

# THE MICRO-MOBILITY REVOLUTION: THE INTRODUCTION AND ADOPTION OF ELECTRIC SCOOTERS IN THE UNITED STATES



**A POPULUS RESEARCH REPORT**  
**JULY 2018**

**populus.ai**

# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY</b>	<b>3</b>
<b>INTRODUCTION</b>	<b>4</b>
<b>METHODOLOGY</b>	<b>7</b>
<b>THE RAPID ADOPTION OF ELECTRIC SCOOTERS IN U.S. METROS</b>	<b>8</b>
<b>PERCEPTIONS OF MICRO-MOBILITY</b>	<b>10</b>
<b>E-SCOOTERS MAY ATTRACT A MORE DIVERSE GROUP OF USERS</b>	<b>13</b>
<b>CONCLUSIONS</b>	<b>15</b>
<b>ABOUT POPULUS</b>	<b>17</b>

# EXECUTIVE SUMMARY

Since the introduction of private ride-hailing services (e.g., Uber, Lyft) in 2011 and 2012, the U.S. transportation ecosystem has seen a wave of significant investment in mobility services and solutions. In this report, we present new data and findings on the adoption and early perceptions of shared electric scooters (e-scooters), which have experienced a rapid rate of private investment, funding significant service launches in cities across the United States in 2017 and 2018.

Transportation planning and policymaking in the age of new mobility services is a challenging endeavor given the current pace of change. Over the past decade, there has been limited information and data on the adoption and use of new mobility services available to cities, making it ever more difficult for cities to develop appropriate policies and transportation plans. The goal of this report, and future publications, is to share new findings on the adoption, utilization, and impacts of private mobility services to help cities and private mobility companies work more effectively together for a safer, equitable, and efficient transportation future.

## KEY FINDINGS OF THIS STUDY

- Based on data from over 7,000 people in major U.S. cities, a majority of people (70%) view electric scooters positively: they expand transportation options, enable a car-free lifestyle, are a convenient replacement for short trips in a personal vehicle or ride-hailing service, and are a complement to public transit.
- Adoption rates of electric scooters and many mobility services are accelerating faster than ever, due in part to the continued proliferation of GPS-enabled smartphones and greater diversity of transportation options in cities.
- While prior station-based, non-electric bikeshare services have predominantly been used by men by a factor of 2x to 3x, this new study suggests that electric scooters may enjoy more support and adoption by women. If U.S. cities can harness this new wave of interest in micro-mobility to improve bike and scooter infrastructure, they might make progress on closing the active transportation gender gap and improve safety for everyone.
- This new data also suggests that dockless electric scooters may also enjoy higher adoption rates by lower-income groups and could potentially help cities make progress on equity goals.
- While a majority of people in San Francisco have a positive view of electric scooters (52%), San Francisco ranks lowest by a wide margin as compared with other cities - but it is an unusual outlier.

# INTRODUCTION

The U.S. transportation ecosystem has seen a significant wave of investment in private mobility services and solutions over the past decade, including ride-hailing services (e.g., Uber, Lyft), micro-transit (e.g., Chariot), mobility-as-a-service apps (e.g., Citymapper), and micro-mobility (e.g., bikeshare, scooter share). In this report, we provide an overview on the adoption of shared electric scooter services (e-scooters), a new mobility service that has experienced unprecedented investment and growth in a short period of time.

## A BRIEF HISTORY OF MICRO-MOBILITY IN THE U.S.

The introduction of e-scooters is part of a broader investment trend in “micro-mobility”: small, human- and electric-powered transportation solutions such as bikes, scooters, and mopeds. It is widely believed that as cities become more urban and streets more crowded, micro-mobility services could more effectively replace personal vehicle and ride-hailing trips, as well as deliver first- and last-mile solutions for public transit. In fact, our analysis of the most recent national transportation data indicates that over 45% of the trips made in the United States are 3 miles or less, and 78% of those trips are made by personal vehicle.

