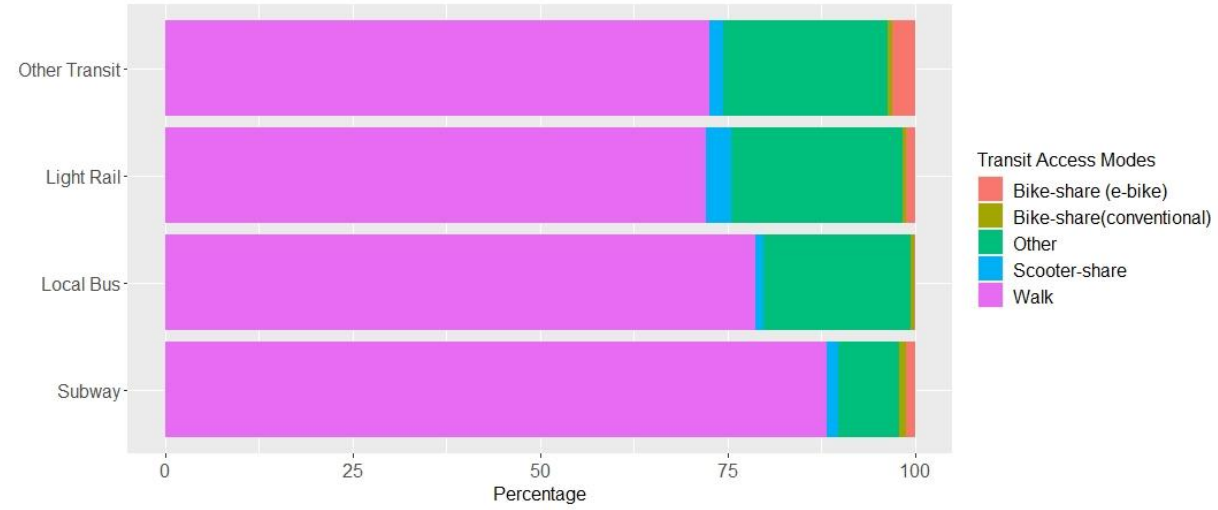

Figure 15. Use of different access modes for different types of transit services (n=2108)

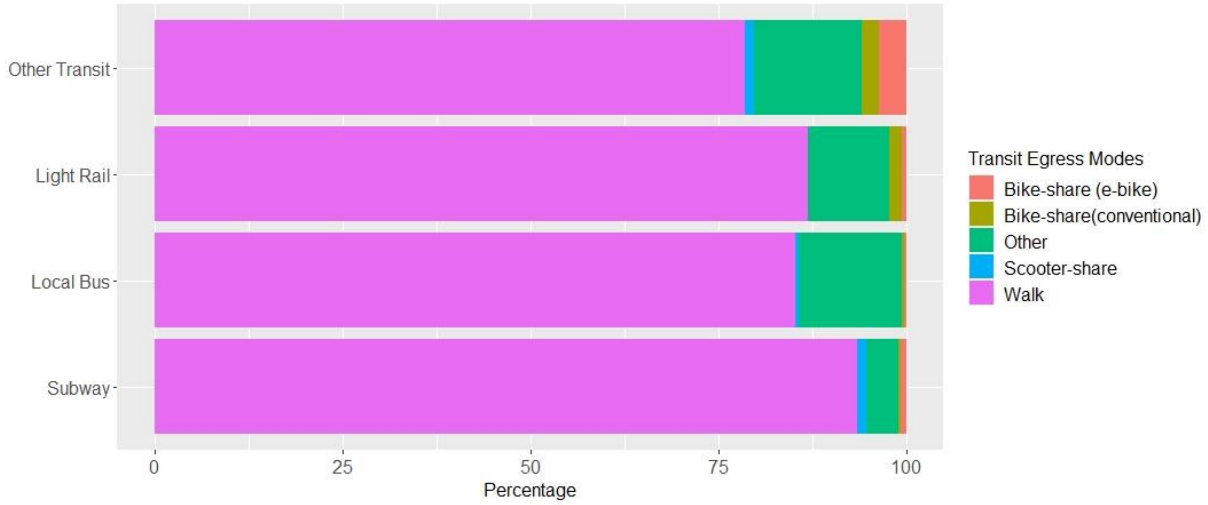

Figure 16. Use of different egress modes for different types of transit services (n=2108)

On the trips where individual reports using micromobility to connect to transit (n=90)[6], a large portion of participants replaced walking. However, a large portion of the micromobility leg of these transit trips also replaced transit itself. To understand the effect of micromobility services on transit ridership and transit trip experience, it is important to further investigate this joint substitution and connection aspect. It suggests that micromobility services can be used both as a substitute and a complement to transit in the same multimodal trip where transit is the dominant mode. It is possible that individuals substitute a portion of transit trips while at the same time they are also using micromobility services as an access and/or egress to the transit. Further analysis of the detailed trip chains is planned to make more firm conclusions, but the small sample size of these types of trips will limit generalizability.

A significant portion of the micromobility connection to transit trips were also induced by micromobility availability (Figure 17). This suggest that some (~ 7% for the participants) of micromobility-transit trips would not have been made in absence of the micromobility service. This suggests micromobility services have some likely connection to increasing transit ridership, although it is less than the transit replacing effect for these participants. Future analysis that considers survey weights will improve our understanding of the magnitude of each effect.

[6] n=90 are extracted from entire set of trips where transit is the main mode (n=2108)

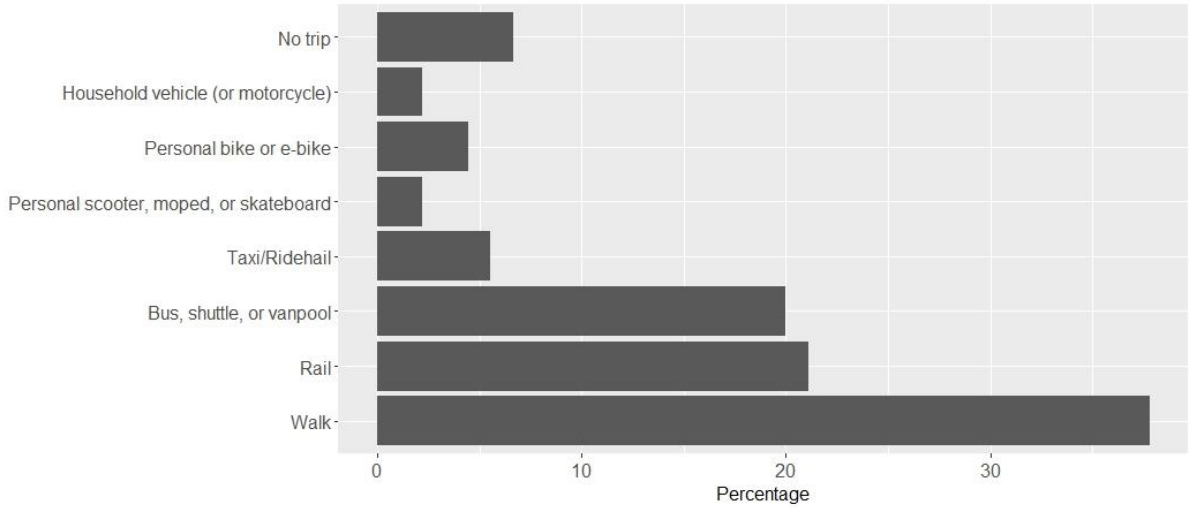

Figure 17. Micromobility transit connection and mode substitution (n=90)

Results: Post Travel Diary Survey

The following results section includes summaries of the post-travel diary survey data alone, without regard for the prompted recall travel diary data. This data is cross-sectional, and similar in form to most past survey research on micromobility services. It primarily differs from other studies in the wide range of cities represented, and the sample size is smaller than for many city-specific cross-sectional surveys. Without weights, this data should not be considered to represent the population. Instead, it provides initial insight into patterns of behavior by the participants for future investigations.

Micromobility Use and Equity

Frequency of micromobility service use

To understand the frequency of use of various transportation modes, participants were asked how often they used eleven different transportation modes. As shown in Figure 18 below, results indicated that most participants walked for more than 5 trips a week. Compared to walking, the use of personal bikes or e-bikes by participants for weekly trips was lower. Almost every participant walked at least once, while personal micromobility devices (such as scooter, moped and skateboard) was the least used mode with more than 75% of participants never having used them.

The responding participants in Big and Dense cities reported using bike-share more frequently than using scooter-share while participants in Other cities had an opposite tendency. A recent NACTO report (2022) shows that the number of scooter-share trips was higher than the total number of station-based bike-share trips and dock-less bike-share trips in 2021. Our results in other cities are consistent with this finding only for smaller cities, not in Big and Dense cities. This may be because we recruited many participants using docked bike-share services in Big and Dense cities.

Participants in Other cities use household vehicles more frequently than in Big and Dense cities, but the frequency of use of taxi/ride-hailing does not change by the size of cities. The frequency of use of the bus (or shuttle or vanpool) and rail (includes train and subway) modes by participants also showed similar proportions.

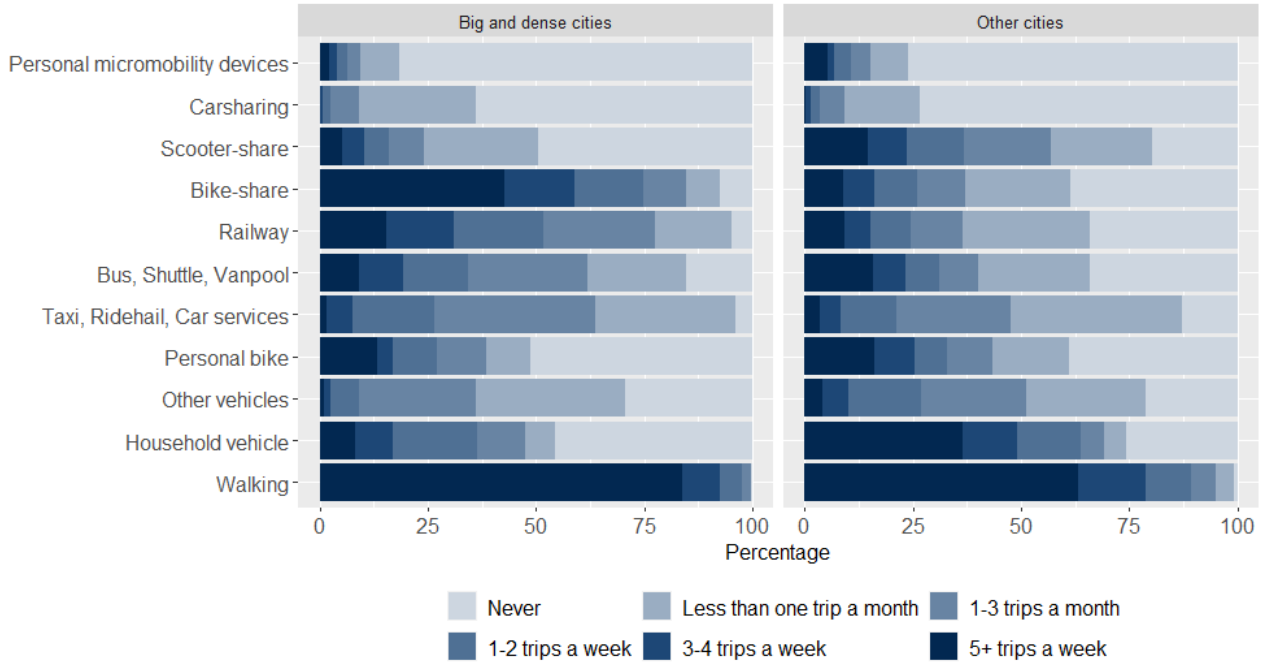

Figure 18. Frequency of use of different transportation modes (n= 657)[7]

Who uses micromobility services?

Bike-share use does not appear to be associated with age as strongly as scooter-share, however as participants get older, they do tend to increase their frequency of use for those high-frequency users (Figure 19). Scooter-share appears to be used more by younger participants as opposed to older participants as shown by prior studies (NABSA 2022; NACTO, 2020). This finding is similar to the trends seen with income and micromobility use, where bike-share and scooter-share use are influenced in opposing ways by participant income (Figure 21). As income increases, bike-share was used by the participants more frequently, while scooter-share was used less frequently.

Asian participants were the most frequent users of bike-share compared to other groups, with Black participants the least likely to frequently use bike-share (Figure 20). Scooter-share shows an opposite trend, with Black participants using scooter-share much more frequently than other groups, and Asian participants very unlikely to use scooter-share frequently. White and Other participants had similar frequencies of use, while still using bike-share slightly more frequently than scooter-share. NACTO (2020) reported that distributions of user income and race vary by city. As a future step, we plan to examine the association between micromobility

[7] The number of observations for other vehicle is exceptionally 655 due to missing values.

use and individual characteristics by city, and to evaluate the variation in relationships between self-reported and smartphone app recorded trip frequency.

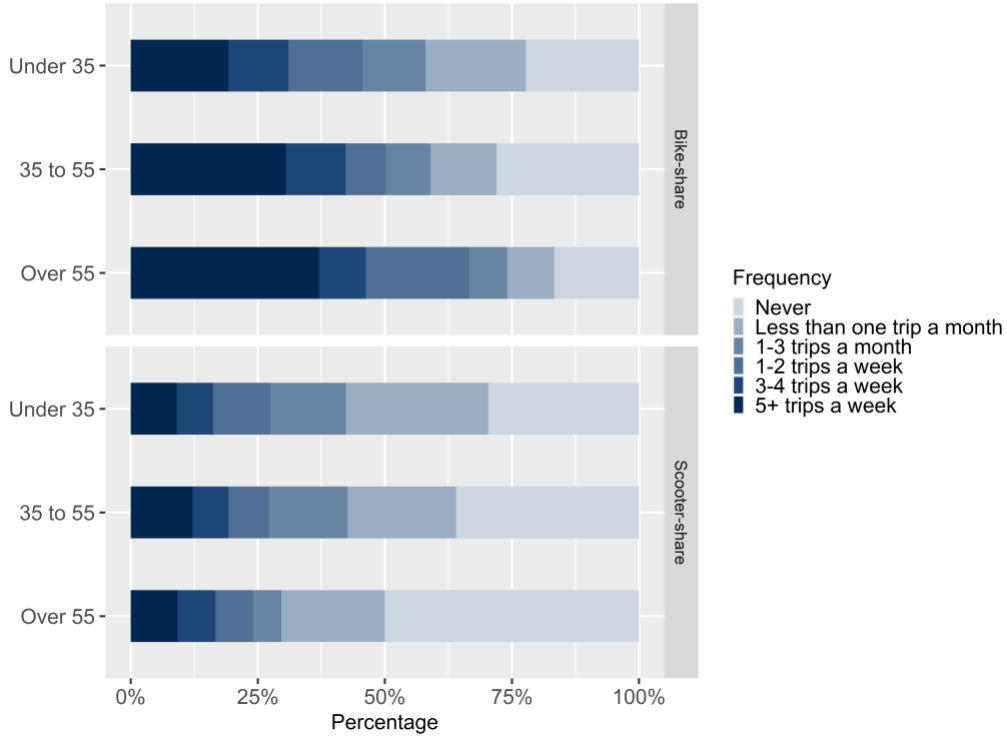

Figure 19. Frequency of micromobility use by age

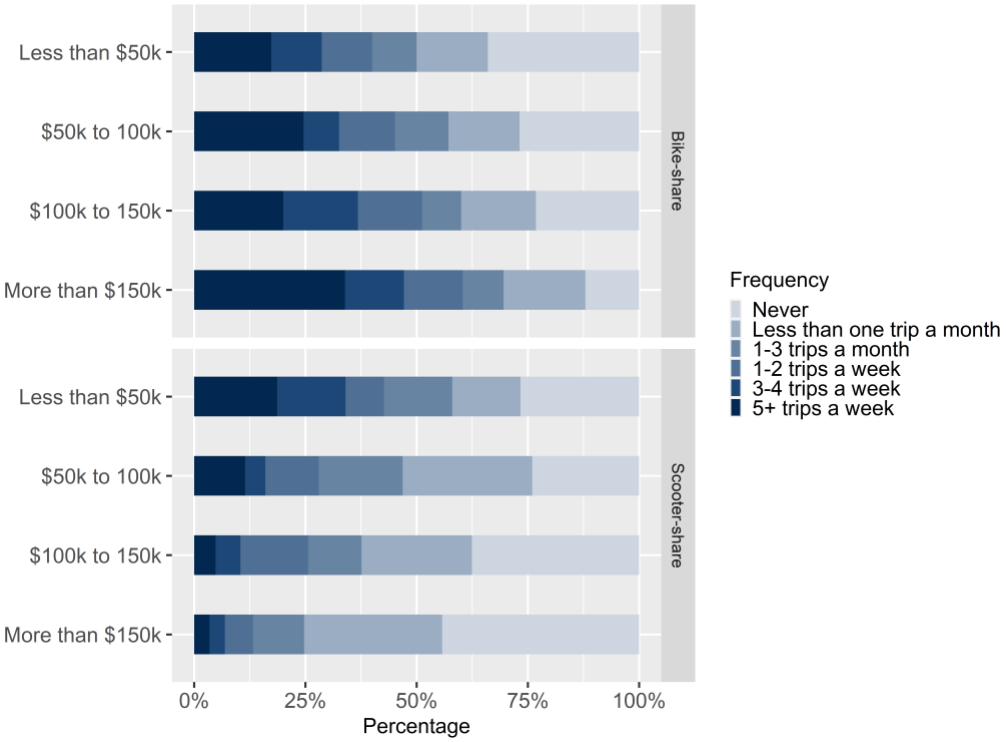

Figure 20. Frequency of micromobility use by income

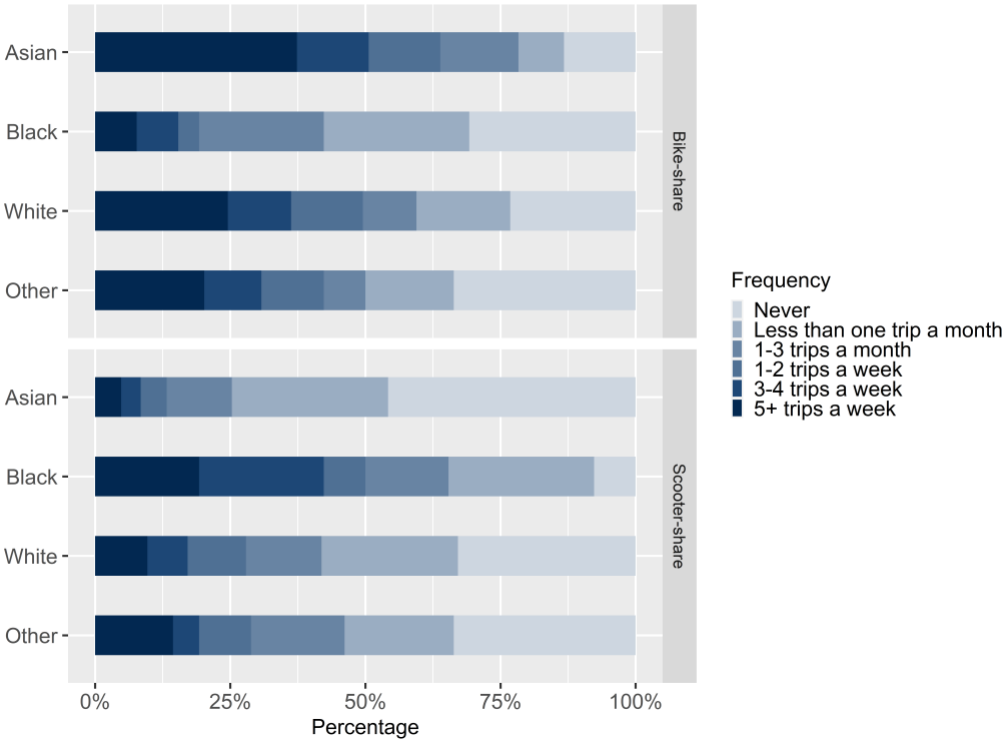

Figure 21. Frequency of micromobility use by race

Micromobility use before COVID

Participants were asked how often they used bike-share and scooter-share modes before the COVID-19 pandemic. A higher proportion of participants used bike-share for weekly trips compared to scooter-share before the pandemic, but this trend varies by city size for general micromobility use (Figure 22 and Figure 23). Bike-share saw a larger increase in use relative to before the pandemic compared to scooter-share for high-frequency trips, and participants who had never used bike-share before became more frequent users compared to participants who had never used scooter-share and began using it during the pandemic. Just under half of the number of participants who had never used bike-share before the pandemic tried it during the pandemic, while only a third or less tried scooter share for the first time. Some participants might not have used any micromobility service before COVID-19 or in summer 2022 due to the lack of service availability. The lack of data on service availability in this study is a limitation that requires further study.

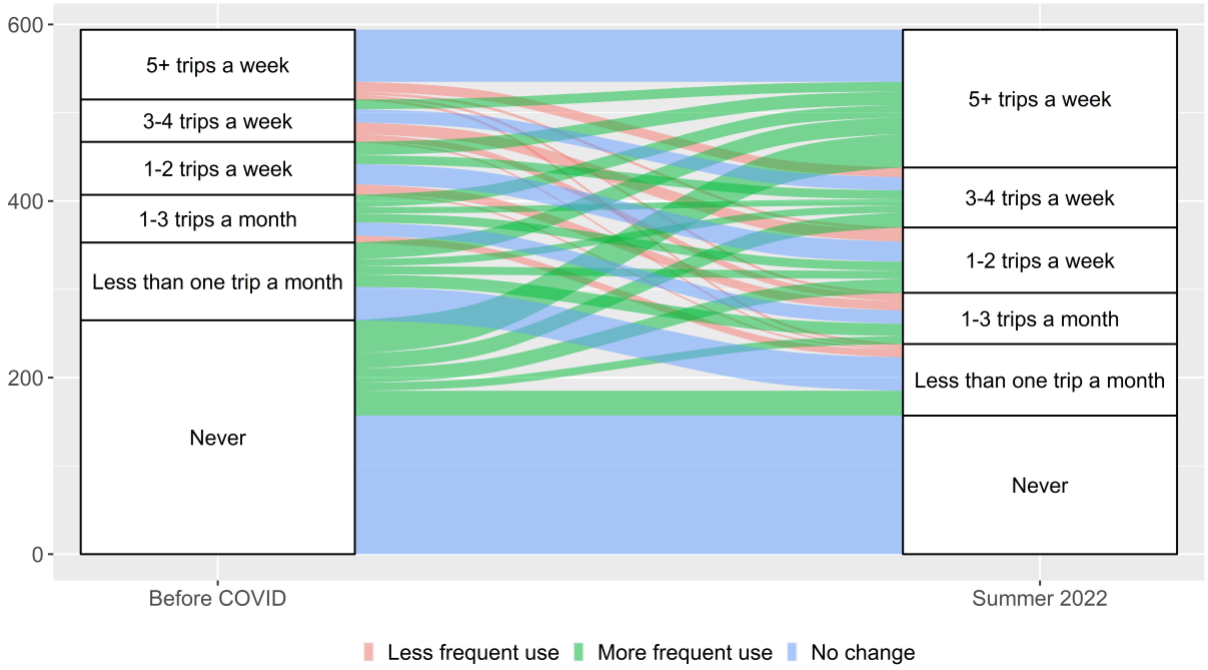

Figure 22. Change of frequency of use of bike-share service (n=594)

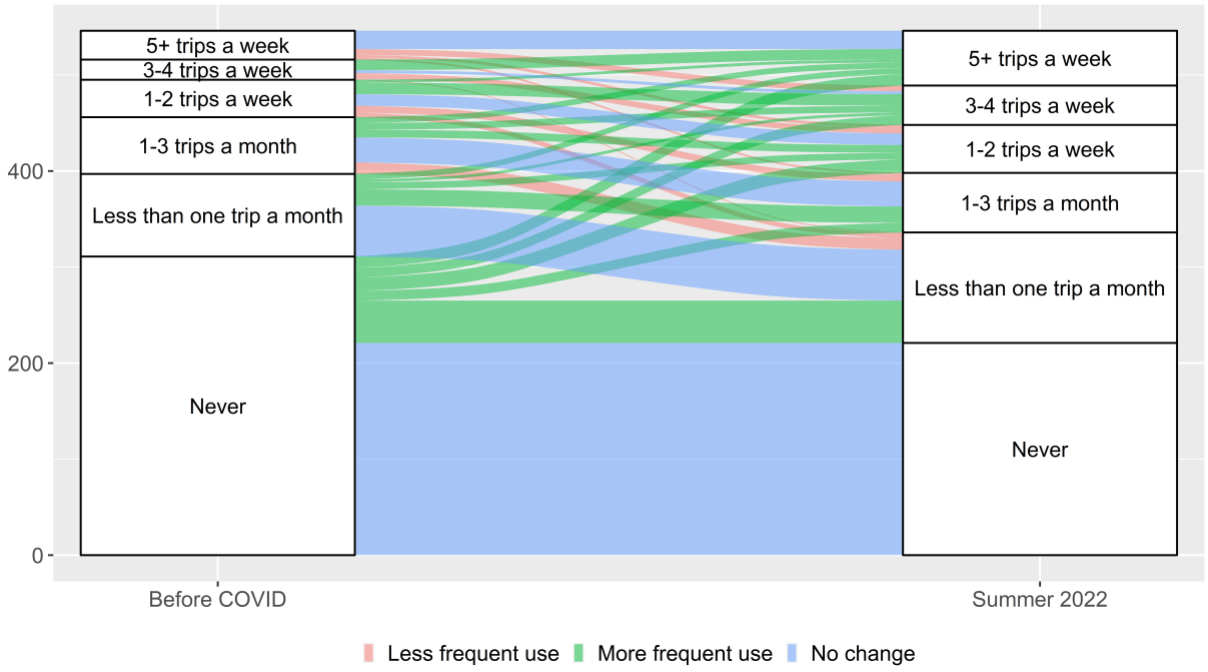

Figure 23. Change of frequency of use of scooter-share service (n=546)

In addition, participants were asked how concerns about COVID-19 impacted their use of micromobility modes during the rMove travel period. Figure 24 indicate that concerns about COVID-19 caused 24% of the participants to use bike-share more frequently than before the pandemic, while the corresponding proportion for scooter-share was 13%. Concerns about the pandemic had no impact on frequency of use of bike-share and scooter-share for 67% and 79% of the participants, respectively. A relatively small proportion of participants used bike-share (9%) or scooter-share (8%) less frequently than before the pandemic. These results demonstrate that the COVID-19 pandemic did not have a large negative impact on these participants' use of micromobility. This mirrors macro statistics of micromobility use, suggesting it has recovered in 2021 (NACTO, 2022) after the COVID-19 pandemic caused the suspension and closure of some micromobility services and substantially reduced micromobility use in 2020 (NACTO, 2022; Fukushige et al., 2022).

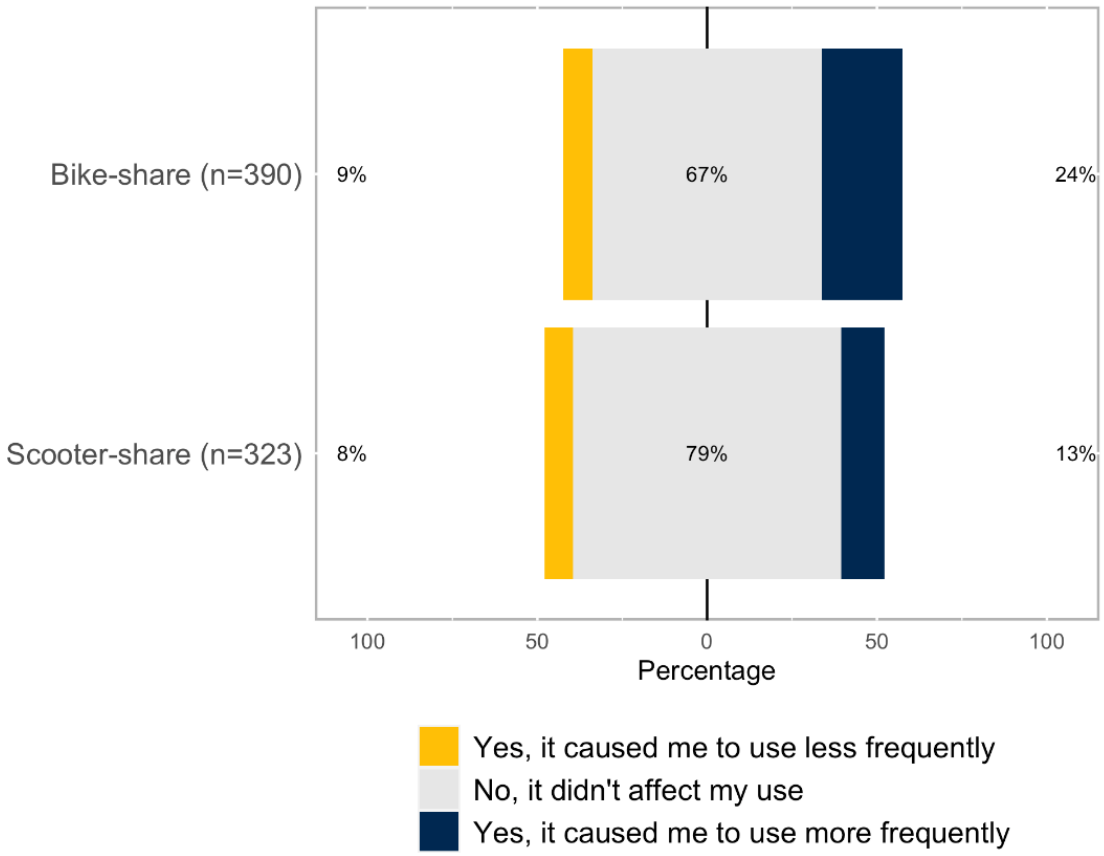

Figure 24. Impact of concerns about COVID-19 on frequency of use of micromobility modes

Payment method of micromobility users

Payment methods for micromobility services and public transit reflect how users incorporate the services into their daily travel costs and has insights for behavioral intention. Figure 25 shows that 38% of the participants who use bike-share pay as they ride, while 35% of them hold some form of discounted membership. Those who hold any form of membership for a bike-share service is 60%. On the other hand, only 22% of participants who use scooter-share services hold either discounted or non-discounted membership. I.e., most participants using scooter-share services pay as they ride. The results suggest that participating scooter-users may use the service less consistently while bike-share users are more likely to integrate bike-share into their routine travel.

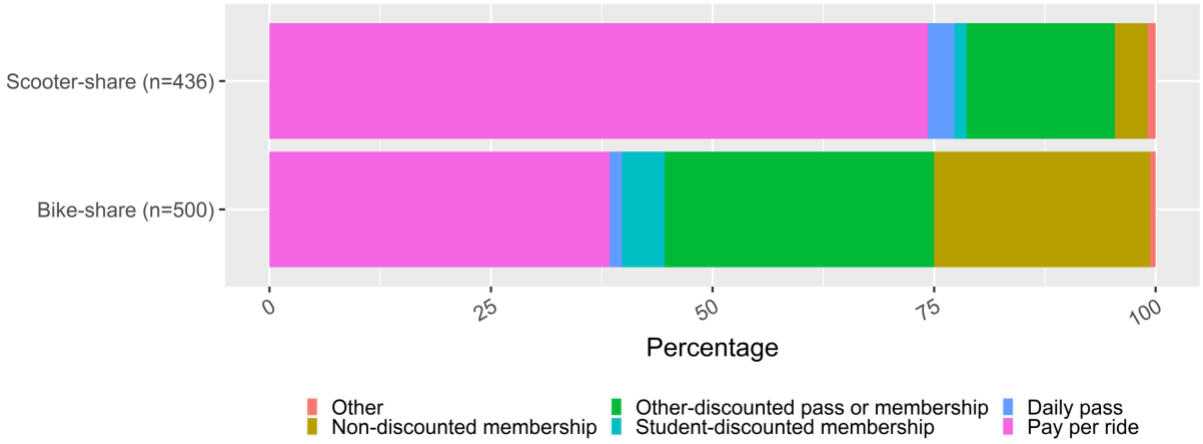

Figure 25. Payment method for bike-share service and scooter-share service

Our results show that most scooter exclusive participants or non-excusive participants pay for public transit as they ride (Figure 26). On the other hand, the number of bike exclusive participants paying for public transit using a transit card or pass was slightly higher than those paying for public transit as they ride. These results suggest that bike-share users are more likely to be frequent transit users than scooter-share users, although differences may not be large enough to warrant picking one mode over the other for micromobility and transit integrative planning.

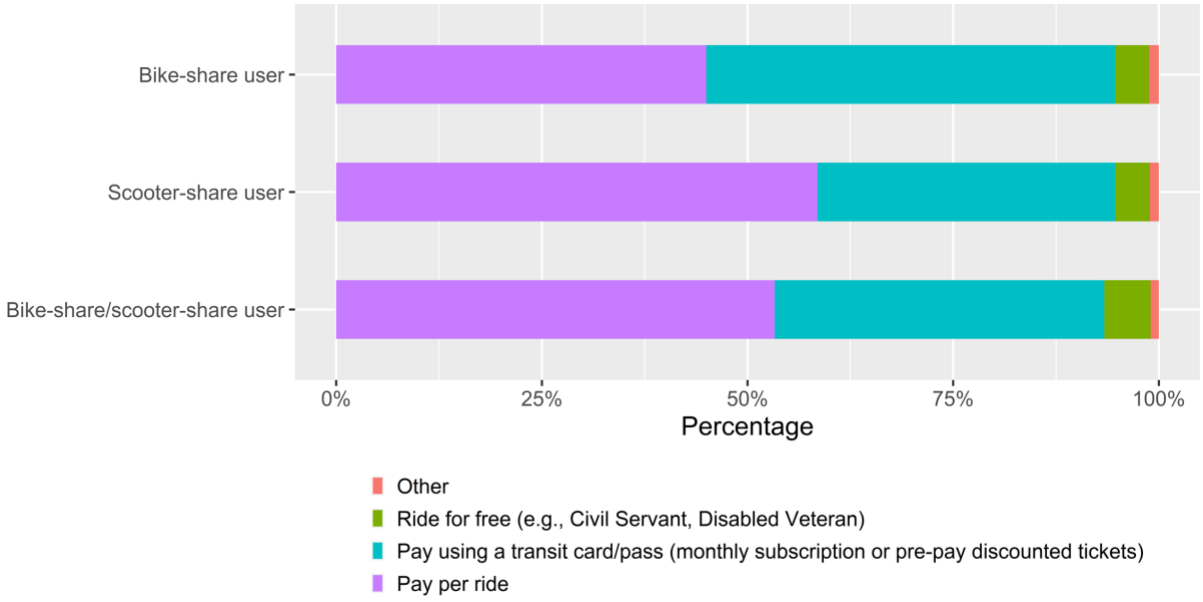

Figure 26. Payment method for transit service

Influence of micromobility services on mode options

Effect of micromobility on car ownership

Previous studies show that micromobility can reduce car use in the short term (Lime, 2019), However, research so far has not fully explored the long-term influence of micromobility on an individual's car-ownership decisions. A report from Lyft shows that 54% of their shared micromobility users do not own or lease a vehicle and 34% of the shared mobility users who have access to a vehicle use it less due to micromobility access (Lyft, 2022). Another report from Portland Bureau of Transportation (PBOT) shows that 6% are getting rid of car and 16% of the e-scooter users considering getting rid of personal car (Portland Bureau of Transportation, 2019). Micromobility can influence car ownership in various ways, such as influencing zero-car households to not purchase a car, influencing a one-car household not to purchase a second car, influencing one or multiple-car households to give up ownership of a car, etc. As the effect of different types of micromobility services on car ownership can vary, we have separately asked users of both bike- and scooter-share about the influence of these modes on their car ownership. Figure 27 shows that for most participants, micromobility did not influence car ownership. However, a substantial portion of the participants reported that bike-share had some influence on them to decide against the purchase of a household vehicle though the portion was slightly lower in Other cities than in Big and Dense cities. Approximately 10% of participants reported access to bike-share influenced them to delay the purchase of a household vehicle in any type of cities. A small portion (~3 %) of participants who used bike-share reported selling or getting rid of their household vehicle due in part or whole to their use of bike-share service.

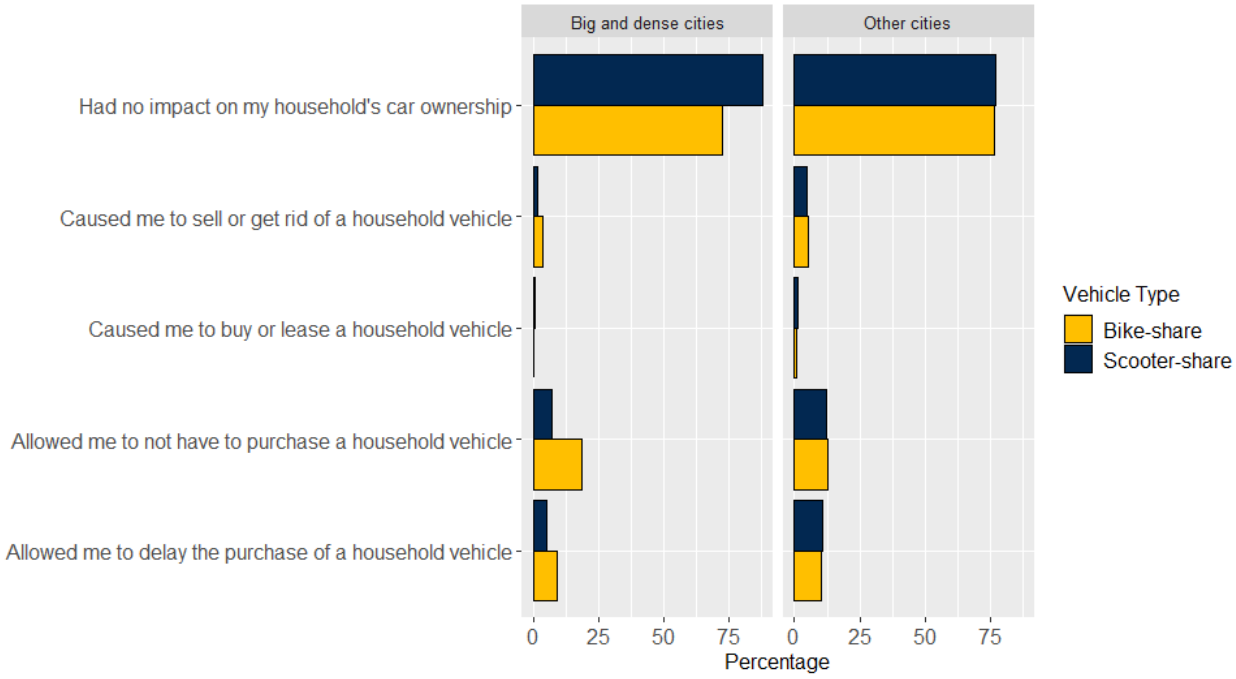

Figure 27. Effect of bike-share and scooter-share on car ownership

Survey results show a similar pattern of the influence of scooter-share on car ownership as that reported for bike-share. However, a larger portion of the participants reported no impact of both bike-share and scooter-share on car ownership. Observing the other categories and comparing them with the bike-share responses at an individual level, bike-share appears to have a greater impact on the car ownership decisions compared to scooter-share in our sample in Big and Dense cities.

Timing of decision-making in micromobility use

To understand the influence of micromobility availability on individuals' travel patterns, we asked how participants planned their use of micromobility for travel, and how frequently they employed those plans. We also asked about travel adjustments individuals make due to their access to micromobility services. Micromobility service availability may also have an influence on an individual's choice of destinations as well as travel time, as a large portion of participants reported changing their destinations and/or timing of their travel due to their access to micromobility.

With regard to planned use of the service, participants decided to use the service both before the start of their journey and while they are traveling to their destinations (Figure 28). When using a micromobility service to connect to transit, most participants reported planning ahead of time. Transit follows a schedule and requires first and last mile connections to and from the transit stops making planning it important to plan access and egress modes ahead of time.

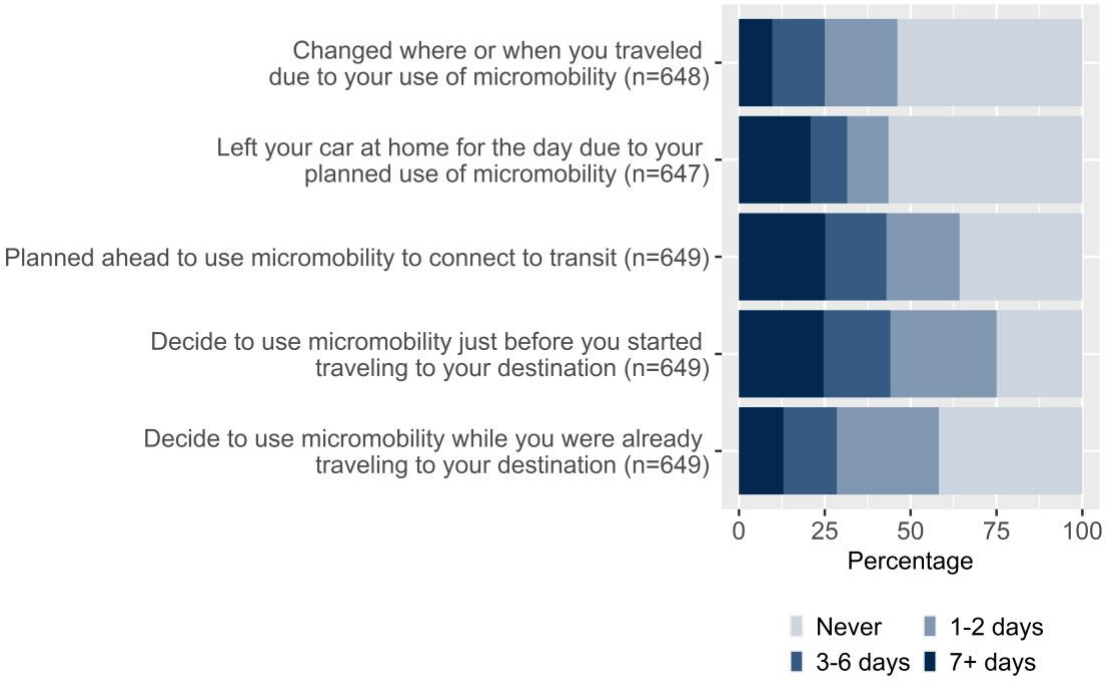

Figure 28. Effect of micromobility access on daily travel choices

Planned use of micromobility may have a larger impact on reducing car travel than unplanned use of the service. A considerable portion of participants reported leaving their car at home due to their planned use of micromobility services. Planned use of micromobility should also increase multimodal travel patterns, however, the effect of planned use of the service on transit use is uncertain as it may either increase or decrease transit use. A large portion of the participants reported planning to use micromobility at least just before the start of their travel for seven or more than seven days of the travel diary period. This indicates that the use of micromobility is at least somewhat planned for most users, rather it may be aligned with their day-to-day travel schedule. The decision to use a micromobility service just before the start of the journey still needs to be analyzed in combination with the decision to not drive their car in future research.

A small but considerable portion of the participants reported deciding to use the service while they were already traveling for seven or more than seven days of the travel diary period. This decision to use the service while traveling needs to be analyzed together with the micromobility service availability as exposure to the service may influence this unplanned use. Multimodal users may have several alternative travel options in their mind while they decide to travel and availability of the micromobility service while traveling may influence those alternative travel choices as well as destination choices.

Effects on other transportation options

Although most participants reported access to bike-share does not have any influence on their selected transportation decisions, a meaningful portion of participants (~20%) in Other cities reported they stopped buying a transit pass due to the availability of bike-share (Figure 29). A smaller (~2%) portion reported purchasing a transit pass in any city size. Approximately 12% of participants in Other cities reported subscribing to ride-hailing services (i.e., Uber or Lyft) due to the availability of bike-share. Overall, participants reported that access to bike-share primarily influences their ride-hailing use, transit use, and bike purchase decisions as only a small portion of participants reported selling their bike due to using bike-share.

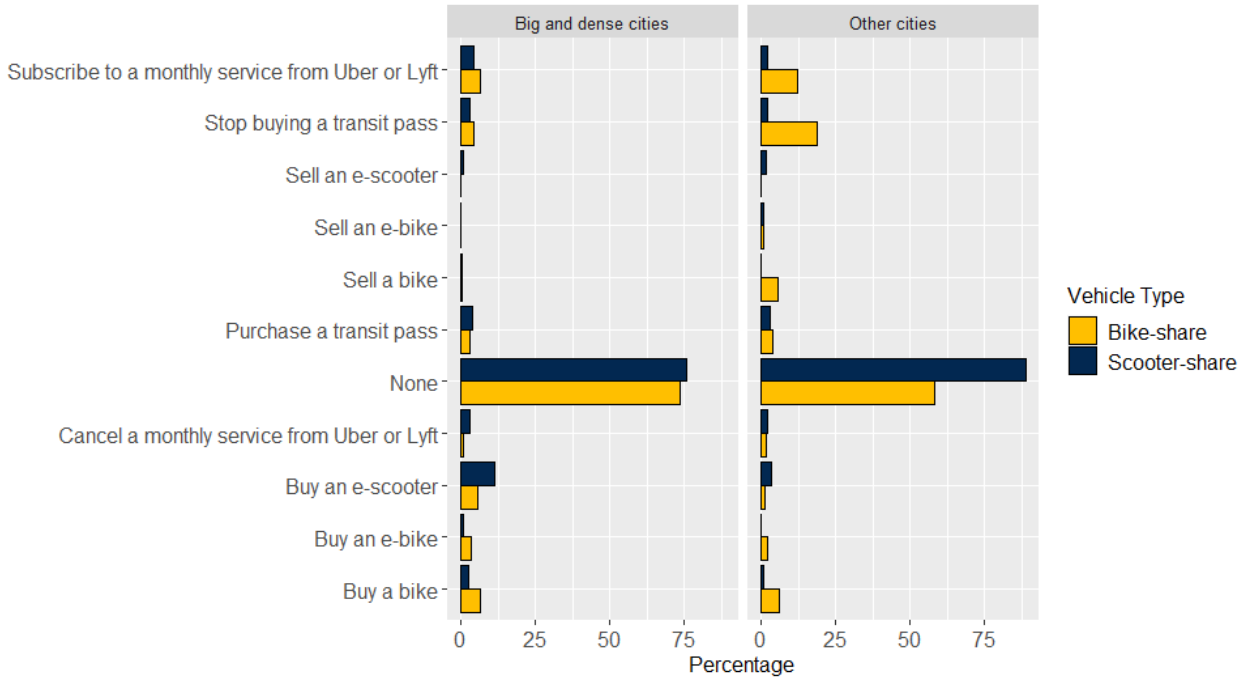

Figure 29. Effect of bike-share and scooter-share on transportation options

The effect of scooter-share on the same list of transportation decisions was similar to bike-share. However, the portion of participants that reported none of the selected options is greater for scooter-share in Other cities. In addition, subscribing to ridehailing and stopping the purchase of transit passed was much more common for bike-share users in Other cities alone. The absolute percentage difference may be due to our sample that overrepresents bike-share users, although the relative difference between Other and Big and Dense cities is still suggestive of varying effects of program vehicle types by city size. One final notable difference is that scooter-share, compared to bike-share, seems to have a much stronger influence on personal scooter ownership, and this is most prominent in Big and Dense cities.

Effect on use of other modes

Micromobility can substitute car trips and play a role in supporting transit by serving as a "first-mile and last-mile" mode (Shaheen and Chan, 2016; Wang et al., 2022). These two effects, car substitution and complementarity with transit, together influence the use of other modes. This change in the use of other modes since the start of the micromobility service may be due to micromobility and/or due to participants' change in mode use pattern irrespective of micromobility (i.e., lifestyle change, home location change, job change, etc.). Thus, we have first focused on participants' overall change in mode use since the start of their micromobility use irrespective of a specific micromobility effect.

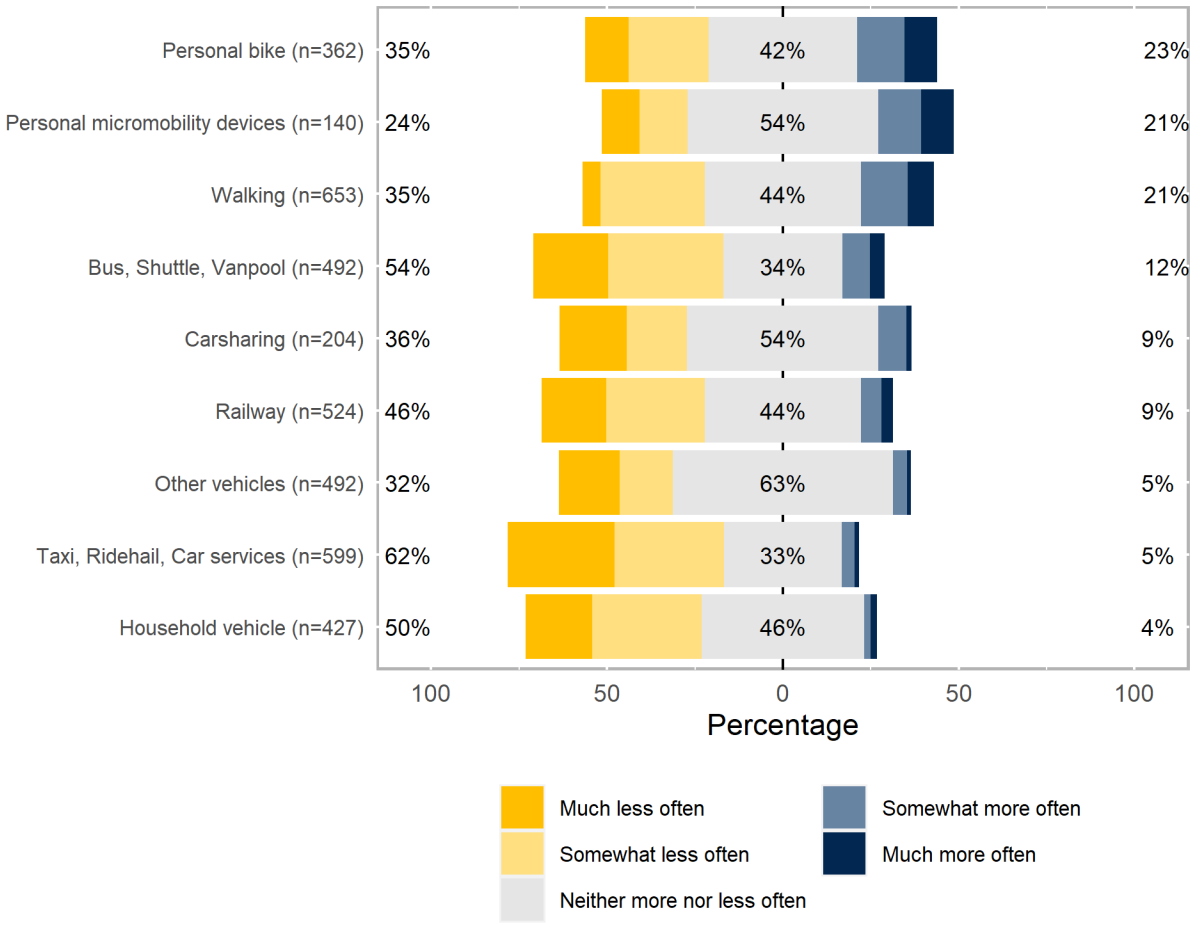

Figure 30. Change in other mode use since using micromobility

Although most of the participants reported no change in walking, a greater portion of participants reported walking less since using micromobility services than those who reported walking more (Figure 30). This is in line with the current literature on mode substitution that suggest walking trips are substituted with micromobility trips (Wang et al., 2022). This trend is similar for other modes except for personal micromobility devices and biking with a personal bike.