In late 2016 and early 2017, several new U.S.-based dockless bikeshare companies raised venture capital and began to launch services, including LimeBike (now Lime) and Spin. Concurrently, ofo and Mobike, China-based bikeshare companies (from the more mature Asian micro-mobility market) also launched in the United States.

In 2017, two established bikeshare companies that originally deployed station-based systems, Motivate and Social Bicycles (now JUMP Bikes), also began to explore alternative business models. It was recently announced in June 2018 that the ride-hailing company Lyft would acquire Motivate, which holds station-based contracts with several major U.S. cities including Washington, D.C., New York, Boston, Chicago, and the Bay Area. Earlier in 2018, Social Bicycles raised additional capital, rebranded as JUMP Bikes, and launched pedal-assist electric bikes with “lock-to” technology. They were shortly thereafter acquired by the ride-hailing giant Uber in April 2018.

In late 2017, a company called Bird raised significant funding to deploy shared electric scooters. The company first launched a fleet in Santa Monica, where they were based, and began to expand to other cities in early 2018. Given the similarities in business and operational models to bikeshare, several existing dockless bikeshare companies (e.g., Lime and Spin), also began to launch e-scooters in U.S. cities in the spring of 2018, including San Francisco, Washington, D.C. and Austin.

While there are a handful of companies that have previously launched dockless bikeshare or scooter-share fleets in U.S. cities, there is significant interest among many companies in the private mobility service space which are seeking to enter this rapidly growing market. For example, when San Francisco announced its plans to provide 5 companies with a permit to operate shared e-scooter services, they received 12 proposals (likely a far greater number than anticipated).

## **BUSINESS MODELS**

The majority of companies operating in the electric scooter market have similar business models. Dockless e-scooters or bikes are distributed across a city and potential riders use their smartphone to unlock and pay for a bike/ e-scooter using a mobile app. Users can also use the mobile app to determine where available e-scooters and bikes are located. Currently, e-scooter rates are typically a \$1.00 flat fee plus \$0.15 per minute.

The redistribution and charging of the bike or scooter fleets of early operators was typically managed centrally. For example, the majority of city-contracted Motivate bikeshare systems were originally re-allocated by a central operator. However, many legacy bikeshare systems (e.g., Citi Bike) and now dockless bike and scooter companies have recently launched cash or rewards programs to incentivize the charging and redistribution of the fleet by riders or through a gig economy model.

## **POLICY AND REGULATION**

Many cities are in the midst of developing policies and regulations for private dockless micro-mobility fleets that have been deployed or may arrive soon. We briefly highlight three of the primary goals that the majority of cities will focus policy and regulations on:

1. Ensuring safety: What policies should be enacted to ensure the safety of riders and others using public space (e.g., streets and sidewalks)? What transportation planning and design modifications are possible to promote the safety of those using shared and personal micro-mobility options and others in the public right of way?
2. Promoting equitable access to services: Are micro-mobility services accessible, and being utilized, by a broad segment of the population? If not, how can the city support expanding access to disadvantaged populations?
3. Evaluating impacts on traffic and sustainability: How do micro-mobility services fit into the broader transportation ecosystem? Are they reducing vehicle trips? How many micro-mobility vehicles can the residents of a city effectively utilize?

## DATA AND ANALYSIS

The need for the public sector to access data on the adoption and utilization of various private mobility services for policy and planning purposes is a critical issue that has been growing in importance over the past decade. Although the private investment and innovation that has fueled the rapid growth of shared mobility services presents an incredible opportunity for the public sector to rethink how people move in cities for the better, this outcome is only possible with better data.

In this report, Populus provides an overview of the most recent mobility service to arrive in U.S. cities: electric scooters. We provide new data and analysis on the adoption of electric scooters for cities and transportation professionals to begin evaluating how these services might evolve over time, and to help cities and regions develop strategies for how to most effectively integrate these new services into their broader short- and long-range transportation plans.