The use of cars, both personal and taxi/ride-hailing, decreased for most of the participants since their use of micromobility services, suggesting a substitution effect of micromobility services reducing automobile travel beyond the trip level that has been most commonly reported in the literature (Fukushige et al., 2021; Wang et al., 2022).

Additionally, participants reported using transit services less often since their use of the micromobility service, indicating that for these participants micromobility has substituted for transit more often than it has complemented transit. Although small, a complementary relationship may exist between micromobility and transit and walking as users may walk to access bike-share and then use bike-share to connect to transit.

Among those participants that reported a change in travel mode since using micromobility, most reported that micromobility is at least somewhat of a reason for the reported change (Figure 31). Only a small portion of the participants reported micromobility was not a reason for the change in mode use.

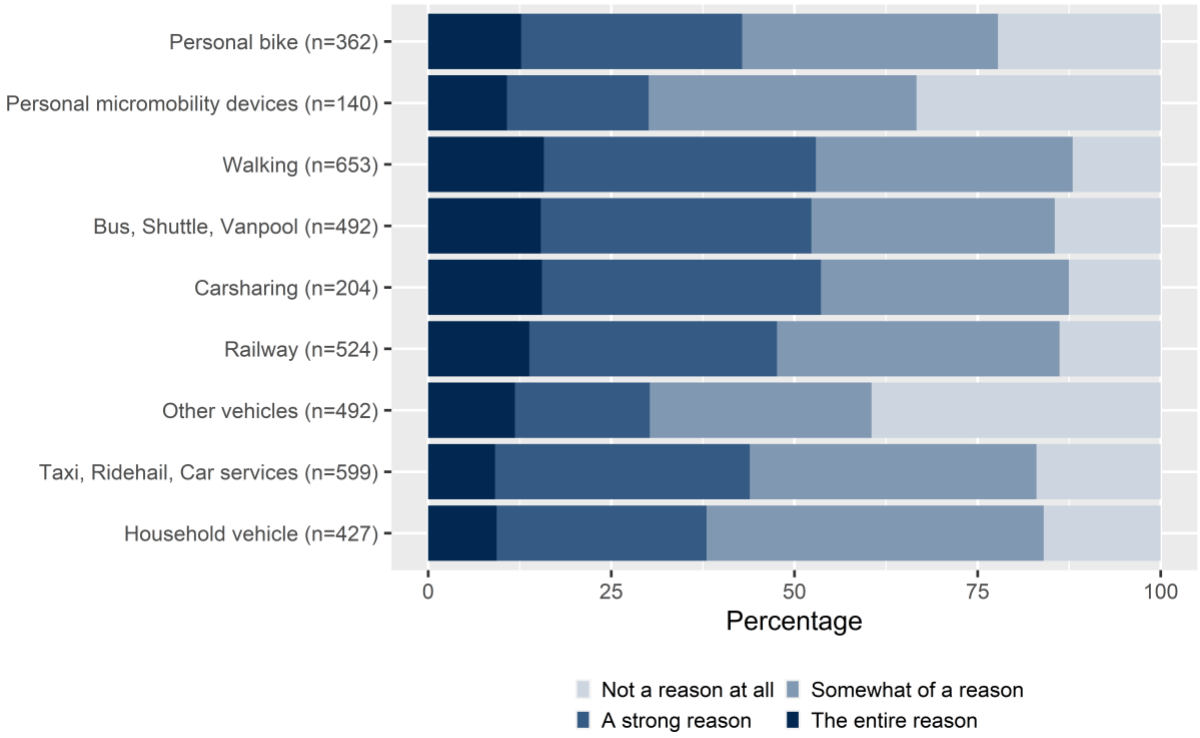

Figure 31. Micromobility a reason for change in mode use

Adoption and barrier to micromobility service use

Micromobility use and travel attitudes

We grouped respondents into three groups based on the types of vehicles they used: bike exclusive, scooter exclusive, and non-exclusive participants. Overall, participants using bike services exclusively have different travel attitudes compared with participants using scooter services exclusively (Figure 32 and Figure 33). Because micromobility services, especially dock-less bike-share and e-scooter-share services are relatively new in cities in the US, it is expected that our participants all showed positive attitudes toward trying new ways of traveling in their respective city. Interestingly, although e-scooter-share services are newer than bike-share services, exclusively scooter-use participants were in less agreement that they like to try new ways of travel in their city than the other two groups. Participants have similar attitudes towards being asked how often they think about how they travel in their city as they do towards trying new ways of traveling.

Additionally, participants who use bikes exclusively or in addition to scooters are more likely to agree that they think about ways in which they can reduce their impacts on the environment

compared to scooter-only participants. It appears that scooter exclusive participants not only think less about how they travel, but also think less about the impact this has on the environment. Instead, they are more concerned with convenience compared to the other groups, and they are the least likely to try to limit their driving.

Almost all participants using bikes either exclusively or non-exclusively agree that they like riding a bike. Though exclusive scooter participants are less likely to agree they like riding a bike compared to the other two groups, a majority still bike liking. In contrast, only 19% of bike exclusive participants agree that they like riding an e-scooter while about 80% or more of participants using either exclusively or non-exclusively agree that they like riding an e-scooter. Participants may be discouraged from using e-scooter services for reasons not addressed by this survey, and this will require further exploration of these results as well as possibly additional follow-up surveys.

A majority in all three groups of participants showed positive attitudes toward using public transit, but scooter participants tend to disagree with that more than other groups. This tendency is similar to overall responses to thinking about ways in which they can reduce their impact on the environment and if participants know many people who regularly take public transit. Most participants disagreed that public transit is just for those without a car, however scooter participants were slightly more likely to agree or answer neutrally with this statement. Similarly, scooter exclusive participants were more likely to say that they need a car for shopping, traveling with children, or to do many of the things they like to do. Scooter exclusive participants were also more likely to like driving a car.

Participants using bikes exclusively or non-exclusively were more likely to agree that many people they know bike regularly than participants using scooters exclusively. This finding was also observed in a similar statement: *many people I know think they should bike*. This is in contrast to: *Many people I know think I should e-scoot regularly*, where scooter-only participants show slightly more agreement compared to the other groups. Most participants who biked disagreed and scooter-only participants were mostly neutral or more likely to agree. This parallel between micromobility mode use and attitudes is likely causally bidirectional, people shaping their attitudes based on their behavior, and behaving based on their attitudes, which has been reported in the bike literature in the past (Kroesen, et al., 2017).

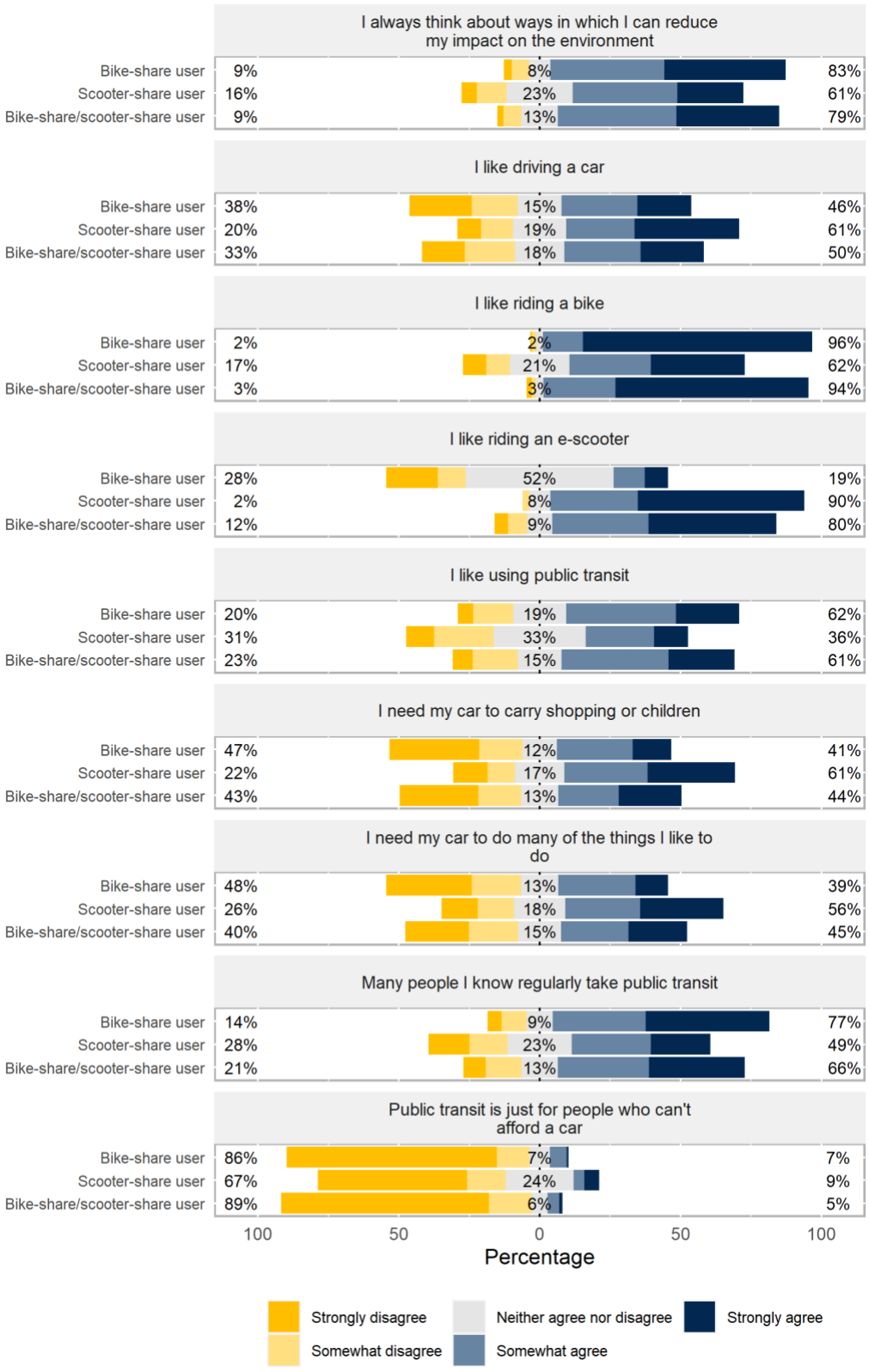

Figure 32. Participants' attitudes toward general travel (1)

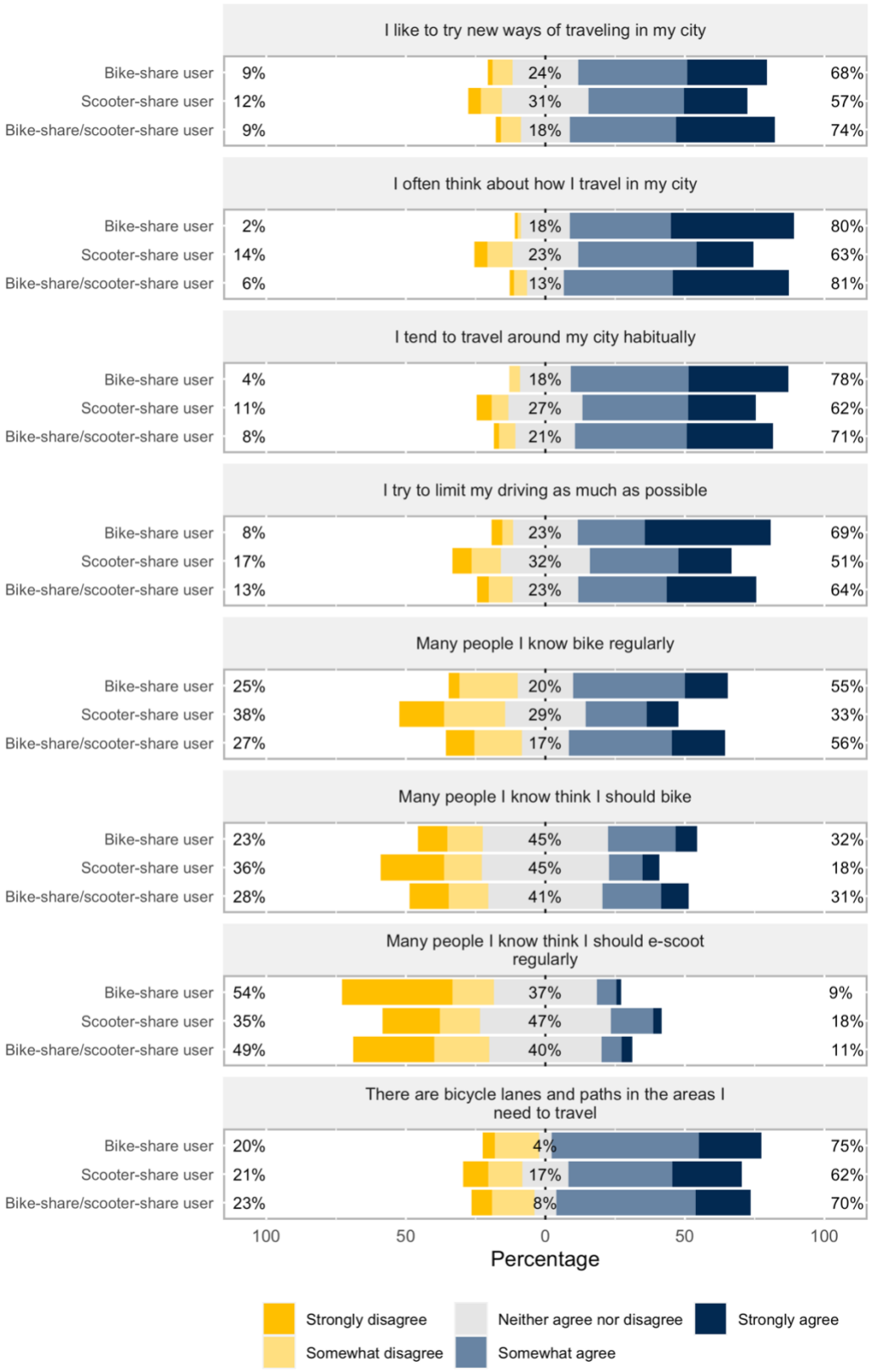

Figure 33. Participants' attitudes toward general travel (2)

Attitudes and perceptions toward micromobility services

Attitudes and perceptions toward micromobility varied by individual characteristics in this sample. In a series of questions measuring attitudes towards micromobility service availability and affordability, participants more often agreed that bikes and scooters are available when and where they need them (Figure 34). On the other hand, that roughly one-quarter to one-third of participants were neutral or think that the services are not available when they need suggests a sizeable supply constraint on demand for the services to satisfy existing micromobility user needs. Black participants were mostly neutral on scooter-share being too costly, and Asian participants were the only group to mostly agree that scooter-share is too costly. Similarly, we observed more Black participants agreeing rather than disagreeing that bike-share is expensive, but the majority of Black participants were still neutral, like in the case for scooter-share. Most White participants disagreed that bike-share services are costly. Participants were overall likely to agree that scooters do not allow them to carry things when traveling, a potentially limiting design of the vehicles for broad use cases.

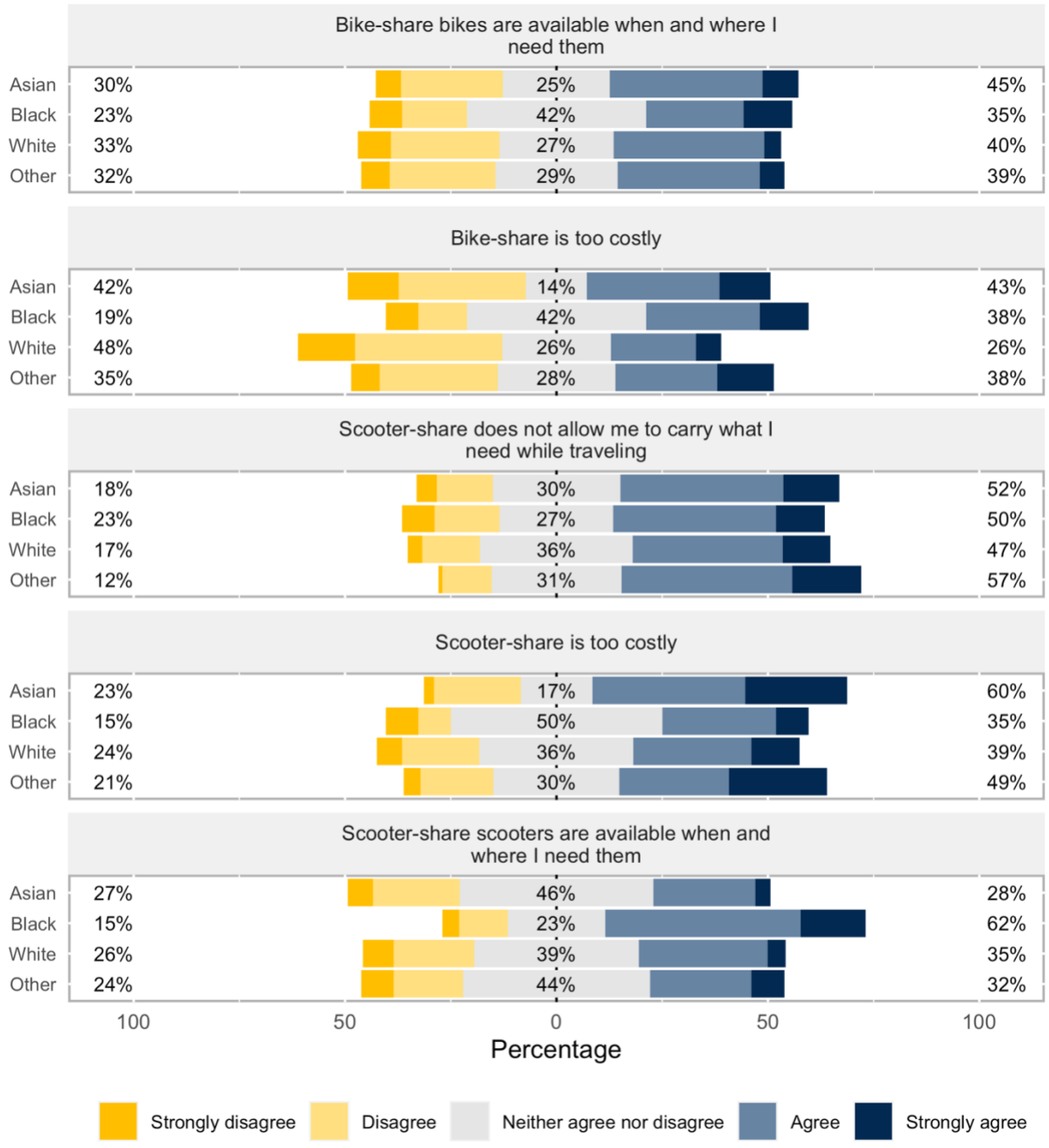

Figure 34. Micromobility service users' perception of different bike and scooter share aspects

Most participants agreed that *micromobility fits with their travel patterns* (Figure 35). About 45% of participants agreed that *micromobility has enabled them to get to activities that they could not get to before*, and that *micromobility has reduced the financial burden of travel for me*. These results suggest that micromobility services help improve transportation equity regarding accessibility and travel cost. However, participants were slightly less likely to agree that *using micromobility is hassle-free*. Most participants agreed that *they are annoyed by*

people using micromobility, consistent with prior research in the Sacramento region, California, U.S. (Fitch et al., 2020).

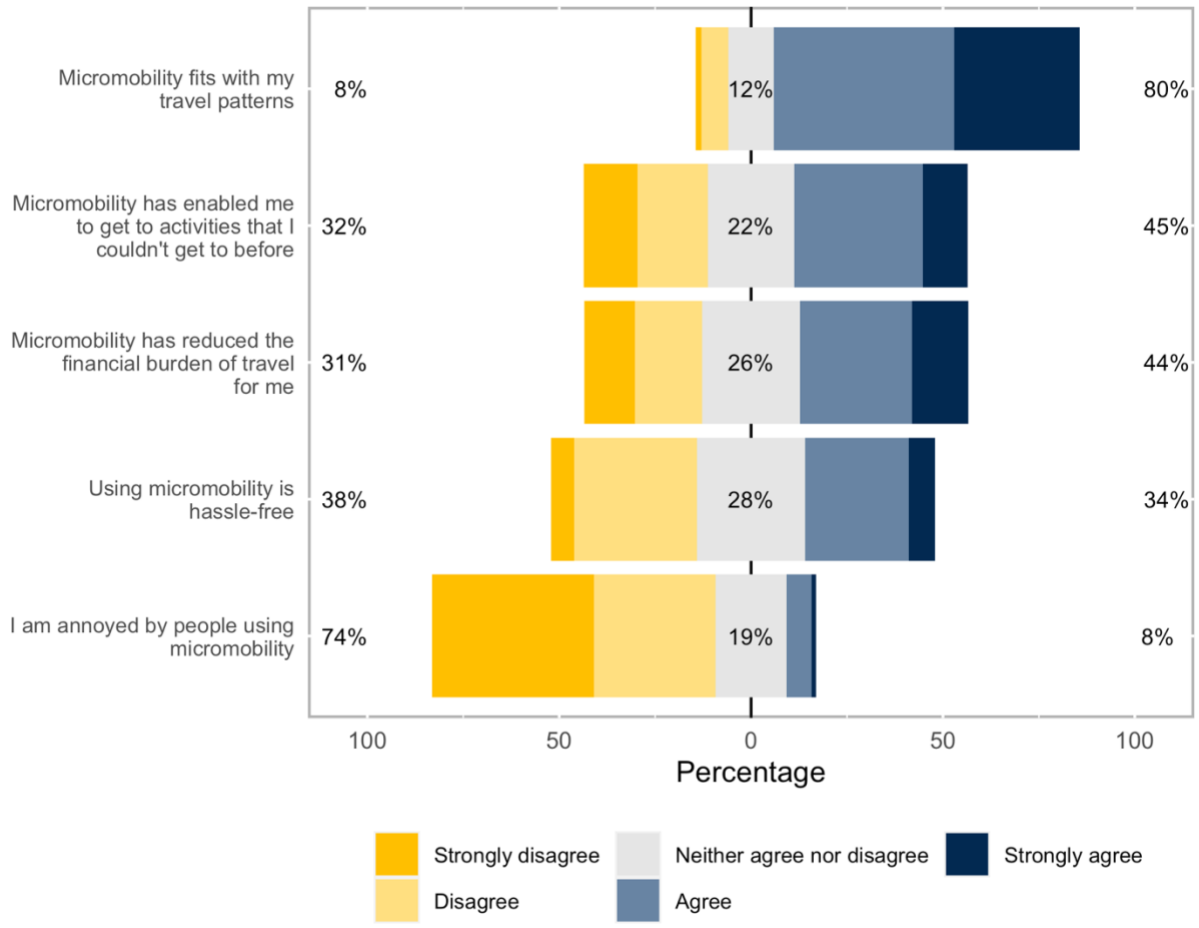

Figure 35. Micromobility service users' perception of micromobility services

Figure 36 shows that scooter users generally find it easier to find a place to park a scooter than bike users. This may be because bikes are larger than scooters, and users therefore may be searching for dedicated bike parking racks rather than leaving them on the sidewalk. Scooters are smaller vehicles and users may feel that they are less obtrusive if they park them on the sidewalk at their destination. Ease of parking may be another factor motivating participants choice of vehicle, although more analysis is needed to determine the relationship between parking and mode choice.

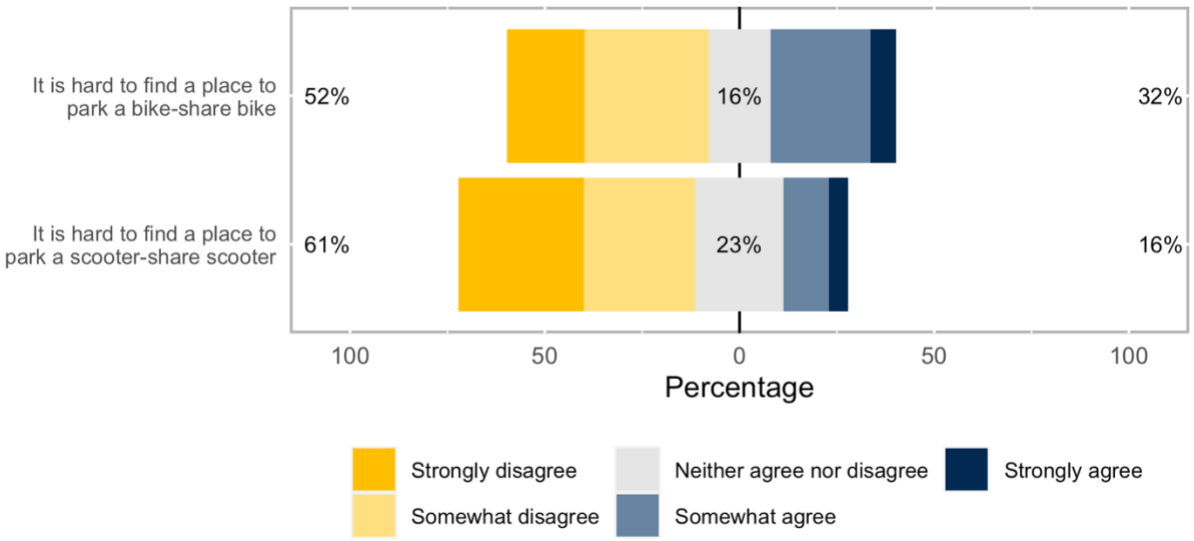

Figure 36. Micromobility users' perception of the difficulty of parking a micromobility vehicle

What types of micromobility services do you prefer to use?