# METHODOLOGY

Populus Groundtruth provides the public sector and private industry with current, representative data on transportation decisions, including public transit use, vehicle ownership, and new mobility service adoption and utilization: ride-hailing, carsharing, bikesharing, and e-scooter sharing, among other topics. Our team of transportation PhDs from UC Berkeley and MIT has been measuring and modeling the adoption and utilization of new mobility services since 2013, shortly after Uber and Lyft first launched commercial service.

The findings in this report are based on data collection designed by transportation industry veterans who combine expertise in geospatial analysis of large datasets with established, rigorous approaches to travel demand analysis. The members of our team have developed travel forecasts and policy analysis for leading public agencies including the Federal Aviation Administration and the Metropolitan Transportation Commission (the San Francisco Bay Area regional transportation planning agency).

The results summarized here are based on representative sampling of the populations of the cities featured in this report. For the purposes of this analysis, we examined Populus data collected mid-May to mid-July 2018 from over 7,000 individuals. Based on our rigorous methods, key demographic variables (age, income, race, and gender) from this sample match those of the actual populations at the city level. The full data and population weights are available for additional analysis.

This report focuses on the adoption and perceptions of electric scooter-sharing. By providing unbiased, high quality data and analysis on private mobility service adoption and utilization, this report aims to serve as a resource for transportation planners, policymakers, and others in the transportation industry with a need for better data on the evolution of mobility services in cities.

# THE RAPID ADOPTION OF ELECTRIC SCOOTERS IN U.S. METROS

Although commercial shared electric scooter services have been available for less than 12 months in the U.S. market, the adoption of these services has grown at an unprecedented pace, mirroring the investment that they have attracted in venture capital. Figure 1 presents the adoption curves in major metropolitan areas for ride-hailing (i.e. Uber and Lyft), carsharing, bikesharing, and electric scooters (e-scooters) based on Populus 2018 Groundtruth data and the limited academic research available on these topics.

Prior data on traditional carsharing services (i.e. Zipcar) suggest that 2% to 3% of the population over the age of 18 in metropolitan areas were members of carsharing services in 2012 and 2013,<sup>1</sup> approximately 12 years after these companies launched commercial service. In comparison, e-scooter sharing has been available for less than 12 *months* (less than 5 months in most markets), and have already experienced an average adoption rate of 3.6% across major cities, as measured by the percentage of people who have ever used these services (Fig.1). There is significant variation by market.

Prior research on the rapid growth of ride-hailing services combined with this new analysis suggest that the adoption of new mobility services continues to accelerate. There are a couple of key factors that support a more rapid pace of adoption:

1. The widespread proliferation of GPS-enabled smartphones has made it possible for the majority of Americans to easily access smartphone-based mobility services. Smartphone adoption has risen from 35% in 2011 to 77% in 2018,<sup>2</sup> and is likely higher in the regions where we have focused our analysis.
2. Traffic congestion in most major U.S. cities continues to increase. In many urban areas, it is faster to travel short distances of 3 miles or less using an e-scooter or human-powered bike than driving a car or using a ride-hailing service.
3. The amount of private financing available for transportation services has grown dramatically, enabling private mobility service companies to deploy larger fleets in a much shorter period of time. Greater supply leads to more convenient access - which ultimately leads to faster adoption.

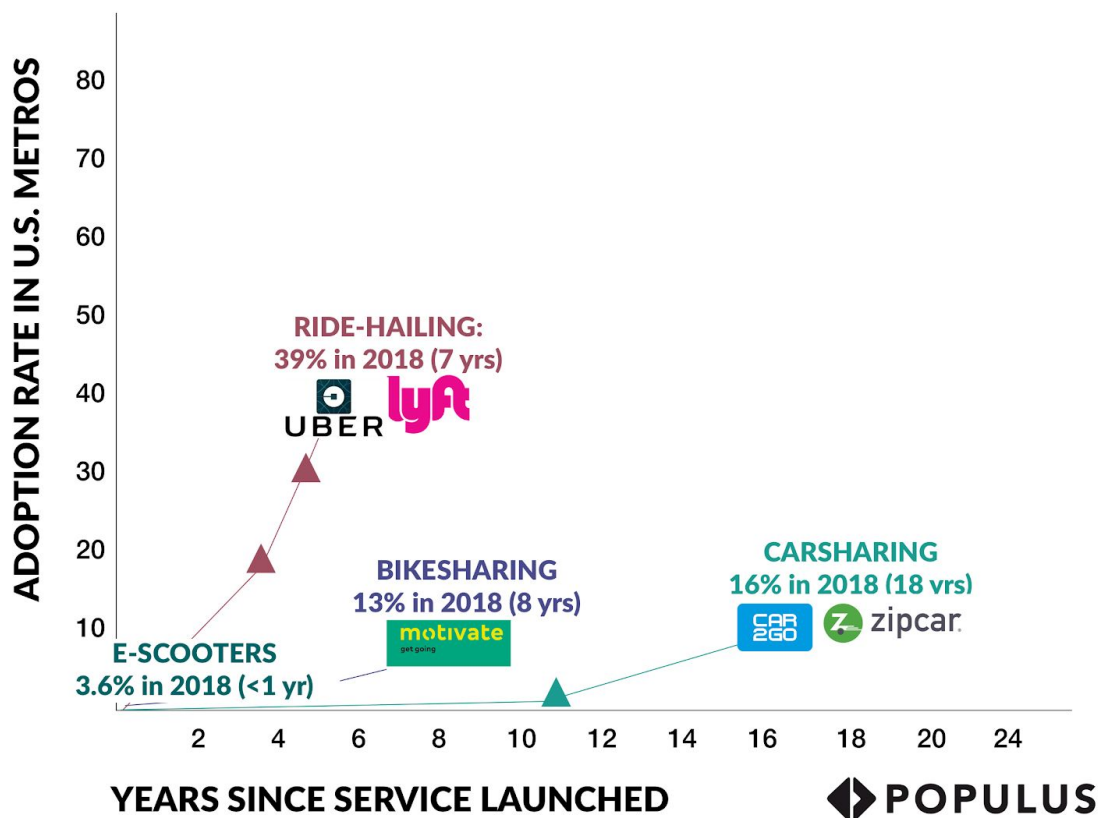
---

<sup>1</sup> Clewlow, R. R. (2016). Carsharing and sustainable travel behavior: Results from the San Francisco Bay Area. *Transport Policy*, 51, 158-164.

<sup>2</sup> Pew Research Center. (2018). Mobile Fact Sheet. <http://www.pewinternet.org/fact-sheet/mobile/>



**Fig 1. A COMPARISON OF MOBILITY SERVICE ADOPTION CURVES IN THE U.S.**



Sources: Populus Groundtruth; Clewlow & Mishra, 2017; Clewlow, 2016

Sources: Populus 2018 Groundtruth; Clewlow & Mishra, 2017; Clewlow, 2016

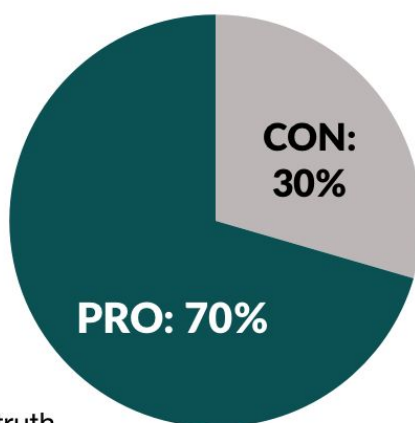
The relatively significant adoption of e-scooters in a short period of time suggests that they appeal to a fairly broad segment of the population. Given the physical abilities required to use micro-mobility services, it is possible that the total adoption of shared e-scooters (as a function of the entire population) will be smaller than what prior ride-hailing services have attracted. However, due to the significant portion of *trips* that are 3 miles or less (45% in the United States overall) and the relative affordability of micro-mobility services, there is evidence to suggest that the total *trips* made via micro-mobility services could potentially be nearly as large as the future ride-hailing market. This outcome could also be influenced by transportation policies and planning efforts such as expanding bike lanes and adopting congestion pricing to promote the efficient use of road space.