In cities where both bike and scooter services have been introduced, some participants have used both services but prefer using one service to another service. Our results show that most participants prefer to use a bike service over a scooter service. Additionally, participants prefer e-bikes over conventional bikes when using a bike service.

We asked participants about reasons of preferring one type of shared micromobility service to another. Figure 37 shows that the fun and availability of services are major reasons for participants to prefer scooter-share services. Participants who prefer to use bike-share services with either conventional bikes or e-bikes are more likely to say that they feel safer on a bike or can more easily carry things with them. One unique reason for participants preferring to use bike-share services with conventional bikes was the cost of using the service. Reaching destinations faster was one major motivation for participants preferring to use bike services with e-bikes over other types of shared micromobility vehicles.

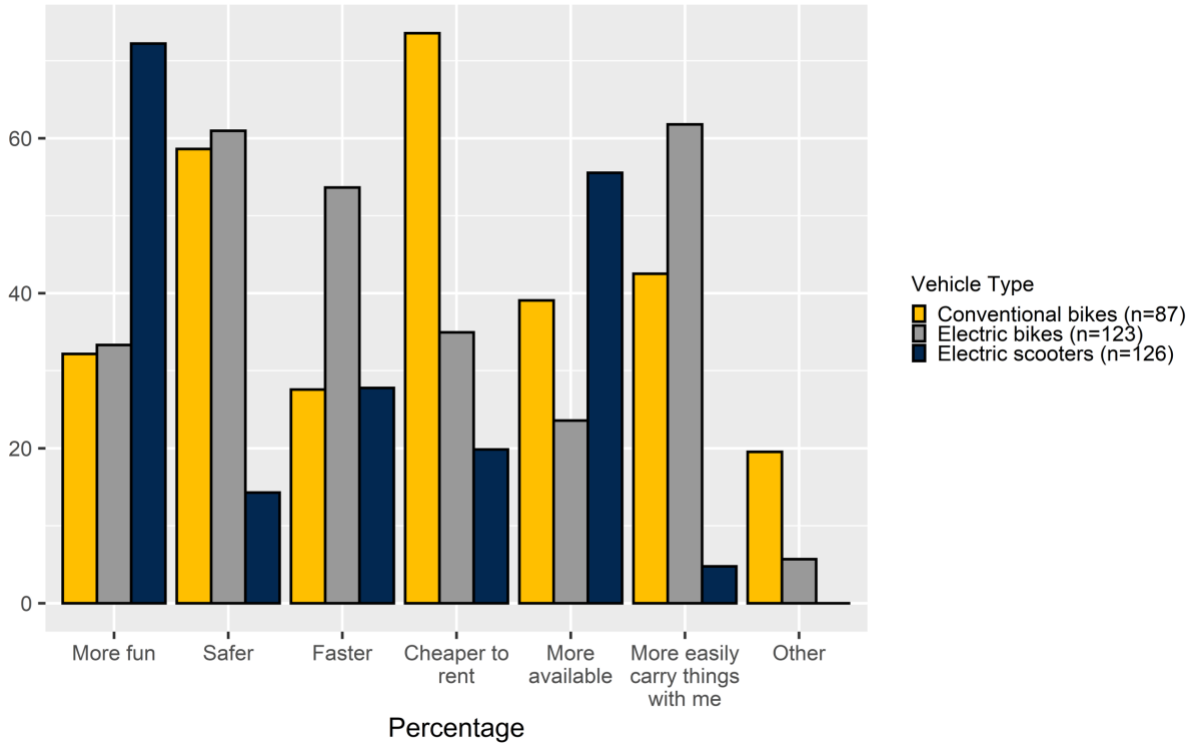

Figure 37. Reasons of preferring one type of micromobility vehicle to other types

Service availability

One challenge for micromobility operators to address is the spatial mismatch between demand and supply. In the survey we asked participants about their frequency of micromobility use and attempts to use but with no available vehicle nearby in the last 7 days. Among 342 participants who used or attempted to use bike services in the past 7 days, 52% of them had at least once experienced that they wanted to use the service but could not find an available bike nearby (Figure 38). Additionally, 6% of participants failed to use the service five or more times in a week. Participants who used or attempted to use scooter services in the past 7 days had a similar statistic with bike users. 47% of participants had at least once experienced it while 10% of them attempted but could find any available scooter nearby five or more times in a week. These perceptions toward the availability of services (roughly one-quarter to one-third of participants think that the services are not available when they need) suggests vehicle supply is a barrier to wider use.

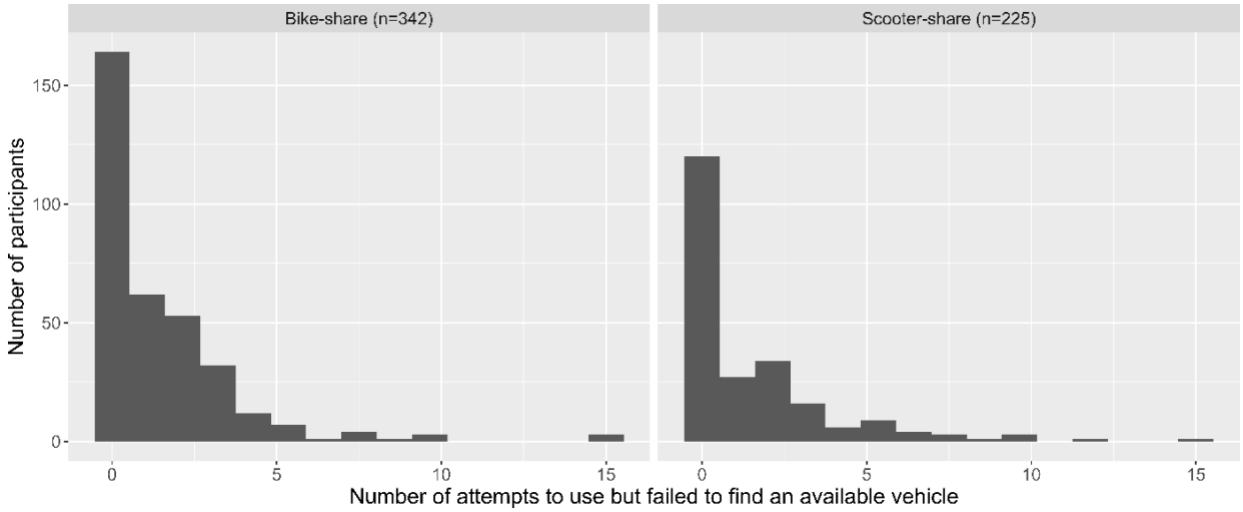

Figure 38. The number of attempts to use a shared service but failed to find an available vehicle nearby

Walking time to the nearest shared vehicle influences a participant's decision to use micromobility services. Results show that participants using bikes for a 15 minute ride are more likely to walk to get a micromobility vehicle for recreation or a specific destination than participants using scooters, although the difference is not large (Figure 39). Participants appear to be more willing to walk to pick up a micromobility vehicle for a recreational trip than for a destination-oriented trip. Both bike and scooter services had large shares of participants only willing to walk up to 5 minutes for any purpose. These results suggest that cities and micromobility operators need to determine the fleet size carefully and to consider the distances between micromobility vehicles when they rebalance the micromobility fleet.

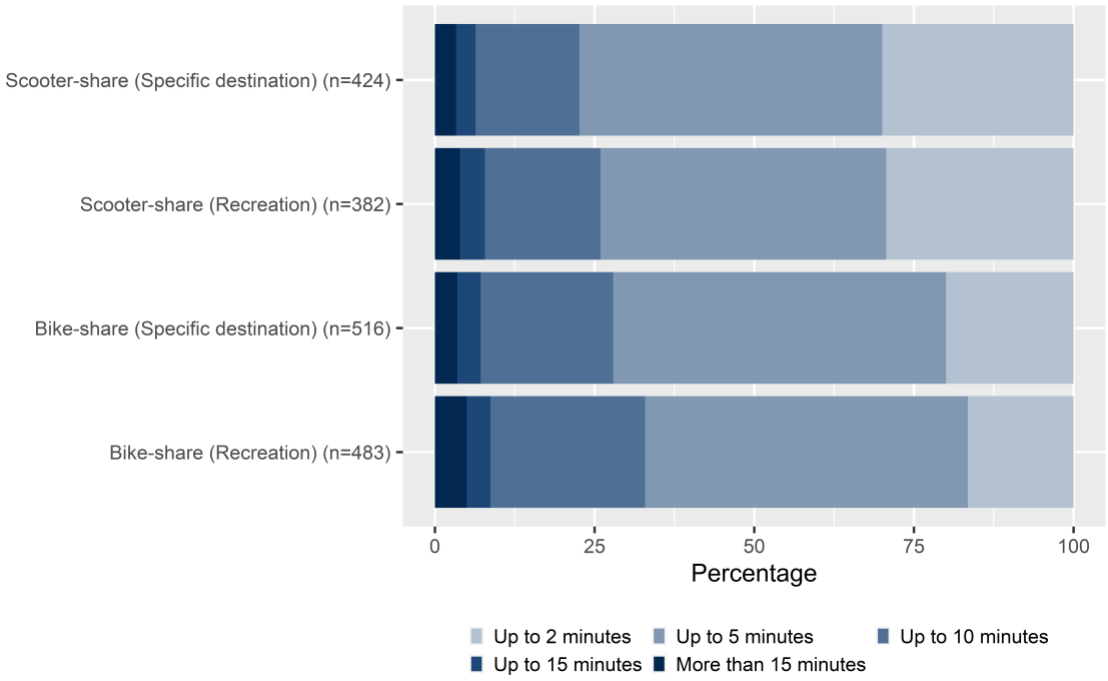

Figure 39. Walking distance at which users are willing to walk to get a shared vehicle

Health

Physical Activity

Participants were asked how much they had used modes of transportation other than driving a personal vehicle in the period of time since they first used a micromobility service (Figure 40). This question was designed to gauge whether using micromobility had influenced their use of active transportation, possibly by increasing the use of active transportation (walking, bicycling and scooting) modes themselves or replacing active modes. For all three groups, more than half of participants were neutral that they changed their use of personal micromobility first using a micromobility service. Figure 41Bike exclusive participants and scooter exclusive participants were more likely to decrease their use of personal micromobility since they first started using a micromobility service. This is in contrast to non-exclusive participants who were more likely to increase usage of personal micromobility, possibly explained by them being more flexible in which types of vehicles they prefer to use. However, with regards to using a personal bike, personal e-bike, or walking, the majority of participants in all three groups were neutral on changing their use of personal bikes and walking after using micromobility services and were also more likely to decrease (rather than increase) their use of personal bikes and walking. Bike exclusive participants mostly reported their use of micromobility is a strong reason or the entire reason for decreasing their amount of biking on a personal bike or e-bike (Figure 41), suggesting that the participants did not bike very frequently given that personal bike mode substitution from micromobility was uncommon (see Figure 5).

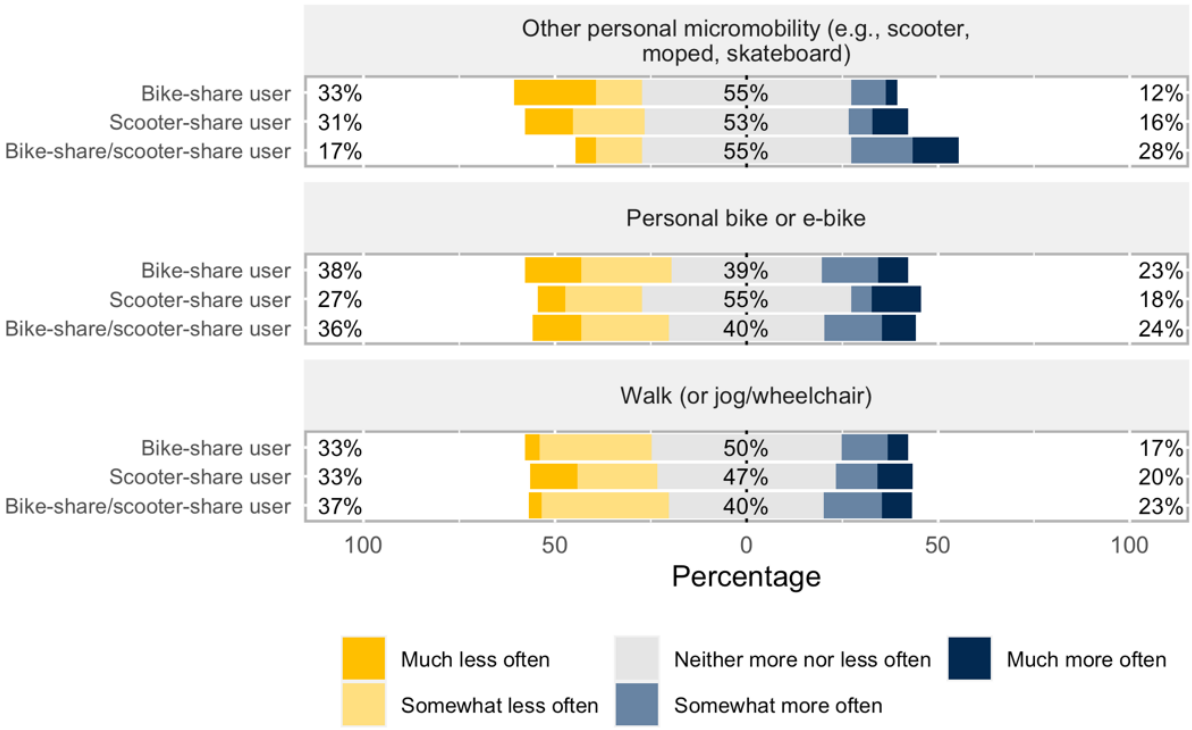

Figure 40. How much micromobility users changed their use of select active transportation modes

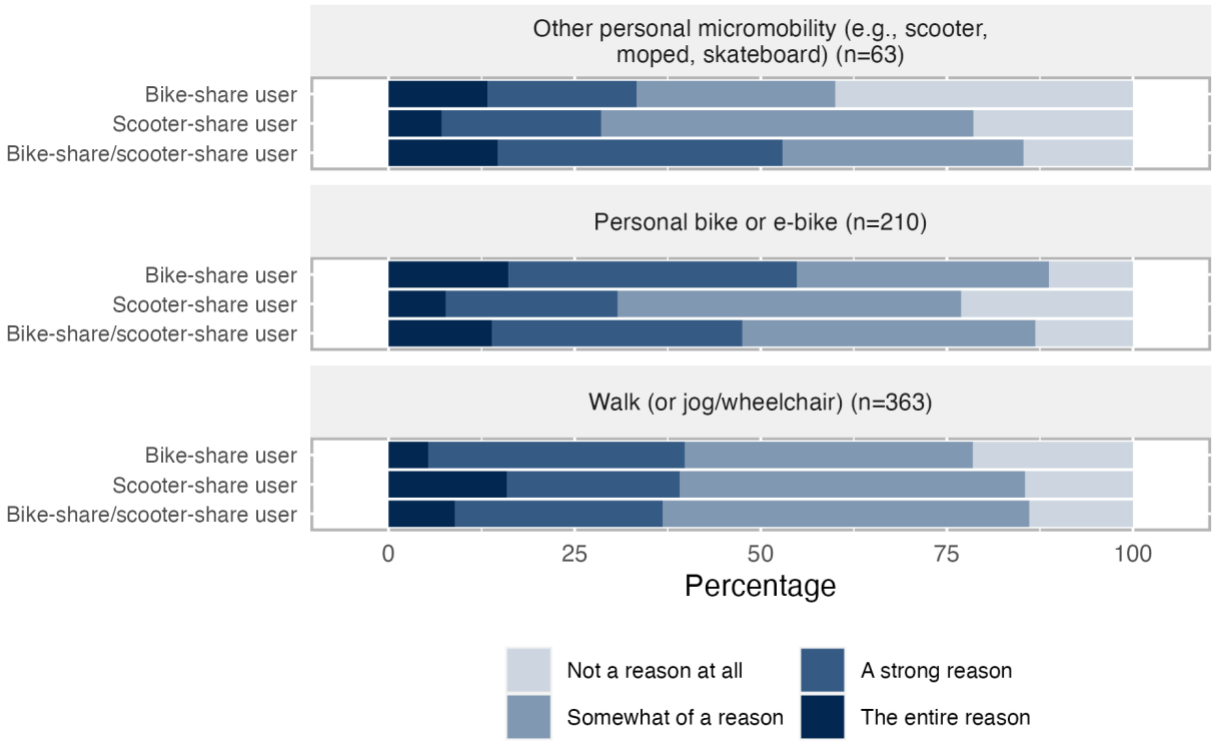

Figure 41. The degree to which the use of micromobility is the reason for the changes in use of active transportation modes

Participants were asked to consider how the use of micromobility has changed how much they bike and scoot, regardless of if they are biking and scooting using personal vehicles or a bike or scooter service (Figure 42). Almost half of bike exclusive participants increased the amount they bike after using a micromobility service. Comparatively few of the participants who only bike decreased the amount they bike. The remainder (38%) said that bikes did not change how much they bike, meaning these participants were already biking for these trips and bike-share did not increase their activity but just replaced their personal bike. For changes in scooting, both personal and shared e-scooting, bike exclusive participants overwhelmingly did not change their amount of scooting, and very small percentages either reduced (5%) or increased (3%) their scooting. This could be that bike exclusive participants already preferred biking over scooting, and the introduction of bike-share did not have much scooting to replace compared to biking on personal bikes or walking. Scooter exclusive participants mostly increased the amount of scooting they did as a result of using scooter-share (55%), and only 16% of scooter exclusive participants own or lease an e-scooter. Just less than half of non-exclusive participants did not change their amount of scooting as a result of scooter-share, and the majority of the rest of participants did increase how much they scoot.

Overall, these results suggest that introducing micromobility in the form of bike-share or scooter-share has an increasing effect on active transportation, although the magnitude may be small. The clearest physical activity gains are from increased biking and scooting while using the

shared services, which in most cases is a stronger change than the reduction that comes from substituting personal micromobility. All three groups on average felt that micromobility did not change their amount of walking, and if it did change, it was more likely to decrease the amount of walking. This suggests that the walking reduction could reduce some of the gains from added bicycling and scooting. As noted in Figure 5, approximately 40% of bike-share trips and 50% of scooter-share trips replaced a walking trip. Participants may feel that the walking needed to reach a micromobility vehicle replaces the amount of walking for the substituted trips, which would explain why they mostly feel micromobility does not change their amount of walking.

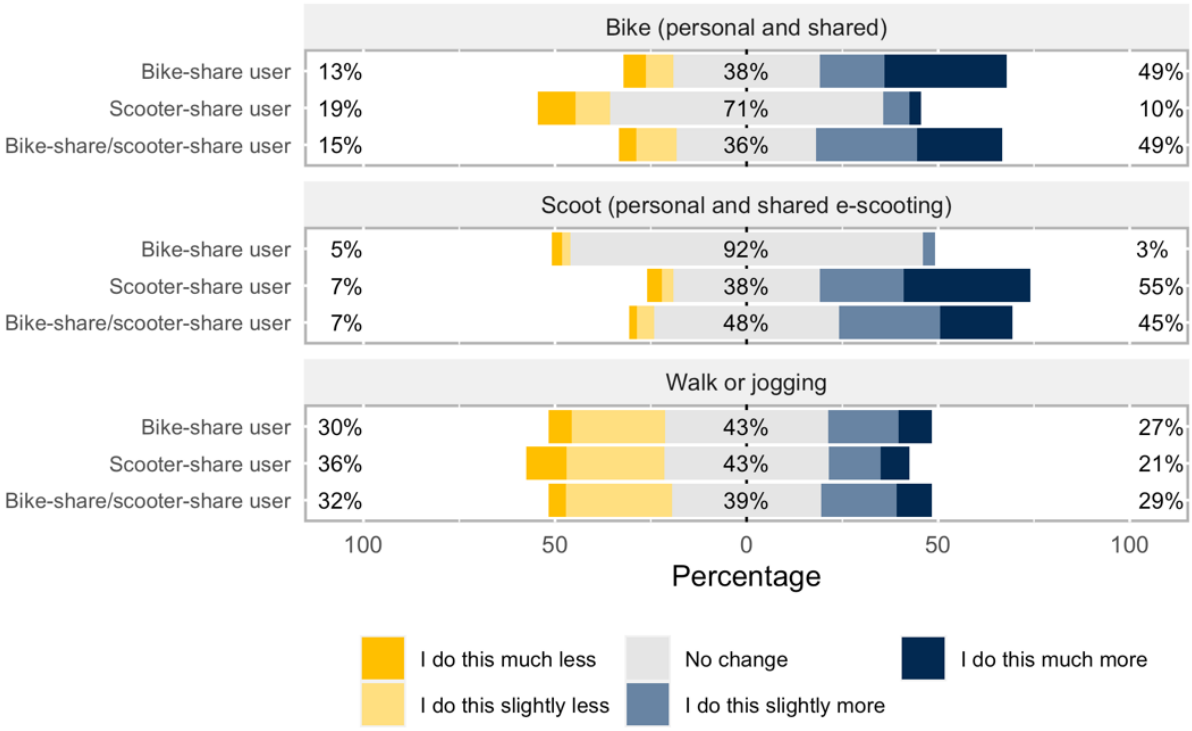

Figure 42. How the use of micromobility changed how much users walk, bike, and scoot (n=656)

Safety

Participants reported being hit or almost being hit by motorized vehicles more often than by bikes or scooters for each of the three modes (Figure 43). Bikers report the largest percentage being almost hit by a motorized vehicle, which is to be expected considering many people bike in areas unprotected from motorized traffic as this is all that is afforded them. This result emphasizes the need for more protected infrastructure for active transportation to separate them from motor vehicle traffic. For those biking and scooting, the frequency of trips seems directly related to the risk of being almost hit as when frequency increases risk increases at each step. Participants, regardless of their travel mode, reported a baseline of about 30-45% of them experiencing a near miss with a car. A greater proportion of participants reported being hit by a bike compared to a scooter, with those biking having the largest percentage. Very few

participants reported being hit by a scooter while walking (0.9%), biking (0.2%), or scooting (0.4%), but 20% of those who walk at least once per week reported almost being hit by a scooter. This could be a result of relatively more sidewalk riding on scooters compared to bikes, although we did not collect that information.

It is notable that those participants scooting have the least proportion of participants reporting being hit or almost being hit in every category, but general scooter users were reported to have almost hit nearly a quarter of those participants walking. Scooter users are also unique in that their frequency of trips (Figure 46) does not change their risk of being hit by a scooter as it does for those walking and biking, Figure 44 and Figure 45 respectively. This is an unusual result that may be explained by the rarity of scooter to scooter crashes, another outcome unmeasured in this study.

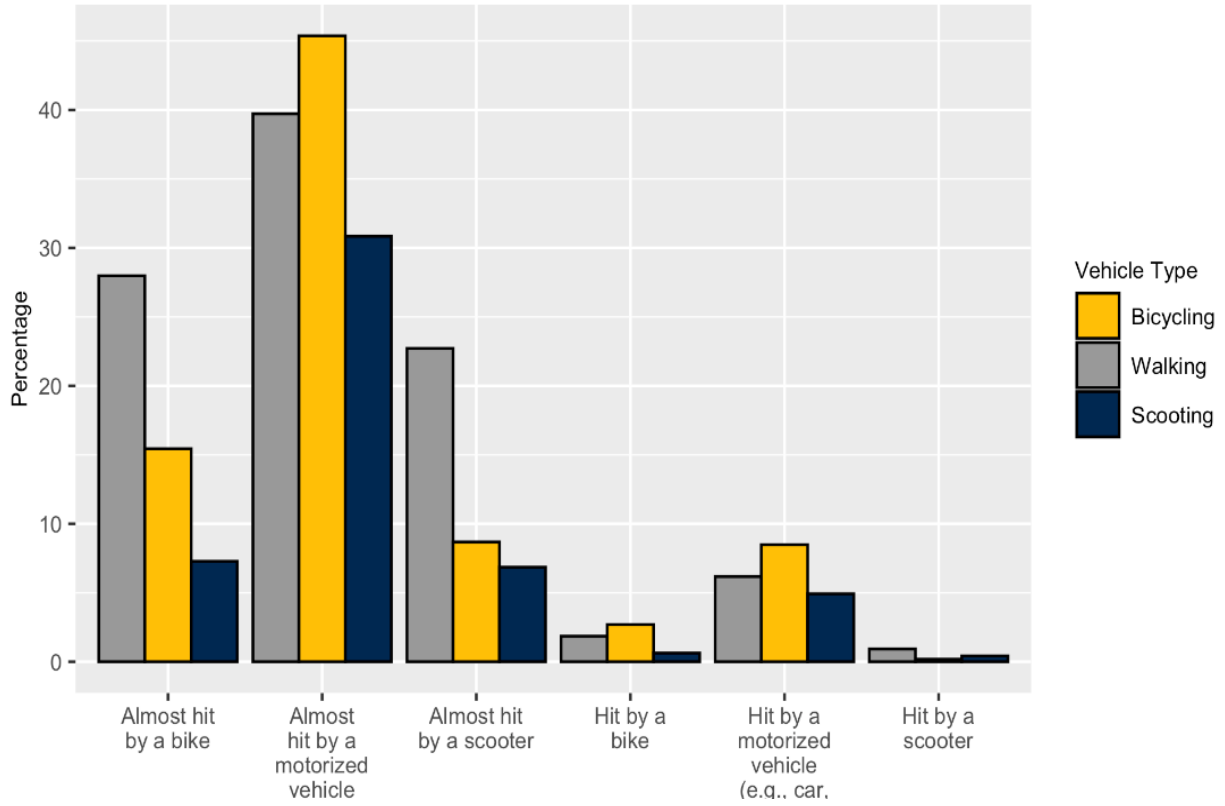

Figure 43. The percentages of participants experiencing each of these incidents while walking, biking, or scooting

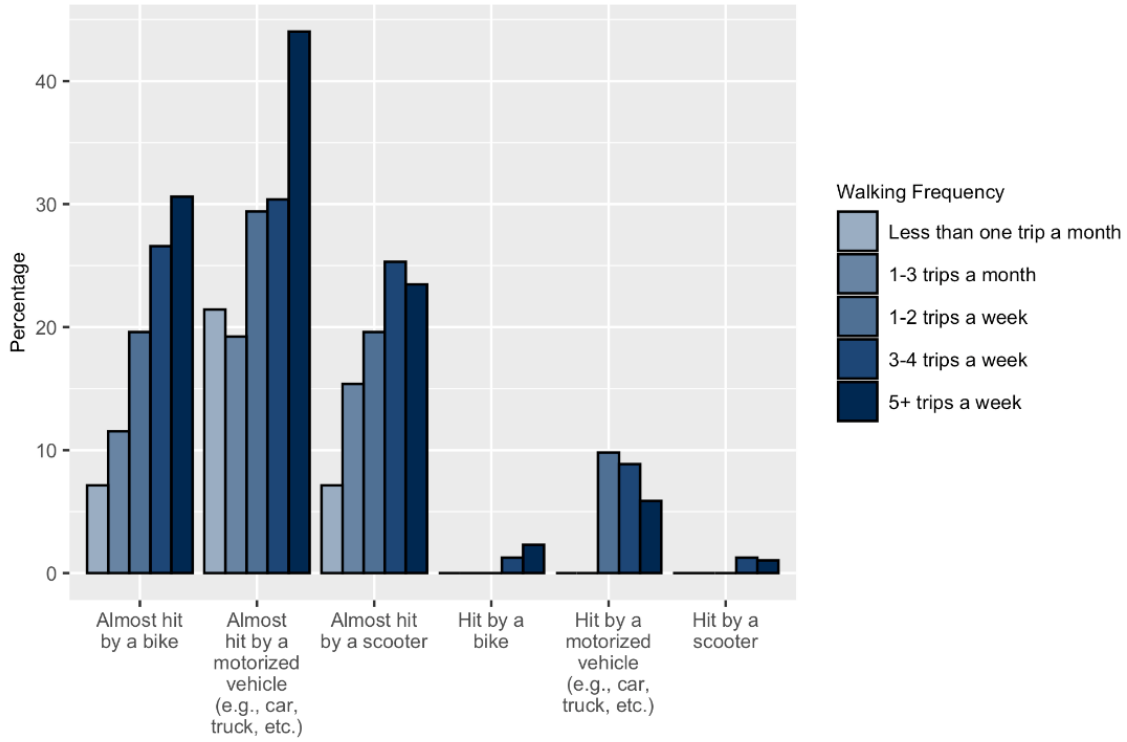

Figure 44. The percentages of participants experiencing each of these incidents while walking

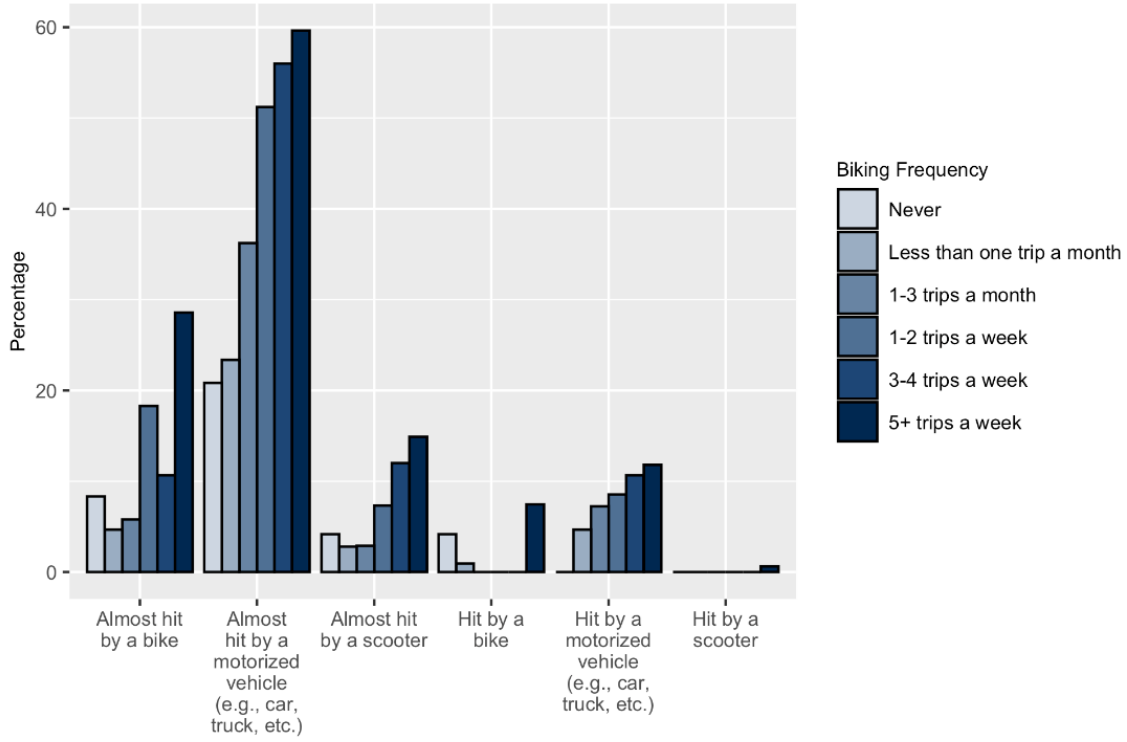

Figure 45. The percentages of participants experiencing each of these incidents while biking

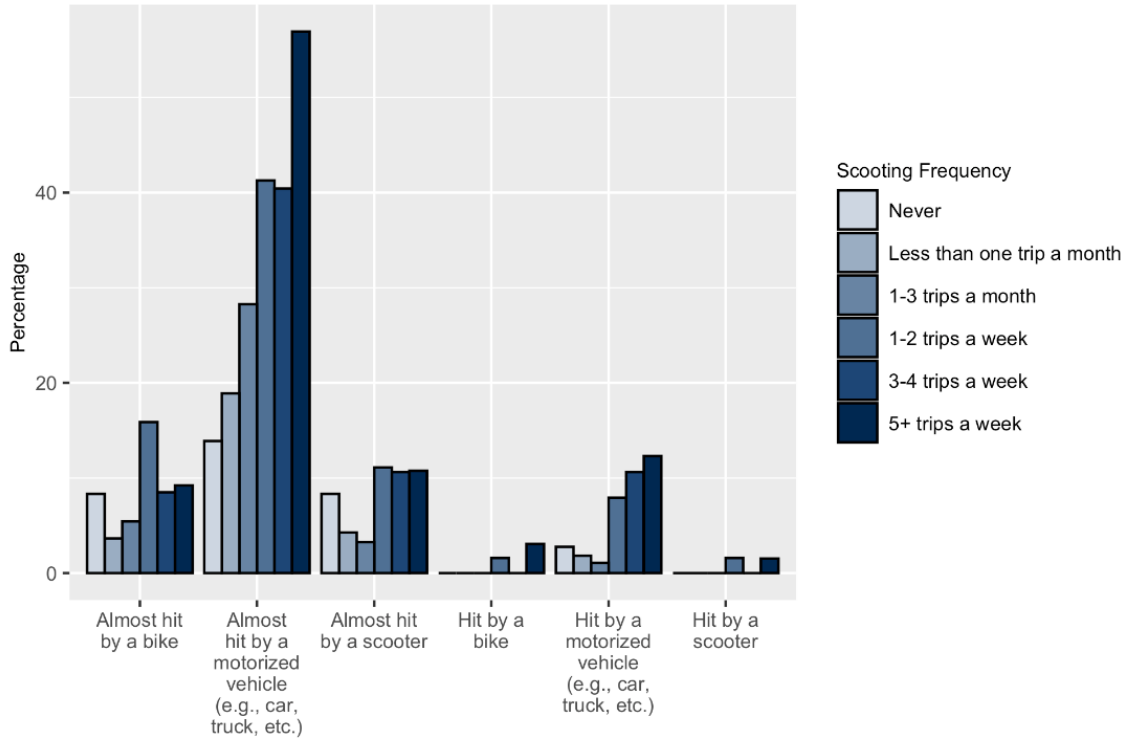

Figure 46. The percentages of participants experiencing each of these incidents while scooting

Participants were roughly four times more likely to say that they hit someone walking while riding a bike as opposed to when riding a scooter (Figure 47), but that is confounded by the bias toward bike-share use in our sample. Nonetheless, this is an interesting result considering the media reports of problems with e-scooters riding on sidewalks and hitting pedestrians leading to bans for e-scooters (Abdulahi, 2022). Participants were less likely to say they had crashed with someone biking or scooting than those biking crashing into pedestrians. Crashing a micromobility vehicle, such as a bike or scooter, is rare enough that it does not necessarily correlate with frequency of biking or scooting in this data. However, the group of participants who only bike or scoot less than one trip a month consistently reported crashing for every category except crashing into pedestrians while biking. While frequency of use may not reduce near misses, it may mean the user is more skilled with a bike or scooter and have a relatively greater chance to avoid a crash.

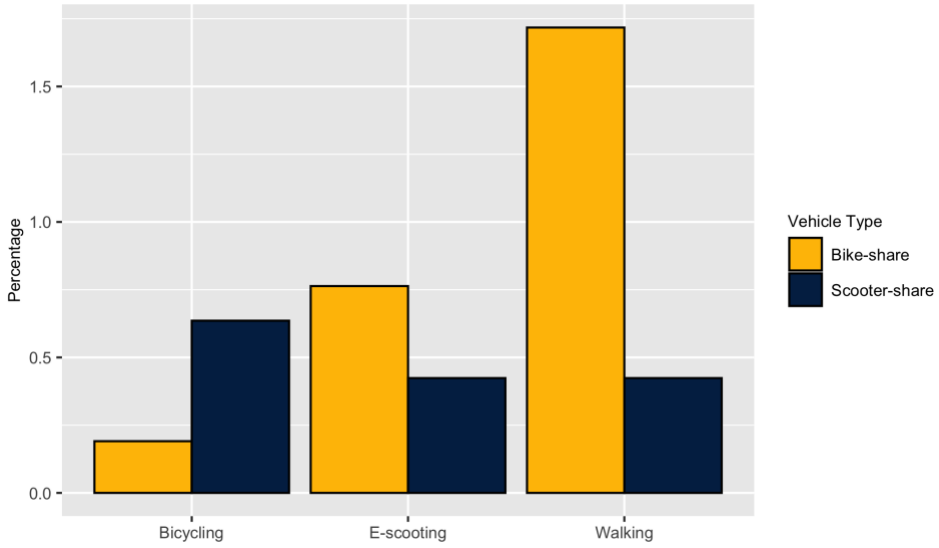

Figure 47. The percentages of participants who hit someone walking, bicycling, or e-scooting while on micromobility

Bike-share riders were the most likely to almost crash into someone walking, biking, or scooting, again a potentially misleading result given the bias toward bike-share users (Figure 48). Also, participants who had a higher biking frequency are more likely to almost crash into people while both biking or scooting. This may be that with more frequent trips, they have more exposure and chances to almost crash. This result suggests that even if more experience reduces crash risk, crash frequency is still likely to rise with more use.

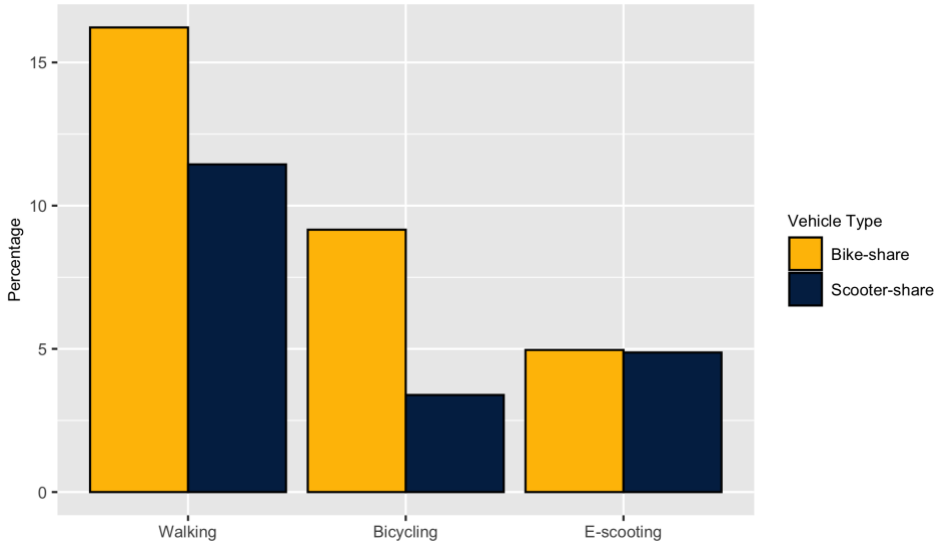

Figure 48. The percentages of participants who almost hit someone walking, biking, or e-scooting while on micromobility

The majority of participants in this study reported never or almost never crashing for both bike-share and scooter-share (Figure 49). Between these two modes, participants scooting reported almost crashing less than one quarter of their trips at almost double the frequency of participants biking. While almost crashing micromobility is rare among these participants, it appears that almost crashing a bike is rarer than almost crashing a scooter. These results match participants' attitudes towards feeling safer on a bike compared to a scooter, where participants were more likely to agree that scooter-share is unsafe compared to bike-share (Figure 50).

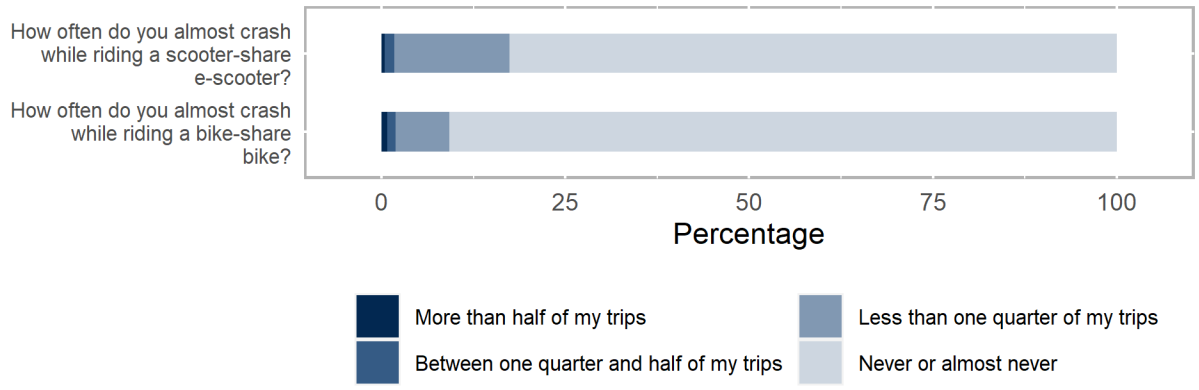

Figure 49. How often users of micromobility almost crash

The results from the attitudinal questions about the safety of micromobility services show that the participants are more likely to disagree that bike-share is unsafe compared to scooter-share, regardless of if they are an exclusive user of bike-share, scooter-share, or a non-exclusive user. In fact, less than 5% of all three types of participants agree that bike-share is unsafe, and scooter-share exclusive users are more likely to feel neutral about the safety of bike-share. This is understandable, as they report not using bike-share and do not have experience to influence their impressions of the service. Similarly, bike exclusive participants are less confident in the safety of scooter-share; just under half of the participants worry about crashing a scooter or think that they are unsafe. Scooter exclusive participants mostly disagree that scooter-share is unsafe, however almost one third of them worry about crashing a scooter. This contrasts with bike exclusive participants, where only a small percentage of them worry about crashing a bike-share bike.

Even among exclusive users of both services, it appears that bike-share is considered safer and causes less concern for crashing. Participants who use both services almost entirely do not think that bike-share is unsafe, and only 12% of them worry about crashing a bike. However, 32% worry about crashing a scooter and 25% feel that scooter-share is unsafe. Overall, the results show that bike-share services are considered safer by users of micromobility than scooter-share services. If potential users of micromobility prioritized their feelings of safety, they may be expected to choose bike-share services over scooter-share services given the choice. However, this may also be a result of the locations the services are offered in. From Figure 1, more cities across the country had participants using scooter-share compared to bike-

share. Many of these cities are not the larger cities of the country and may be more car-dependent, meaning less safe infrastructure for active transportation and likely to cause more concern about safety when using scooter-share.

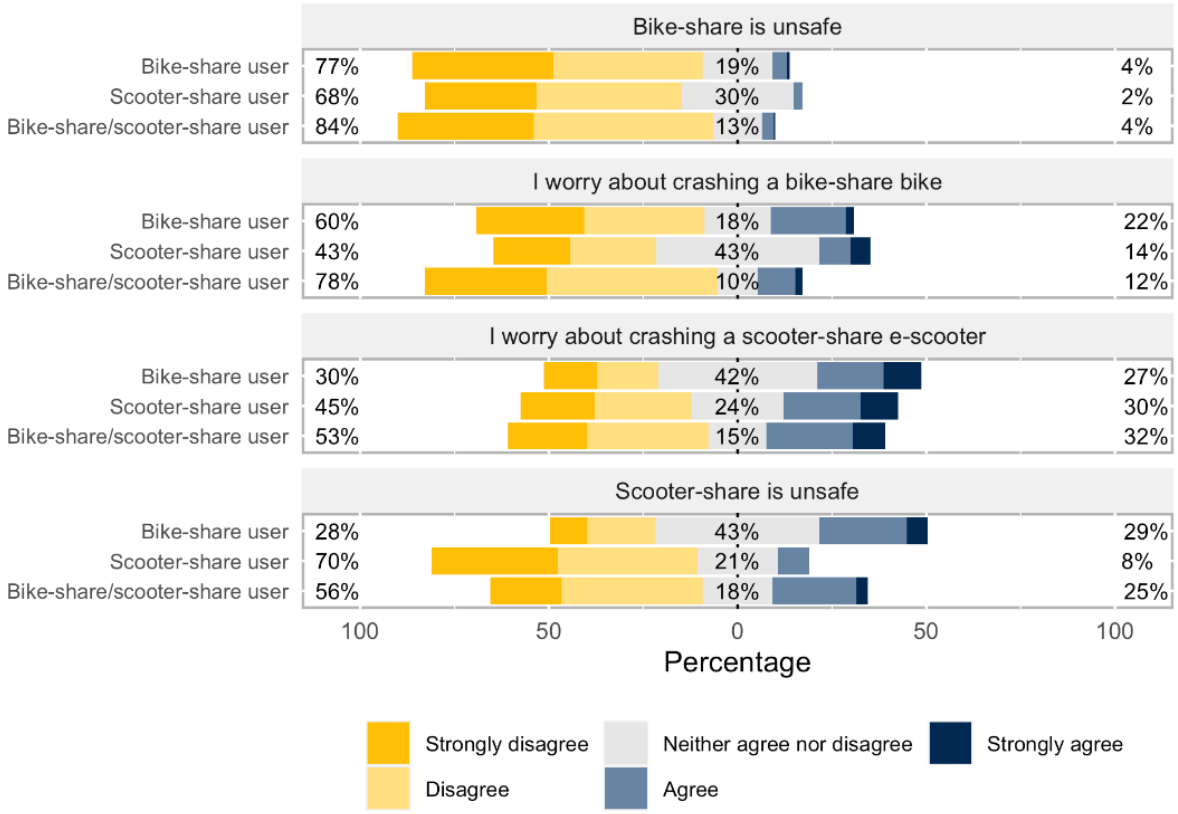

Figure 50. Micromobility user attitudes towards safety (n=650)

Attitudes towards safety does show variation by race when considering scooter-share (Figure 51), where Black participants were the least likely to agree or be neutral (65% disagree) that scooter-share is unsafe. All groups had similar rates of agreeing that they worry about crashing a scooter, however Black participants had much fewer neutral feelings and were more likely to disagree. Participants over 55 years of age do not agree that bike-share is unsafe at all, and they are the only age group to not agree (Figure 52). The younger the participant is, the more likely for them to worry about crashing a bike as well. This may be explained by older participants having different uses for bike-share. However, this trend is reversed for attitudes towards scooter-share. As the age of the participant increases, they were more likely to be neutral and less likely to disagree that scooter-share is unsafe and less likely to worry about crashing a scooter. This may reflect the differences in use of bikes compared to scooters by participants, and participants may use them for different reasons, such as for leisure or commuting. As previously discussed in the section *Why do people use micromobility services?* and Figure 3, bike-share is more likely to be used for social/recreation trips than scooter-share, while scooter-share is more likely to be used for work or for a meal.