## PERCEPTIONS OF MICRO-MOBILITY

In the past few months, the introduction of e-scooters in cities has been met by a fairly even balance of positive and negative commentary in the media and by public officials. Viewpoints on the e-scooters typically range from consumers who report that they love riding them, to reports that they obstruct city sidewalks.

Little is actually known about how the general public perceives these new micro-mobility services or who is actually using them. This new data, based on statistically representative sampling of the population in 11 major U.S. cities, finds that on the whole, Americans overwhelmingly support these micro-mobility services (70%), although there is variation across regions, income groups, and other demographics as discussed in the next section.

**Fig 2. PUBLIC PERCEPTION OF MICRO-MOBILITY IN MAJOR U.S. CITIES**



Source: Populus 2018 Groundtruth



In the 11 major U.S. cities where data was collected, 70% of people view shared e-scooters as a way to get around without the hassle of owning a car, as a substitute for short driving trips, or as a complement to public transit (Fig. 2). While further data and analysis are needed to better understand the travel behavior decisions associated with electric scooters, given that they are relatively small devices (i.e. not cars), the question of whether or not they substitute for public transit trips or walking trips is somewhat irrelevant from an environmental or congestion perspective. However, cities will need to better understand how travel demand patterns are changing in order to efficiently plan and fund public infrastructure.

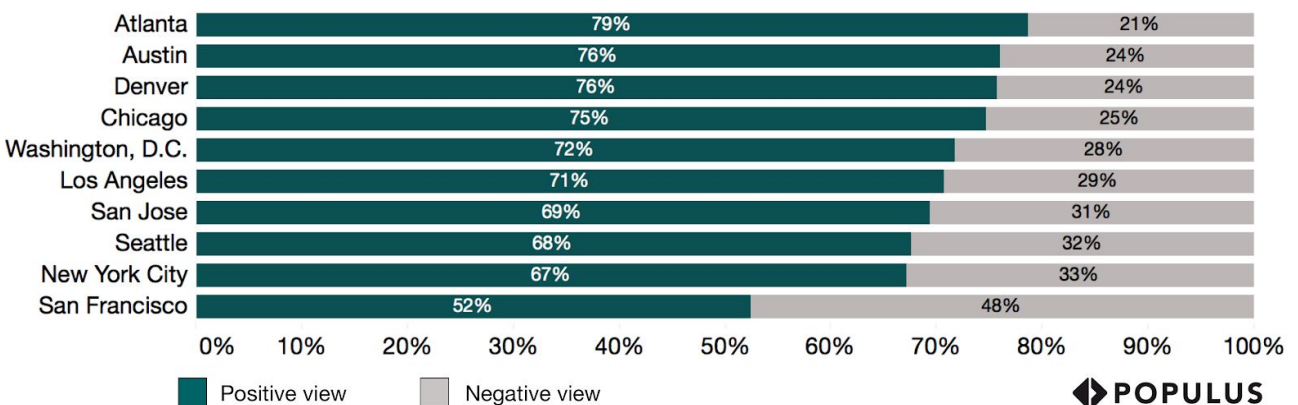
## SAN FRANCISCO IS AN UNUSUAL OUTLIER

Our data includes large samples from multiple cities, including ones where electric scooters had arrived by May 2018 as well as ones where they were not yet available, allowing us to conduct comparative analysis across regions. We found some variation in public opinion, adoption, and utilization across the cities in this study. Most notably, public support of e-scooters is unusually low in San Francisco as compared with other U.S. cities (Fig. 3).

Further data and analysis would be required to definitively determine why public sentiment is lower in San Francisco. However, we do still find that a majority of people (52%) view micro-mobility services as a positive contribution to the transportation system.