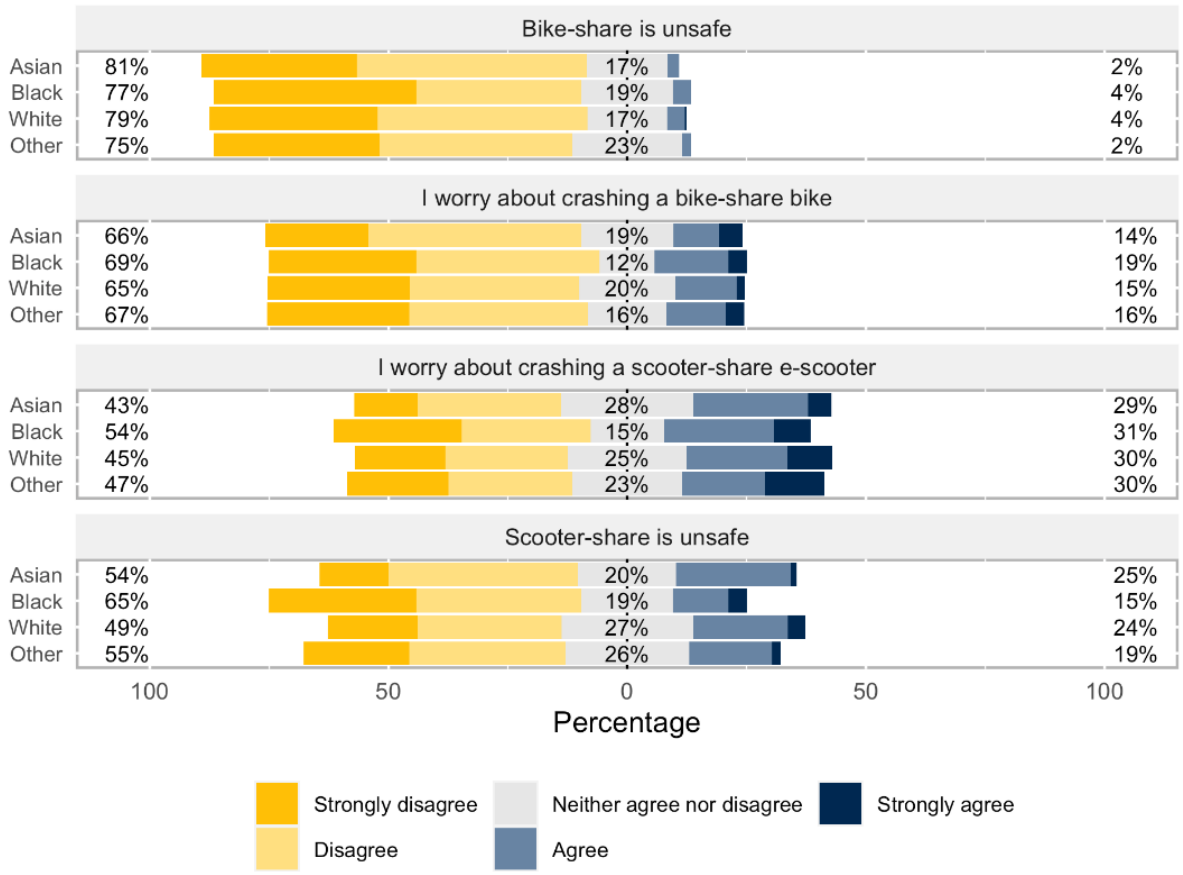

Figure 51. Micromobility user attitudes towards safety by race

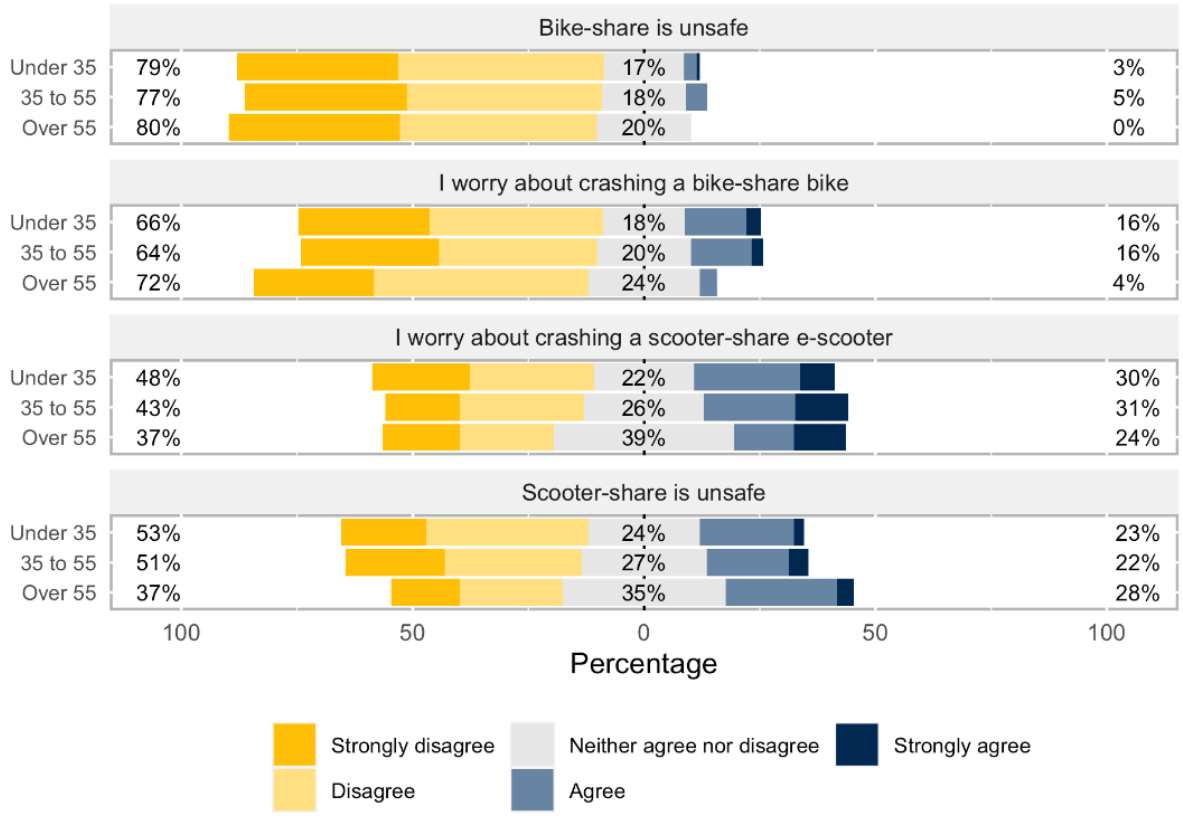

Figure 52. Micromobility user attitudes towards safety by age

Mental health

We asked six attitudinal questions that address a participant's mental health regarding the use of bike-share (Figure 53) and scooter-share services (Figure 56). Our results show that using a bike-share service may be more likely to improve a user's mental health than using a scooter-share service. For both bike-share and scooter-share services, the results of the attitudinal questions are separated by participants who exclusively used that service ("Bike-share user" or "Scooter-share user") and participants who used both services ("Bike-share/scooter-share user"). The majority of participants responded that they feel less stressed after using a bike-share bike (exclusive bike-share users: 64%/non-exclusive users: 53%) and feel relaxed while riding a bike (71%/68%). The majority of bike-share users thought that using the service improves their mental health (79%/66%). Additionally, women were less likely to agree that bike-share reduces their stress after a trip, relaxes them during a trip, or improves their mental health compared to other genders (Figure 54). Participants generally felt the same towards bike-share and their mental health regardless of race, except for Black participants being the only group to not have any disagreement that they feel less stressed than they did before their trip and that bike-share improves their mental health (Figure 55). However, Black participants were also more likely to disagree that they feel relaxed while riding a bike-share bike. This is an interesting finding, that while bike-share overall improves Black participants' mental health and reduces their stress after a trip, during the trip they may not be relaxed. This either suggests

that factors that can make riding micromobility more stressful, such as unprotected infrastructure or personal securing concerns affect Black participants more strongly, or Black riders have different perceptions of stress while riding but not about the stress reduction effect after trips, or both. This result parallels the health benefit disparities of active travel more generally with regard to race (Barajas and Braun, 2021).

Both scooter exclusive participants and non-exclusive participants had a similar tendency toward how they feel during and after riding a scooter and the effect of using the service on their mental health (Figure 59). However, this is less pronounced than with bike-share, and there was a larger share of participants feeling neutral or negative towards scooter-share than bike-share. Again, this may be a function of the sample that leans more toward bikes. Participants who had taken both services were more likely to choose “Neither agree or disagree” for each question regarding the effect of riding a scooter-share service on their mental health. While a similar proportion of non-exclusive participants and bike exclusive participants had negative attitudes toward each question, non-exclusive participants were more likely to disagree with the positive effect of scooter-share use on their mental health than scooter exclusive participants. These results suggest that bike-share may be more reliable at improving a user’s mental health than scooter-share.

Similar to bike-share, Black participants were more likely to agree that scooter-share reduces their stress after a trip compared to other groups (Figure 57). However, there are not any noticeable differences between groups for feeling relaxed riding a scooter or for scooters improving a user’s mental health. Interestingly, as a participant’s income increases, they were less likely to find mental health benefits from scooter-share services (Figure 58). This may be explained by wealthier participants having more alternatives to micromobility, such as comfortable vehicles, which provide comfort and protection from traffic that micromobility services do not.

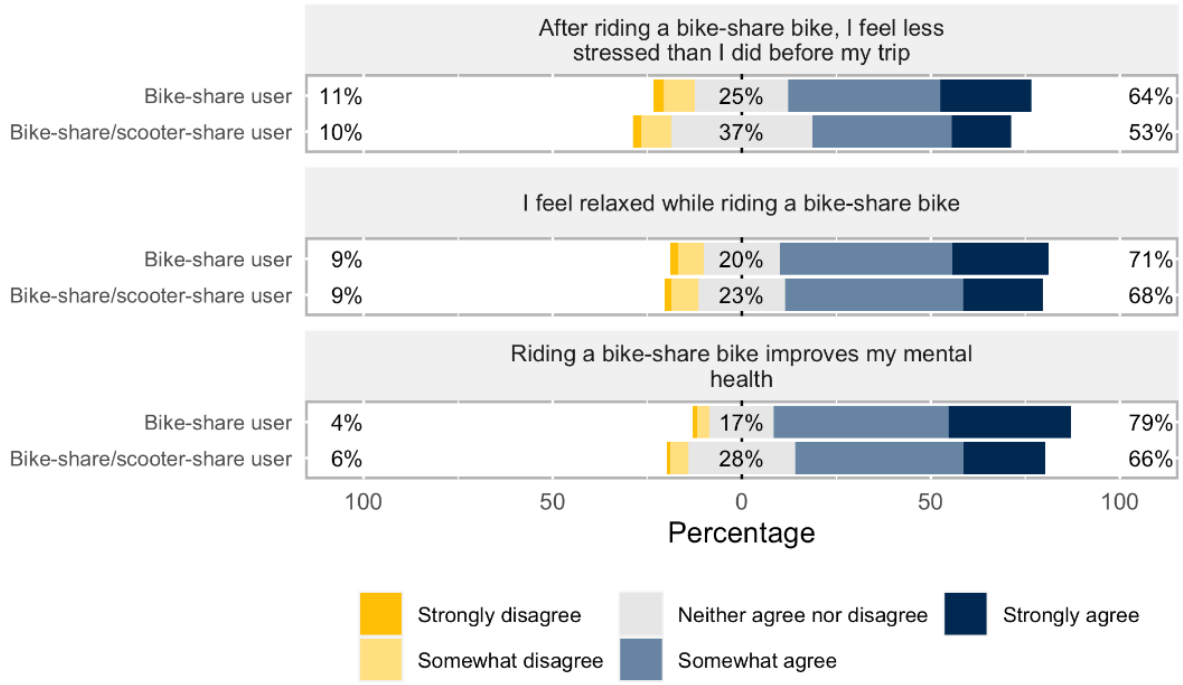

Figure 53. Bike-share users' perception of bike-share services regarding mental health

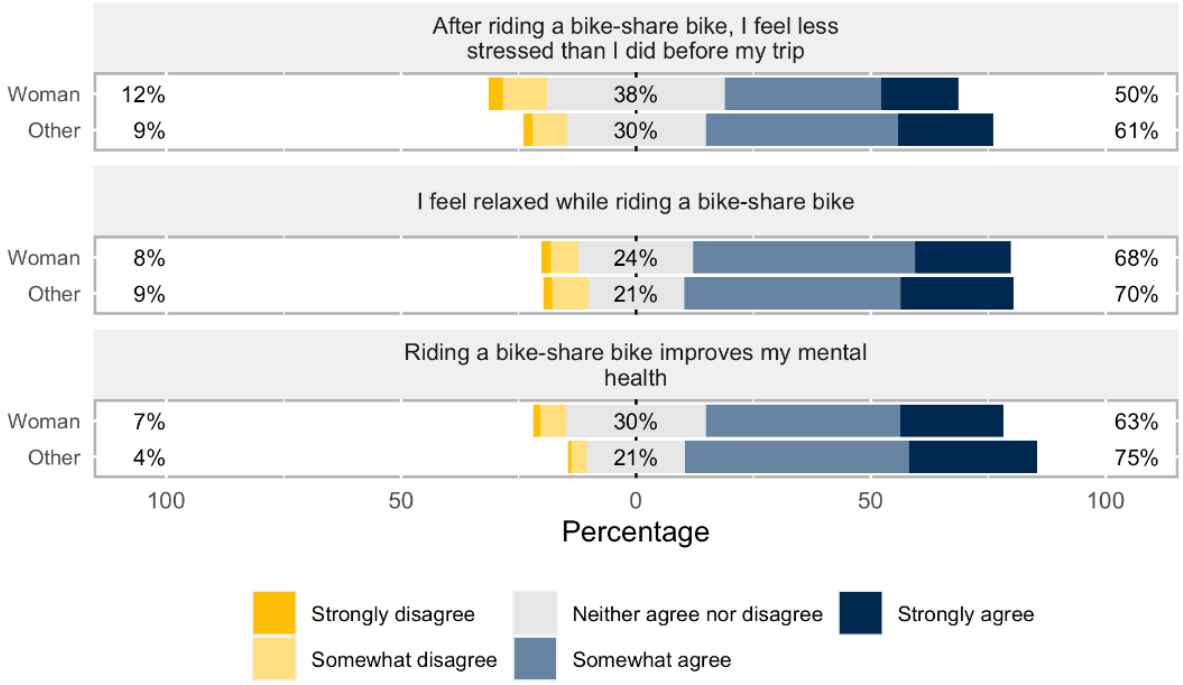

Figure 54. Bike-share users' perception of bike-share services regarding mental health by gender

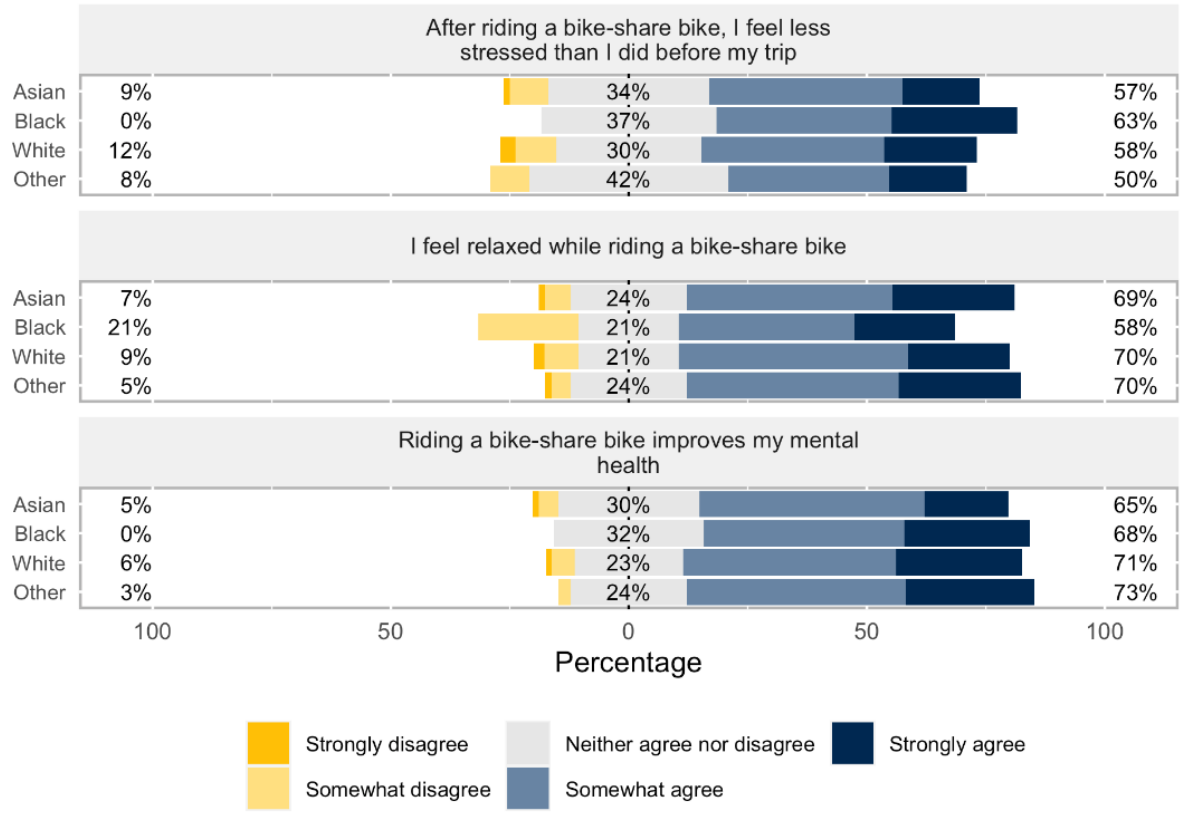

Figure 55. Bike-share users' perception of bike-share services regarding mental health by race

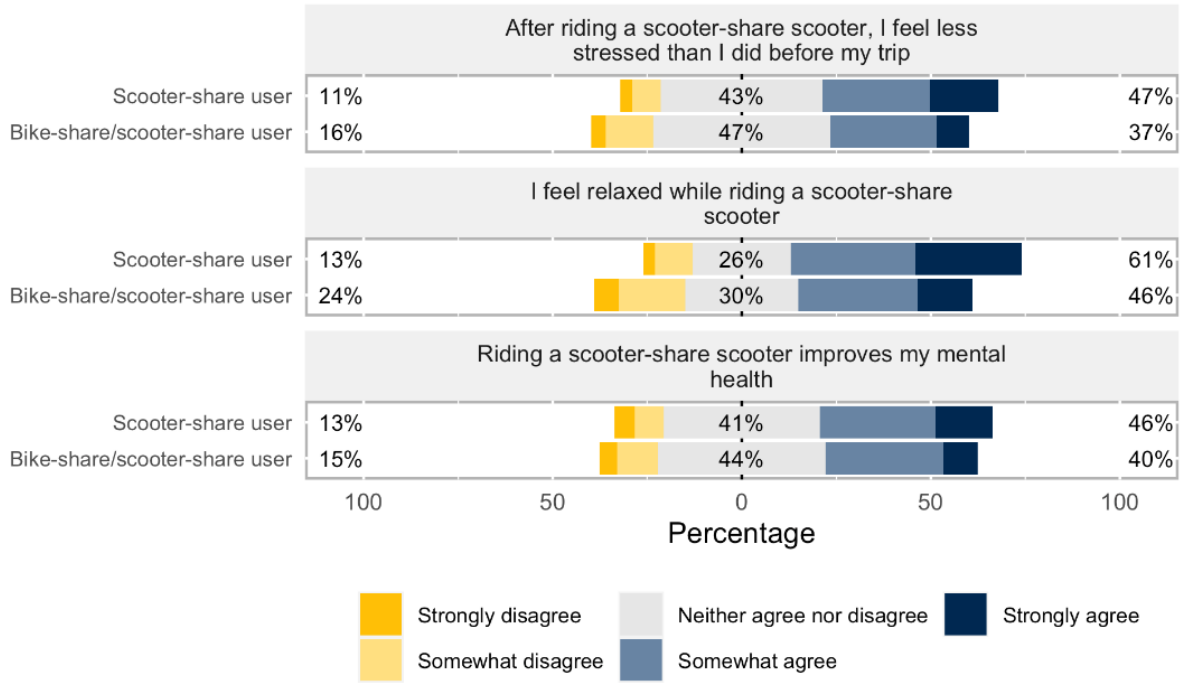

Figure 56. Scooter-share users' perception of scooter-share services regarding mental health

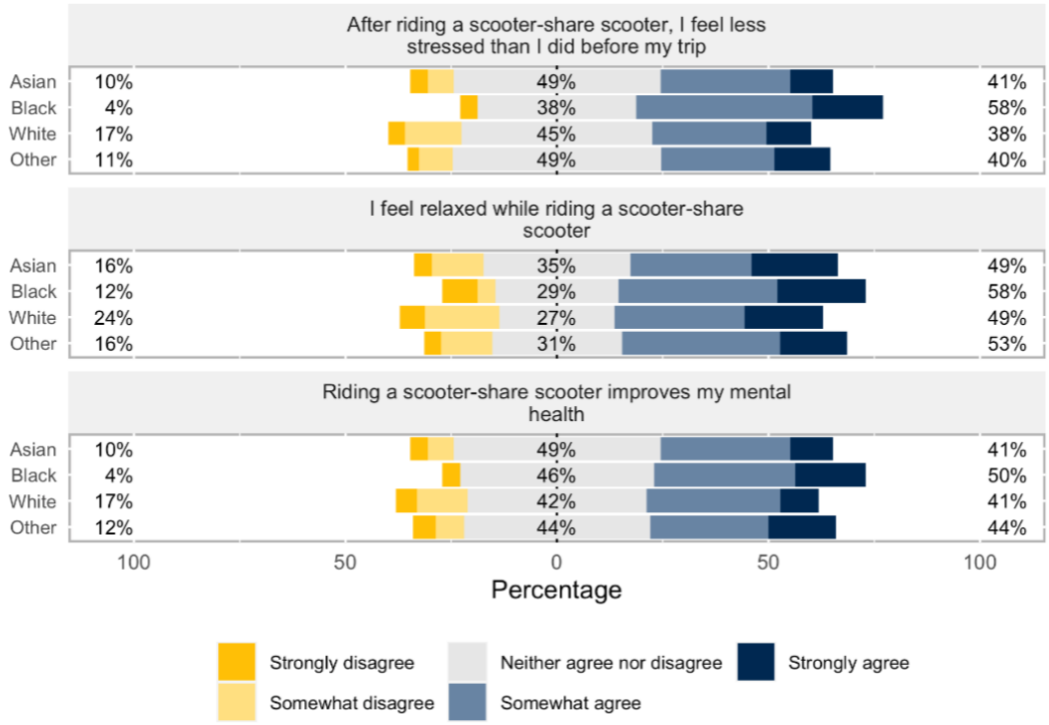

Figure 57. Scooter-share users' perception of scooter-share services regarding mental health by race

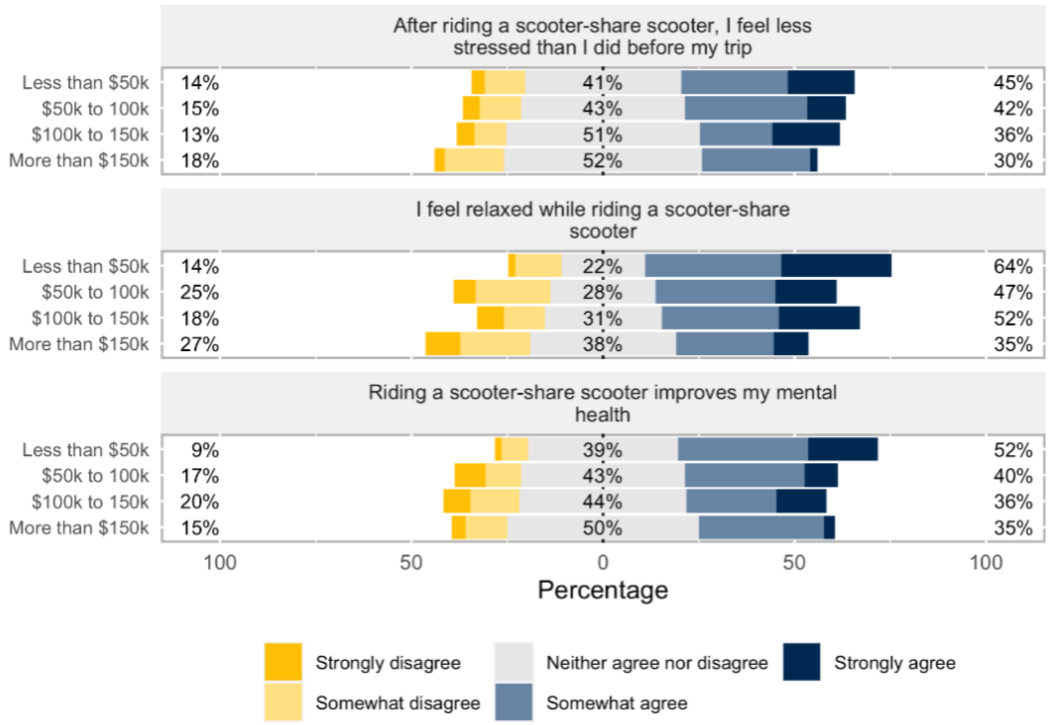

Figure 58. Scooter-share users' perception of scooter-share services regarding mental health by income

Conclusions and Next Steps

In this report we summarized smartphone travel diary data and a post-travel diary survey data of micromobility service users in 48 US cities as a preliminary analysis to examine the impact of micromobility services on travel behavior and outcomes such as mode shift, car ownership, access, equity, safety, and physical activity. We note that we made our summary statistics without any weight to consider sample representativeness. For example, in Big and Dense cities the number of those using bike-share in post-diary survey and bike-share trips in travel diary survey was higher than the number of those using scooter-share and scooter-share trips as opposed to a finding in a recent NACTO's report (2022). Without this consideration, we cannot generalize micromobility users' individual characteristics and travel behavior. However, our results still provide some interesting findings and suggest further investigation for deeper insights.

Micromobility services have the potential to help improve transportation equity. Our results show that most participants think that micromobility improves their accessibility and reduces their travel cost. However, attitudes or perceptions toward micromobility services and service use frequency vary by individual characteristics. That our results showed the association between individual characteristics and service use frequencies are different from findings in a prior study (NACTO, 2020) encourages a deeper analysis.

One expected benefit from introducing micromobility services in a city is to replace car trips and to reduce car emissions. Although walking was the most substituted mode of micromobility trips, participants substituted micromobility for car trips, including personal vehicle and ride-hailing, to varying degree depending on vehicle type and city size. We also found not only a substitution effect of the services on reducing car trips but also some influence on participants' decision of car purchase as a long-term effect.

Micromobility services are often cited as having potential as a last-mile solution for transit. We found that bike exclusive or non-exclusive participants showed more positive attitudes toward using public transit than scooter exclusive participants. However, our results showed that both bike-share and scooter-share constituted only a small portion of the first and last mile modes in any city size. We found a stronger transit substitution effect of micromobility trips than a transit complementary effect, especially for bike-share trips. In fact, most participants reported that they have used transit services less often since their use of the micromobility service. To understand the effect of micromobility service on the transit ridership and transit trip experience, it is important to further investigate transit substitution and complementarity of the recorded multimodal trips and include trip weights to account for sample biases.

For a successful micromobility service, it is important for users to have reliable and timely access to the shared vehicles. The definition of availability here depends on users, but our results show that most participants are willing to walk up to five minutes to get a vehicle for 1 15-minute ride. One-quarter to one-third of participants perceive that bike and scooter services are not available when and where they need them. This perception is related to the fact that half of participants had at least once experienced that they could not find an available vehicle

nearby. These results suggest a sizeable supply constraint on demand for the services to satisfy existing user needs.

Bike-share services are considered a way to improve health though physical activity increases. We did not find a clear effect of micromobility services on increasing personal micromobility, but a general increase in physical activity though the vehicles themselves is likely to result in net increases. This is even in light of the fact that the most substituted mode of micromobility trips was walking. The results of micromobility use improving mental health are a first (to our knowledge) and an important topic for future research.

Safety concerns are rising as the number of micromobility trips have increased. Our results show that small percentages of participants reported crashing on micromobility. It is notable that participants in general feel that bike-share is safer than scooter-share, and further work can explore why participants feel less safe on scooter-share, and how this is affected by a participant's individual characteristics.

This is a Part 1 reporting of the American Micromobility Panel. In future work we will post-process and clean the "Review" trip data to make our dataset more robust by increasing the size of the data. We will also use distributions of personal micromobility use frequency for each city by vehicle to weigh our sample to system-level trip making to consider sample representativeness. Because this report revealed only preliminary findings, we will further examine and test the hypotheses generated here using statistical analysis in future reporting.

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Data Summary

Products of Research

In this project, we conducted two different surveys: a 21-day smartphone-based travel diary of shared micromobility users and an online follow-up survey of travel diary participants (post-travel diary survey).