The key takeaway from this regional analysis based on broadly representative data across many cities is that San Francisco is an outlier. Given as such, the policies, regulation, utilization rates, and attitudes relating to electric scooters in San Francisco may not be appropriate or required in other cities.

**Fig 3. PUBLIC PERCEPTION OF E-SCOOTERS BY U.S. CITY**



Source: Populus 2018 Groundtruth

## SIDEWALKS, STREETS, AND THE ALLOCATION OF PUBLIC SPACE

We asked people to select their primary view of the new micro-mobility services that were distributed across cities and typically parked on sidewalks, including electric scooters. Only a small fraction expressed that the statement which *best reflected* their view was that the electric scooters or bikes obstruct their walking paths. While further research on this topic is needed as well as strategies to ensure the safety of pedestrians, we also note that research based on visual time of day data in New York have found that bike lanes have obstacles 40% of the time and bus lanes are blocked by other vehicles 57% of the time in some cities.<sup>3</sup>

As cities become more populated and the demands on public space continue to increase, it is important that the public sector develop policies to efficiently allocate space in a way that is equitable across modes, that can prioritize space and energy efficient alternatives, and that can promote safety for everyone.

When one considers the allocation of public space, one must put the potential allocation of space for new micro-mobility services in a broader context. Based on the most recent public data, San Francisco, a relatively small city with one of the lowest vehicle ownership rates in the country, has approximately 500,000 registered vehicles. The city has approximately 442,000 publicly-available parking spots, including 275,000 on-street parking spaces. In comparison, various e-scooter regulations across the country that have adopted fleet restrictions have set caps on the number of e-scooters at 150 (on the low end) to 3,000 per company (on the high end, or no cap at all).

Given ever increasing demands for streets and sidewalks, cities could consider evaluating a variety of metrics linked to public goals, including transportation equity and access, utilization rates, safety, and reliability, to determine whether and how to cap fleet sizes of new mobility services that require access to public space. This data suggests that public views on the latest wave of micro-mobility services could potentially provide cities with the support they need to rethink the use of public space to further safety, equity, and sustainability objectives.

---

<sup>3</sup> Anzilotti, E. 2018, March 21. AI And Open Data Show Just How Often Cars Block Bus and Bike Lanes. *Fast Company*.

## E-SCOOTERS MAY ATTRACT A MORE DIVERSE GROUP OF USERS

As significant research has demonstrated, closing the gender gap is related to improving bicycling infrastructure, which could increase the share of trips that are made by active transportation overall. Cities that have large bike mode shares always have parity between the number of men and women who use biking as a transportation option. A key reason: women are more sensitive to issues of personal safety.<sup>4,5</sup> Thus, the safer it is to use active transportation, the more women (and people overall) are willing to use lower-carbon, space-efficient transportation alternatives, such as biking and walking.<sup>6</sup> If we can design our streets so that women feel safe using micro-mobility services, research shows that everyone using active transportation will be safer.

Despite the growth of station-based bikesharing systems in cities across the U.S., there has not been a shift in the share of women who use bicycling as a transportation mode. Based on analysis of our 2018 data, 12% of women have used station-based bikeshare services, as compared with nearly double the rate for men (21%). Our analysis of U.S. station-based bikeshare system data also shows that 25% of all trips are made by women and 75% of trips by men. This is not the fault of these systems per se, but rather reflects the broader need to invest in better cycling infrastructure.

While it is still early in the growth of electric scooter-sharing services, our representative data across U.S. cities finds that the gender gap may be smaller for newer, micro-mobility services than for prior bikeshare services: 3.2% of women thus far have tried electric scooters, and 4.4% of men (Fig. 4).

We offer a few theories as to why women appear to be more open to using electric scooters:

1. Women may feel safer on electric scooters because they are smaller and are more easily ridden on sidewalks. While this is not where most cities want people to ride them, this behavior points to the core problem: women (and likely other people, including older individuals) simply do not feel safe riding bikes or scooters on the street.