The first dataset was collected in Summer 2022, targeting bike-share or scooter-share users in 48 US cities to understand the current impacts of micromobility services on other mode use. We used a third-party vendor (RSG) to monitor the travel diary survey. Five micromobility service companies (Bird, Lime, Lyft, Spin, Superpedestrian) we partnered with recruited users in three waves to avoid oversampling and to balance the number of participants by city and vehicle types in our dataset. We also recruited those who have not experienced any shared micromobility service before to understand the difference of travel behavior and attitude toward transportation in general and micromobility service. We used a snowball sampling technique to recruit these participants. However, our recruitment failed as we were only able to collect 32 participants from this approach. The total number of valid responses for this survey was 2206 participants (2174 users and 32 non-users) with 183,483 trips data. This dataset consists of eight different .csv files and contains various types of information, including household characteristics, person-level characteristics, types of vehicle participants own, daily-level information, trip attributes, locations of trips, trip classifier, and code lookup to merge travel diary survey dataset with post-diary survey dataset.

The second dataset was collected in September 2022, targeting participants in the travel diary survey to measure the effect of micromobility services on their travel behavior and attitudes. We invited 940 participants (original sample size of participants willing to be recontacted), received 693 responses, and decided to use 657 valid responses for the analysis. This dataset consists of a .csv file and contains information on topics related to experience with micromobility services, use of different transportation modes before the COVID19 pandemic or at present, the effect of micromobility use on other transportation use, collision or almost collision experience on or with micromobility vehicles, attitudes towards micromobility services and other aspects of transportation, and additional individual characteristics the travel diary survey did not include, such as types of living place and housing ownership.

Data Format and Content

There are nine .csv files for the database, and an .html file for the codebook and dataset guide.

Database: Each row represents a single survey participant, a collected trip, or a collected location with a unique ID number assigned, and each column corresponds to one variable.

Codebook and dataset guide: This file describes variables and attributes in the database, and a dataset guide with information about data privacy, data preparation, and notes on joining table.

Data Access and Sharing

The final data of this project is subject to the UC Davis Institutional Review Board (IRB) guidelines on the treatment of human subject data and is available upon request from the principal investigator.

Reuse and Redistribution

The final data of this project is subject to the UC Davis Institutional Review Board (IRB) guidelines on the treatment of human subject data and is available upon request from the principal investigator. For all purposes allowed by the IRB guidelines, there are no restrictions on the use of the data. Data can be reused with credit to this report and the authors of the research.

Appendix: Survey Instruments

Below are the survey instruments. There are two surveys: travel diary survey and post-travel diary survey. While all the complexities of the survey questions cannot be fully represented in this format (e.g., map questions, survey flow logic), we hope these questions can provide valuable details about the wording of questions for the variables we analyze in the main report.

Appendix A: Travel Diary Survey

1.0 ACTIVATION

1.1 [ACCESS_CODE]

Please enter your access code.

Access code entry

1.2 [MEMBER_1_EMAIL]

Please enter your email so we can send you a new, secure participation code.

text box entry, accept valid email responses only

1.3 [PARTICIPATION_CODE]

We just sent your new participation code to <email>.

Please enter that code here once you receive it. This may take a few minutes.

*Please keep track of this code. You will use this code any time you need to log back in.

Participation code entry

1.4 [LANGUAGE]

1.5 [TERMS_AND_AGREEMENT]

2.0 SIGNUP SURVEY

2.1 [INTRO]

Thank you for your participation!

The purpose of the American Micromobility Study is to understand the travel patterns and needs of residents like you. Your participation is important to us, and your responses will help us understand how scooter and bike sharing services are impacting travel in your city.

2.2 [INCENTIVE_TYPE]

After completing the full study, you will receive one free ride credit. Would you like to receive a $15 gift card after completing the study? Gift cards and credits will be distributed monthly throughout the research period.

Yes, please send me an Amazon e-gift card (delivered by email)

Yes, please send me a Walmart e-gift card (delivered by email)

No, prefer no gift card

2.3 [RAFFLE]

In addition, would you like to be entered into a raffle to receive one of ten $250 gift cards after completing the study? The prize drawing will occur in early September. Prize drawing rules are available at micromobilitystudy.com.

Yes, please enter me into the raffle for one of ten $250 gift cards.

No, do not enter me into the raffle.

2.4 [MEMBER_1_NAME]

First, we will ask a short set of questions about you and your travel preferences.

Please provide your initials or a nickname.

text box entry

2.5 [NUM_VEHICLES]

How many registered motor vehicles are in your household?

Include vehicles available for use (e.g., don't include vehicles away at college, broken down vehicles).

0 (no vehicles in my household)

1

2

3

4

5

6

7

8 or more

2.6 [VEHICLE_DETAILS]

show if number of vehicles > 0

Please provide the year, make, & model for each vehicle (e.g., 2011 Ford F-150).

Show drop downs of year, make, and model for current vehicle database. Include an 'Other' option in each drop down and if 'Other' is selected in any drop down then show text box and ensure that all subsequent drop downs are nulled out if the participant writes in the 'Other' text box

2.7 [FUEL_TYPE]

Logic: show if number of vehicles > 0

What type of fuel does each vehicle use?

Show list of all household vehicles.

- Gas
- Hybrid (HEV)
- Plug-in hybrid (PHEV)
- Electric (EV)
- Diesel
- Flex fuel (FFV)
- Other (e.g., natural gas, bio-diesel)

2.8 [VEHICLE_OWNERSHIP]

show if number of vehicles > 0

What is the ownership status of each vehicle?

Show list of all household vehicles.

- Fully owned (not making payments)
- Owned (making payments)
- Leased
- Employer provided
- Other

2.9 [NUM_PEOPLE]

How many OTHER people live in your household?

Please include all other adults, children, and roommates who normally live with you. Do not include people who are currently living away from home (e.g., away at college, active duty military).

0 (I live alone)

1

2

3

4

5

6

7

8

9

10

11

12 or more people live with me

2.10 [OTHER_MEMBERS_NAMES]

if household size is greater than 1

Please provide an initial/nickname for the OTHER people in your household.

This will save you time as you complete the survey.

Text box entry

Validate so text box count = number of people minus the primary participant taking the signup survey (whose name we already collected).

Validate all entries are unique and unique from primary participant taking the signup survey.

2.11 [RELATIONSHIP]

if household size is greater than 1

What is each person's relationship to you?

Show list of all persons in HH other than the person responding. Any member whose relationship to member 1 is "nonrelative" is considered NOT related for future logic.

Spouse/partner

Child/child in-law

Parent/parent in-law

Sibling/sibling in-law

Other relative (grandchild, cousin)

Nonrelative (friend, roommate, household help)

2.12 [DEFINE_RELATED]

show if any household members are "nonrelative" to member 1

If only related household members are surveyable (no question asked):

In this study, we will ask certain questions only of household members who are 'related' to you and will only ask those members to report travel.

For the purposes of this study, 'related' household members include spouses, unmarried partners, children, parents, siblings, and other relatives. Roommates, friends, household help, and other nonrelatives are not included in 'related' household members.

2.13 [AGE]

What is the age range of each person?

Show list of all household members

Under 5 *if not household member 1*

5-15 *if not household member 1*

16-17 *if not household member 1*

18-24

25-34

35-44

45-54

55-64

65-74

75-84

85 or older

2.14 [EMPLOYMENT]

Jobs affect many people's transportation needs.

As of today, what is each person's employment status?

Show list of all persons age 16 or older

Employed full-time (paid)

Employed part-time (paid)

Employed, but not currently working (e.g., on leave, furloughed 100%)

Self-employed

Unpaid volunteer or intern

Unemployed and looking for work

Not employed and not looking for work (e.g., retired, stay-at-home parent, student)

2.15 [NUM_JOBS]

if household has 1 or more participating members employed full/part/furloughed/self/volunteer

How many jobs does each person have?

Show each person who is employed full/part/furloughed/self/volunteer AND participating

1

2

3

4

5

6 or more

2.16 [JOB_TYPE]

if household has 1 or more participating members employed full/part/self/volunteer

As of today, which of the following best describes each person's CURRENT work location?

if at least one related HH member has more than one job: ***Please answer for the job where each person works the most hours.***

Show list of persons age 16+ who are employed full/part/self/volunteer AND related

- Go to one work location ONLY (outside of home)
- Work ONLY from home or remotely (telework, self-employed)
- Telework some days and travel to a work location some days
- Work location regularly varies (different offices/jobsites)
- Drive/bike/travel for work (driver, sales, deliveries)

2.17 [STUDENT]

School schedules affect many people's transportation needs.

As of today, which adults are enrolled as a student?

If school is currently out of session, please answer for when school is back in session.

Show list of all persons age 18 or older

- Not a student
- Part-time student, currently attending some or all classes in-person
- Part-time student, ONLY online classes
- Full-time student, currently attending some or all classes in-person
- Full-time student, ONLY online classes

2.18 [SCHOOL_TYPE]

if household has 1 or more related children age 0-17 or 1 or more participating adult students

As of today, in what type of school is each person enrolled?

If school is currently out of session, please answer for when school is back in session.

If someone is enrolled in school and attending remotely or from home, please select the type of school they are enrolled in.Show list of related persons age 0-17 AND related adult students

Cared for at home *if age = under 5*

Daycare outside home *if age = 0-15*

Preschool *if age = 0-15*

Elementary school (public, private, charter) *if age = 0-15*

Middle school (public, private, charter) *if age = 5-15*

High school (public, private, charter) *if age = 5-24*

Home school *if age = 0-17*

Vocational/technical school *if age >= 16*

2-year college *if age >= 16*

4-year college *if age >= 16*

Graduate or professional school *if age >= 16*

Other

2.19 [SECOND_HOME]

If 1 participating household member (only one person listed below) **Do you regularly spend the night at a second home (e.g., another parent or grandparent's house, partner or spouse's home, or a vacation home)?**

If 2+ participating household members **Do any household members (including yourself) regularly spend the night at a second home (e.g., another parent or grandparent's house, partner or spouse's home, or a vacation home)?**

Show list of all participating household members

Does not regularly spend night at second home

Regularly spends night at second home

2.20 [HABITUAL_LOCATIONS]

Now we will ask about the places your household goes the most. We ask this to save you time as you complete the survey.

Thanks for your participation. **Please click 'Next' to continue.**

2.21 [HOME_LOC]

Where is your home located?

Geocoder centered over current lat/lon

2.22 [SECOND_HOME_LOC]

Show if any household member has a second home
Where is each person's second home located?
Programmers: Show list of participating HH members with a second home.

Programmers: Geocoder centered over current lat/lon

2.23 [WORK_LOC]

If household has 1 or more participating HH members with "only one work location" or "teleworks some days and travels to a work location some days" for job type

Where is each person's primary workplace located?

Show for participating HH members with "only one work location" or "teleworks some days and travels to a work location some days" for job_type

Geocoder centered over current lat/lon

2.24 [SCHOOL_LOC]

If household has 1 or more participating adult students who attend class in person or children who are not homeschooled or cared for at home

Where is each person's school located?

If currently attending school remotely due to COVID-19, please report the school location each person will return to when they are no longer attending school remotely. Do NOT report their home location.

If school is currently out of session, please answer for when school is back in session.

Show list of participating persons age 18+ who are students and attend class in person (based on [student]) AND all related children who are not homeschooled or cared for at home (based on [school_type])

Geocoder centered over current lat/lon

2.25 [ETHNICITY]

Thanks. These next questions help us understand how well the study results represent the overall region. What is your ethnicity?

Select all that apply.

Ask of member 1 only.

- Not of Hispanic, Latino, or Spanish origin *Programmers: Clears set*
- Mexican, Mexican American, Chicano
- Puerto Rican
- Cuban
- Another Hispanic, Latino, or Spanish origin
- Prefer not to answer *Programmers: Clears set*

2.26 [ETHNICITY_OTHER]

if responded "Other" ethnicity

You selected 'another Hispanic, Latino, or Spanish origin.' Please tell us more.

Text box entry

2.27 [RACE]

What is your race?

Select all that apply.

Ask of member 1 only.

- African American or Black
- American Indian or Alaska Native
- Asian
- Native Hawaiian or other Pacific Islander
- White
- Other race
- Prefer not to answer *Programmers: Clears set*

2.28 [RACE_OTHER]

if responded "Other" race

You selected ‘other race.’ Please tell us more.

Text box entry

2.29 [GENDER]

What is each person’s gender?

Show list of participating household members

Woman

Man

Non-binary

Other/prefer to self-describe

Prefer not to answer

2.30 [HH_LICENSES]

Show if household has only 1 participating HH members age 16+

Do you drive? Please answer yes if you can drive a motor vehicle including a car, personal truck, SUV, van, or motorcycle.

We will use this information to customize which transportation questions you are asked in this study.

Show if household has more than 1 participating HH members age 16+

Does each person drive? Please answer yes if they can drive a motor vehicle including a car, personal truck, SUV, van, or motorcycle.

We will use this information to customize which transportation questions you are asked in this study.

Show list of participating persons age 16 or older

Yes, drives

No, does not drive

2.31 [INCOME_DETAILED]

Last year, what was your household's total annual income (from all sources, before taxes/deductions from pay)?

If household has any NON-participating members Please exclude income from members of your household who are not related to you (e.g., roommates, household help).

Less than $15,000

$15,000-$24,999

$25,000-$34,999

$35,000-$49,999

$50,000-$74,999

$75,000-$99,999

$100,000-$149,999

$150,000-$199,999

$200,000-$249,999

$250,000 or more

Prefer not to answer

2.32 [CLOSE]

Thank you! Please select 'Next' to continue.

3.0 SURVEY PLATFORM PROMPTS

3.1 [RMOVE_LANDING]

Respondent sees Dashboard screen, show below text on the dashboard until their travel period begins.

Your travel period is <START DATE> - <END DATE>.

Before <START DATE>, rMove will begin recording the trips you make and will send you notifications when trip surveys are ready. Each day, you'll also be asked to complete a daily survey about your household's general travel habits.

Note: Collecting your trips will use more battery than usual. Please try to keep your phone charged for the best trip collection.

4.0 DAILY SURVEY: CORE QUESTIONS

Daily survey core questions are asked on each travel day for participating adults age 18+

4.1 [BEGIN_DAY]

On <traveldate> , where did you BEGIN your day?

This question helps to confirm that rMove correctly collected your travel.

Home

Someone else's home

Work *if employment = full/part/self/volunteer*

Your other home (e.g., partner, second home) *if has second home*

Temporary lodging (e.g., hotel, vacation rental)

Traveling (e.g., red-eye flight)

Other

4.2 [END_DAY]

On <traveldate> , where did you END your day?

This question helps to confirm that rMove correctly collected your travel.

Home

Someone else's home

Work *if employment = full/part/self/volunteer*

Your other home (e.g., partner, second home) *if has second home*

Temporary lodging (e.g., hotel, vacation rental)

Traveling (e.g., red-eye flight)

Other

4.3 [NO_TRAVEL]

if made zero trips

Why didn't you go anywhere on <traveldate>?

Select all that apply.

- I did make trips on <traveldate>
- Not scheduled to work/took day off *if employment = full/part/furlough/self/volunteer*
- Worked at home for pay (e.g., telework) *if employment = full/part/self/volunteer*
- Hung out around home
- Weather conditions (e.g., snowstorm)
- Sick or quarantining (self or others)
- Waited for visitor/delivery (e.g., plumber)
- Kids did online/remote/home school *hide if nobody <18 in HH*
- Scheduled school closure (e.g., holiday) *hide if nobody <18 in HH*
- No available transportation (e.g., no car, no bus)
- Other reason

4.4 [TELECOMMUTE_TIME]

if employment = full/part/self/volunteer

How much time did you spend working at home or teleworking (from anywhere) for pay on <traveldate>?

Please estimate for all time teleworked (both during & outside regular business hours).

Selection is in 15-minute increments from 0 up to 10+ hours

5.0 DAILY SURVEY: DAYS 1 – 6

No additional daily questions asked these days.

6.0 DAILY SURVEY: DAY 7

6.1 [PARTICIPATE]

Are you willing to participate in future transportation surveys (like this one)?

You will be compensated as thanks for your time.

Yes

No

6.2 [SNOWBALL]

If segment = user

Do you have friends or family (age 18 or older) who don't use bike or scooter share who may be interested in this study? After receiving their permission, please provide an email address for these adults so we can send them instructions to participate.

You will receive an additional $2 per contact who completes the study (up to $10). Contacts will also receive $15 for their participation and be entered into a raffle for one of five $100 gift cards.

Gift cards and raffle prizes will be distributed in early September.

Optional text box entry (eight boxes).

7.0 DAILY SURVEY: DAYS 8 – 20

No additional daily questions asked these days.

8.0 DAILY SURVEY: DAY 21

8.1 [FEEDBACK]

Thank you for participating! Please provide any feedback you have about the study experience by clicking 'More' on your dashboard and selecting 'Give us feedback.'

9.0 DAILY SURVEY COMPLETE SCREEN

9.1 [DAY_END]

Programmers: if made trips on travel day or confirmed they didn't make trips:

Thank you. rMove's goal is to show **all** trips made.

Did rMove miss a trip? To add trips, return to your travel roster for this day and click the + button in the bottom right of the screen.

Press 'Next' to finish this survey.

Programmers: if indicated they traveled in the no_travel question, but currently don't have trips in their roster:
You indicated that you made trips on <travel_date>. Press 'Next' to add your trips for this day.

10.0 TRIP SURVEY

10.1 [STOP_DEFINE]

Link to this page when information hyperlink about stops is clicked.

What is a stop?

A stop is any time you traveled more than 100 feet and conducted an activity at a different address. Examples include:

- Arriving at school or work
- Getting a coffee on the way to work
- Dropping someone off or picking someone up
- Using a drive-thru

What is NOT a stop?

- Going to another place inside the same building (like a different store within the same mall or a different doctor's office in the same hospital)
- Going to the end of the driveway to get the mail
- Walking around your yard/property

What if I changed vehicles?

If you changed vehicles of one type to another, this IS A STOP (e.g., driving a car to a bus stop and switching from a car to a bus).

What if I pick up someone or drop someone off?

If you pickup or drop-off a member of your group, you should record this as a stop.

Examples:

- Dropping or picking up a child from school or day care
- Picking up a spouse from work
- Dropping off children at a game or afterschool program

10.2 [STOP_DESTINATION]

Did you stop here?

Add information hyperlink: What's a stop?

Yes, I stopped

No, I was still traveling

No, I didn't make this trip at all

10.3 [STOP_DETECTED]

We found some stops you may have made along the way.

Add information hyperlink: What's a stop?

Please choose which stops to keep.

List of potential stops based on speed

10.4 [STOP_ADDED]

Do you need to add any more stops along the way?

Add information hyperlink: What's a stop?

Counter input 0-9

10.5 [STOP_LOCATION]

if stop_added > 0

Where did you stop?

Use the arrows and slider to move the marker. When the marker is at the point closest to the stop you want to add, click 'Next.'

Trip trace slider

10.6 [CONFIRM]

if trip details are prepopulated

We guessed at the details of your trip. Please select 'Confirm all' or 'Edit details' at the bottom of the list, then click 'Next'

Confirm all

Edit details

10.7 [MODE]

How did you travel on this trip?

If you used multiple modes or changed modes during your trip, please select all modes used.

Walk (or jog/wheelchair)

Household vehicle (or motorcycle)

Other vehicle (e.g., friend's car, rental, carshare, work car)

Uber/Lyft, taxi, or car service

Bus, shuttle, or vanpool

Rail (e.g., train, subway)

Bike share (e-bike)

Bike share (conventional bike)

Scooter share (e.g., Lime, Bird)

Personal bike or e-bike

Other personal micromobility (e.g., scooter, moped, skateboard)

Medical transportation service

Other

10.8 [TRANSIT_ACCESS]

if mode = bus or rail

How did you get to the transit stop?

Transferred from another bus

Transferred from other transit (e.g., rail, air)

Walked (or jogged/wheelchair)

Drove and parked my own household's vehicle (or motorcycle)

Drove and parked another vehicle (or motorcycle)

Got dropped off in my own household's vehicle (or motorcycle)

Got dropped off in another vehicle (or motorcycle)

Uber/Lyft, taxi, or car service

Bike share (e-bike)

Bike share (conventional bike)

Scooter share (e.g., Lime, Bird)

Personal bike or e-bike

Other personal micromobility (e.g., scooter, moped, skateboard)

Other

10.9 [TRANSIT_EGRESS]

if mode = bus or rail

How did you exit the transit stop?

Transferred to another bus

Transferred to other transit (e.g., rail, air)

Walked (or jogged/wheelchair)

Drove my own household's vehicle (or motorcycle)

Drove another vehicle (or motorcycle)

Got picked up in my own household's vehicle (or motorcycle)

Got picked up in another vehicle (or motorcycle)

Uber/Lyft, taxi, or car service

Bike share (e-bike)

Bike share (conventional bike)

Scooter share (e.g., Lime, Bird)

Personal bike or e-bike

Other personal micromobility (e.g., scooter, moped, skateboard)

Other

10.10 [MODE_OWN]

if mode or transit_access or transit_egress = HH vehicle

What vehicle did you use on this trip?

Select all that apply.

<HHvehicle1>

<HHvehicle2>

…

Other vehicle in household

Other motorcycle in household

10.11 [MODE_AUTO]

if mode or transit_access or transit_egress = other vehicle

What vehicle did you use on this trip?

Select all that apply.

Car from work *if employed full/part/self/volunteer*

Friend/relative/colleague's car

Rental car

Carpool match (e.g., Waze Carpool)

Carshare service (e.g., Zipcar)

Peer-to-peer car rental (e.g., Turo)

Other vehicle (not my household's)

Other motorcycle (not my household's)

10.12 [MODE_TAXI]

if mode or transit_access or transit_egress = taxi

What type of taxi or ride service did you use on this trip?

Select all that apply.

Regular taxi (e.g., Yellow Cab)

Uber, Lyft, or other smartphone-app ride service

Other hired car service (e.g., black car, limo)

10.13 [TNC_TYPE]

if mode_taxi = Uber/Lyft

What type of smartphone-app ride service did you use on this trip?

Pooled (e.g., UberPool, Lyft Shared)

Regular (e.g., UberX, UberXL, Lyft, LyftXL)

Premium (e.g., UberBlack, Lyft Lux)

Don't know

10.14 [MODE_BUS]

if mode or transit_access or transit_egress = bus

What bus did you use on this trip?

Select all that apply.

Local bus

Express/commuter bus

Rapid transit bus (BRT)

School bus *if adult student*

University/college shuttle/bus

Employer-provided shuttle/bus *if employed*

Other private shuttle/bus (e.g., a hotel's, an airport's)

Vanpool

Paratransit/Dial-A-Ride

Intercity bus (e.g., Greyhound)

Other bus

10.15 [MODE_RAIL]

if mode or transit_access or transit_egress = rail

What train/rail did you use on this trip?

Select all that apply.

- Subway
- Commuter rail
- Light rail
- Intercity rail (e.g., Amtrak)
- Cable car or streetcar
- Other rail

10.16 [MODE_BIKE]

if mode or transit_access or transit_egress = personal bike or e-bike

What bicycle did you use on this trip?

Select all that apply.

- Standard bicycle (my household's)
- Electric bicycle (my household's)
- Borrowed bicycle (e.g., a friend's)
- Other bicycle

10.17 [BIKE_PARK_LOC]

if mode = personal bike or e-bike

Where did you park the bicycle?

- Inside house/apartment (includes garage, porch, storage area)
- Bike rack
- Bike locker
- Secured bike room
- Locked to other object (e.g., post, tree)
- In a parking garage/ramp/lot
- Unlocked on-street
- Carried it with me
- Other

10.18 [MODE_MM]

if mode or transit_access or transit_egress = Bike share (e-bike) or Bike share (conventional bike) or Scooter share (e.g., Lime, Bird)

What scooter or bike share service did you use on this trip?

Select all that apply.

- Bird
- Lime
- Lyft, Nice Ride, Bay Wheels, or CoGo
- Spin
- Superpedestrian or LINK
- Other shared e-scooter service
- Other shared bike service

10.19 [MM_PARK_LOC]

if mode = Bike share (e-bike) or Bike share (conventional bike) or Scooter share (e.g., Lime, Bird)

Where did you park the shared bike or scooter?

- Bike/scooter rack
- Sidewalk/free-standing
- Adjacent to sidewalk
- Locked to other object (e.g., post, tree)
- Scooter-share designated parking area *if mode = scooter-share*
- Scooter-share designated docking station *if mode = scooter-share*
- In a parking garage/ramp/lot
- Other

10.20 [MM_REPLACE]

if mode or transit_access or transit_egress = Bike share (e-bike) or Bike share (conventional bike) or Scooter share (e.g., Lime, Bird)

Imagine shared bike and scooter services did not exist in the city. What mode would you have used for most of the distance on this trip?

None, I wouldn't have made the trip

Walk (or jog/wheelchair)

Household vehicle (or motorcycle)

Other motor vehicle (e.g., friend's car, rental, carshare, work car)

Taxi, ride-hail (e.g., Uber), or car service

Bus, shuttle, or vanpool

Rail (e.g., train, subway)

Personal bike or e-bike

Personal scooter, moped, or skateboard

Other

10.21 [MODE_OTHER]

if mode or transit_access or transit_egress = other

Which of the following did you use on this trip?

Select all that apply.

Airplane/helicopter

Vehicle ferry (took vehicle on board)

Other public ferry or water taxi

Other boat (e.g., kayak)

Golf cart

ATV

Snowmobile

Other

10.22 [MODE_OTHER_SPECIFY]

if mode_other = other

You selected 'other.' Please tell us more.

Text box entry

10.23 [HH_TRAVELERS]

if HH size > 1

Which household members traveled with you on this trip?

Please include anyone that started the trip with you and traveled with you.

Select all that apply.

- Just me
- <hh_member1>
- <hh_member2>
- …
- <hh_member13>

10.24 [NON_HH_TRAVELERS]

if HH size > 1:

How many other people (not in your household) were traveling specifically with you for the whole trip?

if HH size = 1:

How many other people were traveling specifically with you for the whole trip?

if mode is taxi/ride service or bus:

Please do NOT include taxi/bus drivers or passengers you know.

Please do NOT include anyone you met at your destination.

- 0
- 1
- 2
- 3
- 4
- 5+

10.25 [DRIVER]

if mode/transit_access/transit_egress = HH vehicle or other vehicle and (travel party = 2+ except if other travelers are household children under 16)

Were you the driver or passenger?

Driver

Passenger

Both (switched drivers during trip)

10.26 [CONFIRM_HOME]

if destination within 150m radius of reported home lat/lon

Did this trip end at home?

Yes

No

10.27 [CONFIRM_SECOND_HOME]

if destination within 150m radius of reported second home lat/lon

Did this trip end at a second home?

Yes

No

10.28 [CONFIRM_PRIMARY_WORK]

if destination within 150m of reported work lat/lon

Did this trip end at work?

Yes

No

10.29 [CONFIRM_PRIMARY_SCHOOL]

if destination within 150m of reported school lat/lon

Did this trip end at school?

Yes

No

10.30 [CONFIRM_DROPOFF_WORK]

if destination within 150m of other HH member's reported work (primary or secondary) lat/lon

It looks like you stopped at a household member's work.

What did you do at this stop?

- Pick someone up
- Drop someone off
- BOTH pick up AND drop off
- Accompany someone only (e.g., go along for the ride)
- Other activity at workplace only (e.g., attend meeting, pick-up or drop-off item)
- Went somewhere other than the workplace

10.31 [CONFIRM_DROPOFF_SCHOOL]

if destination within 150m of other HH member's reported school lat/lon

It looks like you stopped at a household member's school.

What did you do at the school?

- Pick someone up
- Drop someone off
- BOTH pick up AND drop off
- Accompany someone only (e.g., go along for the ride)
- Other activity at school only (e.g., attend meeting, pick-up or drop-off item)
- Went somewhere other than the school

10.32 [PURPOSE]

if not confirmed habitual location

For all trips except loop trips **Why did you make this stop?**

For loop trips only **Why did you make this trip?**

- Went home
- Went to work, work-related, volunteer-related *if employment = full/part/self/volunteer*
- Attended school/class *if student*
- Dined out, got coffee or take-out

Dropped off, picked up, or accompanied another person

Changed or transferred mode (e.g., waited for bus or exited bus)

Appointment, shopping, or errands (e.g., gas)

Social, religious, leisure, entertainment activity

Exercise or recreation (e.g., gym, jog, bike, walk dog)

Went to another residence (e.g., someone else's home, second home)

Went to temporary lodging (e.g., hotel, vacation rental)

Other reason *Programmers: Ask follow-up open-end on other*

10.33 [PURPOSE_WORK]

if purpose = work/work-related and destination is not reported work location

Why did you make this stop?

Went to primary workplace

Went to work-related activity (e.g., meeting, delivery, worksite)

Volunteering

Other work-related *Programmers: Ask follow-up open-end on other*

10.34 [PURPOSE_SCHOOL]

if purpose = school/class and destination is not reported school location

Why did you make this stop?

Attend daycare or preschool *if school_type = daycare or preschool*

Attend K-12 school *if school_type = K-12 school*

Attend college/university *if school_type = college/university or graduate/professional school*

Attend vocational education class *if school_type = vocational education*

Attend other type of class (e.g., cooking class) *Programmers: Ask follow-up open-end on other*

Attend other education-related activity (e.g., field trip) *Programmers: Ask follow-up open-end on other*

10.35 [PURPOSE_ERRAND]

if purpose = Appointment/shopping/errands

Why did you make this stop?

Grocery shopping

Other routine shopping (e.g., pharmacy)

Got gas

Medical visit (e.g., doctor, dentist)

Errand without appointment (e.g., post office)

Errand with appointment (e.g., haircut)

Shopping for major item (e.g., furniture, car)

Other *Programmers: Ask follow-up open-end on other*

10.36 [PURPOSE_LEISURE]

if purpose = Social/religious/leisure activity

Why did you make this stop?

Social activity (e.g., visit friends/relatives)

Family activity (e.g., watch child's game)

Leisure/entertainment/cultural (e.g., cinema, museum, park)

Religious/civic/volunteer activity

Other *Programmers: Ask follow-up open-end on other*

10.37 [PURPOSE_DROP]

if purpose = pick-up/drop off

Why did you make this stop?

Pick someone up

Drop someone off

BOTH pick up AND drop off

Accompany someone only (e.g., go along for the ride)

Other activity only (e.g., attend meeting, pick-up or drop-off item) *Programmers: Ask follow-up open-end on other*

10.38 [PURPOSE_OTHER]

if purpose = other on first or second level

Can you tell us more about why you made this stop?

Text box entry

Appendix B: AMP Post Travel Diary Survey

Start of Block: Introduction

Q1.1 Welcome to the follow-up survey of the American Micromobility Study being conducted by the University of California, Davis. Thank you for your participation in the rMove portion of this study. This is a one-time survey to collect additional information we could not collect in rMove.

Survey length...
It should take about 15 minutes to complete.

What you get...
You will receive a $5 Amazon gift card and entered into a drawing to win **one of ten** $250 additional Amazon gift cards. We will distribute these gift cards before October 15th, 2022. Additionally you will receive $5 in promotional micromobility ride credit from one operator (Lime, Spin, or Bird) of your choice at the end of this survey.

Eligibility
Everyone can be entered in the drawing regardless of participation. If you prefer not to participate in the survey but want to be included in the drawing, please email dtfitch@ucdavis.edu. Participation in research is completely voluntary. You are free to decline to take part in the project. You can decline to answer any questions and you can stop taking part in the project at any time. Whether or not you choose to participate, or answer any question, or stop participating in the project, there will be no penalty to you or loss of benefits to which you are otherwise entitled.

Questions...
If you have any questions about this research, please feel free to contact Dillon Fitch (dtfitch@ucdavis.edu)

End of Block: Introduction

Start of Block: MM user set

Q2.1 In this survey, "micromobility" is the term we use for both bike-share and scooter-share services.

Page Break

Q2.2 Have you ever used a micromobility service? Select all that apply.

- ☐ ⊗ I've never used a micromobility service
- ☐ I have used bike-share
- ☐ I have used scooter-share

Page Break

Q2.3 Do you have a disability or illness that affects your ability to travel?

- ○ Yes
- ○ No

Q2.4 What modes does your disability prevent you from using? Select all that apply.

- ☐ Walk
- ☐ Bike
- ☐ E-bike
- ☐ E-scooter
- ☐ Drive
- ☐ Use transit
- ☐ ⊗ Prefer not to answer

End of Block: MM user set

Start of Block: Transportation Experience and MM effect

Q3.1 When did you **first use** the following micromobility services?

	Less than 6 months ago	6 months to a year ago	1 to 2 years ago	More than 2 years ago
Bike-share	○	○	○	○
Scooter-share	○	○	○	○

Page Break

Q3.2 What type of micromobility service do you prefer to use?

- ○ Bike-share (Electric bikes)
- ○ Bike-share (Conventional bikes)
- ○ Scooter-share (E-scooters)
- ○ Other _____

Page Break

Q3.3 Why do you prefer to use bike-share? Select all that apply.

- [ ] I feel safer on a bike
- [ ] I have more fun on a bike
- [ ] Bikes are more comfortable than scooters
- [ ] Bikes are more available than scooters
- [ ] I can more easily carry things with me
- [ ] I can reach my destination faster
- [ ] Bikes are cheaper to rent than scooters
- [ ] Other: (please list)

_____

Page Break

Q3.4 Why do you prefer to use scooter-share? Select all that apply.

- [ ] I feel safer on a scooter
- [ ] I have more fun on a scooter
- [ ] Scooters are more available than bikes
- [ ] I can more easily carry things with me
- [ ] I can reach my destination faster
- [ ] Scooters are cheaper to rent than bikes
- [ ] Other: (please list)

_____

Page Break

Q3.5 How often (number of trips) do you typically use the following transportation modes?

By "trip" we mean anytime you travel more than 100 feet. Please include trips for any purpose (e.g., for leisure, exercise, to get to a destination, etc.).

	5+ trips a week	3-4 trips a week	1-2 trips a week	1-3 trips a month	Less than one trip a month	Never
Walk (or jog/wheelchair)	○	○	○	○	○	○
Household vehicle (or motorcycle)	○	○	○	○	○	○
Other vehicle (e.g., friend's car, rental, carshare, work car)	○	○	○	○	○	○
Personal bike or e-bike	○	○	○	○	○	○
Taxi, Uber/Lyft, or car service	○	○	○	○	○	○
Bus, shuttle, or vanpool	○	○	○	○	○	○
Rail (e.g., train, subway)	○	○	○	○	○	○
Bike-share	○	○	○	○	○	○
Scooter-share (e.g., Lime, Bird)	○	○	○	○	○	○
Carsharing services (e.g., Zip car, Car2go, Turo, etc.)	○	○	○	○	○	○
Other personal micromobility (e.g., scooter, moped, skateboard)	○	○	○	○	○	○

Page Break

Q3.6 How do you typically pay for public transit (bus/train)?

- ○ Pay using a transit card/pass (monthly subscription or pre-pay discounted tickets)
- ○ Pay per ride
- ○ Ride for free (e.g., Civil Servant, Disabled Veteran)
- ○ Other _____

Page Break

Q3.7 How do you typically pay for...?

	Pay per ride	Daily pass	Student-discounted membership	Other-discounted pass or membership	Non-discounted membership	Other
Bike-share	○	○	○	○	○	○
Scooter-share	○	○	○	○	○	○

Page Break

Q3.8 In the last 7 days, how many times did you...
Use **bike-share** : _____
Want to use **bike-share** but could not find an available bike nearby : _____
Total : _____

Page Break

Q3.9 In the last 7 days, how many times did you...
Use **scooter-share** : _____
Want to use **scooter-share** but could not find an available scooter nearby : _____
Total : _____

Page Break

Q3.10 How has your use of **bike-share** caused you to change your transportation options? Select all that apply, even if bike-share was only one of many reasons for the change.

My use of bike-share has caused me to…

- ☐ Sell a bike
- ☐ Buy a bike
- ☐ Sell an e-bike
- ☐ Buy an e-bike
- ☐ Sell an e-scooter
- ☐ Buy an e-scooter
- ☐ Purchase a transit pass
- ☐ Stop buying a transit pass
- ☐ Subscribe to a monthly service from Uber or Lyft
- ☐ Cancel a monthly service from Uber or Lyft
- ☐ ⊗ None of the above

Page Break

Q3.11 How has your use of **scooter-share** caused you to change your transportation options? Select all that apply, even if scooter-share was only one of many reasons for the change.

My use of scooter-share has caused me to…

- [ ] Sell a bike
- [ ] Buy a bike
- [ ] Sell an e-bike
- [ ] Buy an e-bike
- [ ] Sell an e-scooter
- [ ] Buy an e-scooter
- [ ] Purchase a transit pass
- [ ] Stop buying a transit pass
- [ ] Subscribe to a monthly service from Uber or Lyft
- [ ] Cancel a monthly service from Uber or Lyft
- [ ] ⊗ None of the above

Page Break

Q3.12 How has your use of **bike-share** caused you to change your car ownership? Select all that apply, even if bike-share was only one of many reasons for the change.

My use of bike-share has…

- ☐ Caused me to sell or get rid of a household vehicle
- ☐ Allowed me to not have to purchase a household vehicle
- ☐ Allowed me to delay the purchase of a household vehicle
- ☐ Caused me to buy or lease a household vehicle
- ☐ ⊗ Had no impact on my household's car ownership

Page Break

Q3.13 How has your use of **scooter-share** caused you to change your car ownership? Select all that apply, even if scooter-share was only one of many reasons for the change.

My use of scooter-share has …

- ☐ Caused me to sell or get rid of a household vehicle
- ☐ Allowed me to not have to purchase a household vehicle
- ☐ Allowed me to delay the purchase of a household vehicle
- ☐ Caused me to buy or lease a household vehicle
- ☐ ⊗ Had no impact on my household's car ownership

Page Break

Q3.14 How have you changed how much you use the following modes of transportation in the period of time since you first used micromobility?

	Much less often	Somewhat less often	Neither more nor less often	Somewhat more often	Much more often
Walk (or jog/wheelchair)	○	○	○	○	○
Household vehicle (or motorcycle)	○	○	○	○	○
Other vehicle (e.g., friend's car, rental, carshare, work car)	○	○	○	○	○
Personal bike or e-bike	○	○	○	○	○
Taxi, Uber/Lyft, or car service	○	○	○	○	○
Bus, shuttle, or vanpool	○	○	○	○	○
Rail (e.g., train, subway)	○	○	○	○	○
Carsharing services (e.g., zip car, Car2go, Turo, etc.)	○	○	○	○	○
Other personal micromobility (e.g., scooter, moped, skateboard)	○	○	○	○	○

Page Break

Q3.15 Considering your answers to the prior question, to what degree is your use of micromobility a reason for the changes in how much you use the following modes of transportation?

	Not a reason at all	Somewhat of a reason	A strong reason	The entire reason
Walk (or jog/wheelchair)	○	○	○	○
Household vehicle (or motorcycle)	○	○	○	○
Other vehicle (e.g., friend's car, rental, carshare, work car)	○	○	○	○
Personal bike or e-bike	○	○	○	○
Taxi, Uber/Lyft, or car service	○	○	○	○
Bus, shuttle, or vanpool	○	○	○	○
Rail (e.g., train, subway)	○	○	○	○
Carsharing services (e.g., zip car, Car2go, Turo, etc.)	○	○	○	○
Other personal micromobility (e.g., scooter, moped, skateboard)	○	○	○	○

Page Break

Q3.16 If you wanted to use **bike-share** for a 15 minute ride, how long would you be willing to walk to pick up a bike for the following purposes?

	Up to 2 minutes	Up to 5 minutes	Up to 10 minutes	Up to 15 minutes	More than 15 minutes	I don't use it for this purpose
A trip for recreation or exercise	○	○	○	○	○	○
A trip to a specific destination (e.g., work, a store)	○	○	○	○	○	○

Page Break

Q3.17 If you wanted to use **scooter-share** for a 15 minute ride, how long would you be willing to walk to pick up a scooter for the following purposes?

	Up to 2 minutes	Up to 5 minutes	Up to 10 minutes	Up to 15 minutes	More than 15 minutes	I don't use it for this purpose
A trip for recreation or exercise	○	○	○	○	○	○
A trip to a specific destination (e.g., work, a store)	○	○	○	○	○	○

End of Block: Transportation Experience and MM effect

Start of Block: Bike use

Q4.1 The following questions will help us understand the transportation options you have.

How many and what types of bicycle(s) are available to you (that your household owns or leases)?
Conventional bicycle : _____
Electric bicycle : _____
Cargo bicycle : _____
Electric cargo bicycle : _____
Folding bicycle : _____
Other type of bicycle : _____
Total : _____

Page Break

Q4.2 Which of the following personal travel devices are available to you (that your household owns or leases)? Select all that apply.

- ☐ Kick scooter
- ☐ E-scooter
- ☐ Moped
- ☐ Skateboard or rollerblades
- ☐ Electric skateboard
- ☐ Electric monowheel (e.g., One Wheel, Solo Wheel)
- ☐ Other _____
- ☐ ⊗ None of the above

End of Block: Bike use

Start of Block: COVID effect

Q5.1 How often did you use the following transportation modes before the COVID-19 pandemic?

	5+ trips a week	3-4 trips a week	1-2 trips a week	1-3 trips a month	Less than one trip a month	Never	No services were available
Bus	○	○	○	○	○	○	○
Rail (e.g., train, subway)	○	○	○	○	○	○	○
Bike-share	○	○	○	○	○	○	○
Scooter-share	○	○	○	○	○	○	○

Page Break

Q5.2 Did concerns about COVID-19 affect your use of public transit during the rMove travel period?

	Yes, it caused me to use less frequently	Yes, it caused me to use more frequently	No, it didn't affect my use
Bus	○	○	○
Rail (e.g., train, subway)	○	○	○

Page Break

Q5.3 Did concerns about COVID-19 affect your use of the following micromobility during the rMove travel period?

	Yes, it caused me to use less frequently	Yes, it caused me to use more frequently	No, it didn't affect my use
Bike-share	○	○	○
Scooter-share	○	○	○

End of Block: COVID effect

Start of Block: Physical Exercise

Q6.1 How has your use of micromobility changed how much you walk, bike, and scoot? Consider all the added travel you do to get to and from shared bikes and scooters and also the travel you *don't do* because of using shared bikes and scooters.

	I do this much less	I do this slightly less	No change	I do this slightly more	I do this much more
Walk or jogging	○	○	○	○	○
Bike (personal and shared)	○	○	○	○	○
Scoot (personal and shared e-scooting)	○	○	○	○	○

End of Block: Physical Exercise

Start of Block: Safety

Q7.1 Have you experienced any of the following incidents? Select all that apply.

	Hit by a scooter	Almost hit by a scooter	Hit by a bike	Almost hit by a bike	Hit by a motorized vehicle (e.g., car, truck, etc.)	Almost hit by a motorized vehicle (e.g., car, truck, etc.)	None
While walking, I was	☐	☐	☐	☐	☐	☐	☐
While riding a bike-share bike, I was	☐	☐	☐	☐	☐	☐	☐
While riding a scooter-share e-scooter, I was	☐	☐	☐	☐	☐	☐	☐

Page Break

Q7.2 Have you experienced any of the following incidents while riding a **scooter-share e-scooter**? Select all that apply.

	Walking	Bicycling	E-scooting	None
I hit someone who was	☐	☐	☐	☐
I almost hit someone who was	☐	☐	☐	☐

Page Break

Q7.3 Have you experienced any of the following incidents while riding a **bike-share bike**? Select all that apply.

	Walking	Bicycling	E-scooting	None
I hit someone who was	☐	☐	☐	☐
I almost hit someone who was	☐	☐	☐	☐

Page Break

Q7.4 How often do you almost crash while riding a **bike-share bike**?

- ○ More than half of my trips
- ○ Between one quarter and half of my trips
- ○ Less than one quarter of my trips
- ○ Never or almost never

Page Break

Q7.5 How often do you almost crash while riding a **scooter-share e-scooter**?

- ○ More than half of my trips
- ○ Between one quarter and half of my trips
- ○ Less than one quarter of my trips
- ○ Never or almost never

End of Block: Safety

Start of Block: Attitude/Importance

Q8.1 Please select the response that most closely represents your agreement or disagreement with the following statements…

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I like riding a bike	○	○	○	○	○
I like riding an e-scooter	○	○	○	○	○
I like using public transit	○	○	○	○	○
Public transit is just for people who can't afford a car	○	○	○	○	○
Many people I know regularly take public transit	○	○	○	○	○
I always think about ways in which I can reduce my impact on the environment	○	○	○	○	○
I like driving a car	○	○	○	○	○

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I need my car to do many of the things I like to do	○	○	○	○	○
I need my car to carry shopping or children	○	○	○	○	○
I try to limit my driving as much as possible	○	○	○	○	○
There are bicycle lanes and paths in the areas I need to travel	○	○	○	○	○
Many people I know bike regularly	○	○	○	○	○
Many people I know think I should bike	○	○	○	○	○
Many people I know think I should e-scoot regularly	○	○	○	○	○
I often think about how I travel in my city	○	○	○	○	○
I like to try new ways of traveling in my city	○	○	○	○	○
I tend to travel around my city habitually	○	○	○	○	○

Page Break

Q8.2 How important are the following factors to the choices you make about your daily travel?

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Concern for the environment	○	○	○	○	○
Concern for cost	○	○	○	○	○
Concern for safety from traffic	○	○	○	○	○
Concern for safety from crime	○	○	○	○	○
Concern for time	○	○	○	○	○
Desire to get exercise	○	○	○	○	○
Desire for enjoyment	○	○	○	○	○
Desire for convenience	○	○	○	○	○

Page Break

Q8.3 Please select the response that most closely represents your agreement or disagreement with the following statement…

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Scooter-share is unsafe	○	○	○	○	○
Bike-share is unsafe	○	○	○	○	○
Micromobility fits with my travel	○	○	○	○	○

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
patterns					
Scooter-share does not allow me to carry what I need while traveling	○	○	○	○	○
I am annoyed by people using micromobility	○	○	○	○	○
Using micromobility is hassle-free	○	○	○	○	○
Bike-share bikes are available when and where I need them	○	○	○	○	○
Scooter-share scooters are available when and where I need them	○	○	○	○	○
Bike-share is too costly	○	○	○	○	○
Scooter-share is too costly	○	○	○	○	○
I worry about crashing a bike-share bike	○	○	○	○	○
I worry about crashing a scooter-share e-scooter	○	○	○	○	○

Page Break

Q8.4 Please select the response that most closely represents your agreement or disagreement with the following statements about micromobility…

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Micromobility has enabled me to get to activities that I couldn't get to before	○	○	○	○	○
Micromobility has reduced the financial burden of travel for me	○	○	○	○	○
It is hard to find a place to park a bike-share bike	○	○	○	○	○
It is hard to find a place to park a scooter-share scooter	○	○	○	○	○
Riding a bike-share bike improves my mental health	○	○	○	○	○
Riding a scooter-share scooter improves my mental health	○	○	○	○	○
After riding a bike-share bike, I feel less stressed than I did before my trip	○	○	○	○	○

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
After riding a scooter-share scooter, I feel less stressed than I did before my trip	○	○	○	○	○
I feel relaxed while riding a bike-share bike	○	○	○	○	○
I feel relaxed while riding a scooter-share scooter	○	○	○	○	○

Page Break

Q8.5 During the time you recorded trips in your rMove travel period, how many days did you do the following?

	7+ days	3-6 days	1-2 days	Never
Decide to use micromobility while you were already traveling to your destination	○	○	○	○
Decide to use micromobility just before you started traveling to your destination	○	○	○	○
Planned ahead to use micromobility to connect to transit	○	○	○	○
Left your car at home for the day due to your planned use of micromobility	○	○	○	○
Changed where or when you traveled due to your use of micromobility	○	○	○	○

End of Block: Attitude/Importance

Start of Block: Individual characteristics

Q9.1 Almost done. Thank you for continuing this survey! It is important that we understand how the people in this study compare to the surrounding region.

What type of place is your current residence?

- ○ Single-family house (detached house)
- ○ Single-family house attached to one or more houses (rowhouse or townhouse)
- ○ Building with 2-4 units (duplexes, triplexes, quads)
- ○ Building with 5-49 apartments/condos
- ○ Building with 50 or more apartments/condos
- ○ Senior or age-restricted apartments/condos
- ○ Manufactured home/mobile home/trailer
- ○ Dorm, group quarters, or institutional housing
- ○ Apartment complex
- ○ Other (e.g., boat, RV, van) _____

Page Break

Q9.2 Do you own or rent?

- ○ Own outright
- ○ Own (paying a mortgage)
- ○ Rent
- ○ Provided by job or military
- ○ Provided by family, relative, or friend without payment or rent
- ○ Other _____
- ○ Prefer not to answer

Page Break

Q9.3 How often do you worry about paying your monthly bills?

- ○ Constantly
- ○ Most of the time
- ○ Sometimes
- ○ Never
- ○ Prefer not to answer

End of Block: Individual characteristics

Start of Block: Further communication

Q10.1 We would like to continue this study to examine how your transportation decisions change over time. Are you willing to be re-contacted between 1-3 years in the future for another short 15 minute survey? We will always compensate you for your time.

- ○ Yes, and please inform me about the results of this research (no more than annually)
- ○ Yes, but please do not bother me with results from this research
- ○ No, I do not wish to participate further

Page Break

Q10.2 Please select the other purposes for which we can contact you in the future.

	Yes	No
To receive awards for this survey	○	○
With questions about your responses to this survey	○	○
For other transportation studies	○	○

Page Break

Q10.3 We are providing a ride credit worth $5 for your survey participation. Please select the micromobility company you want the credit from.

- ○ Lime
- ○ Spin
- ○ Bird
- ○ None

End of Block: Further communication

Start of Block: End

JS

Q11.1 Thank you for participating! If you agreed to be re-contacted to receive awards we will email you with your $5 Amazon gift card and if you win additional raffle prizes before October 15th, 2022.

Please provide any feedback you have about your study experience (using rMove and this survey).

Page Break

JS

Q11.2 Thank you for participating!

Your Lime $5 ride credit code is **AMPSURVEY**

We will email you with your $5 Amazon gift card and if you win additional raffle prizes before October 15th, 2022.

Please provide any feedback you have about your study experience (using rMove and this survey).

Page Break

JS

Q11.3 Thank you for participating!

Your Spin $5 ride credit code is **SPINAMP**

We will email you with your $5 Amazon gift card and if you win additional raffle prizes before October 15th, 2022.

Please provide any feedback you have about your study experience (using rMove and this survey).

Page Break

JS

Q11.4 Thank you for participating!

Your Bird $5 ride credit code is **BIRDSURVEY**

We will email you with your $5 Amazon gift card and if you win additional raffle prizes before October 15th, 2022.

Please provide any feedback you have about your study experience (using rMove and this survey).

End of Block: End