---

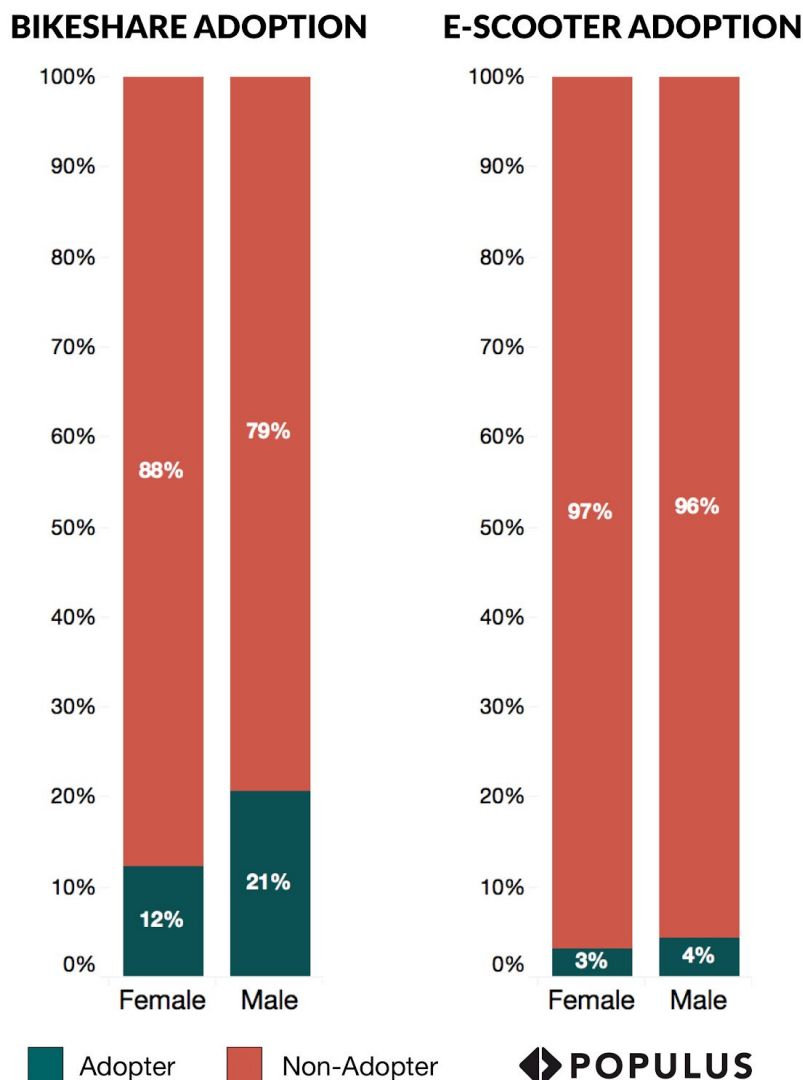
<sup>4</sup> Akar, G., Fischer, N., & Namgung, M. (2013). Bicycling choice and gender case study: The Ohio State University. *International Journal of Sustainable Transportation*, 7(5), 347-365.

<sup>5</sup> Garrard, J., Rose, G., & Lo, S. K. (2008). Promoting transportation cycling for women: the role of bicycle infrastructure. *Preventive medicine*, 46(1), 55-59.

<sup>6</sup> Pucher, J., & Buehler, R. (2008). Cycling for everyone: lessons from Europe. *Transportation research record*, 2074(1), 58-65.

2. Women are more likely to wear clothing (i.e. skirts or dresses) that make it easier to stand on a scooter versus a bicycle. Previous academic research has shown that one's attire influences the decision of whether or not to bike.<sup>7</sup>
3. Women are also more distance-sensitive, and are less likely to bike longer distances.<sup>9</sup> Both electric bikes and electric scooters enable everyone to travel greater distances more easily.

**Fig 4. ADOPTION OF MICRO-MOBILITY SERVICES BY GENDER**

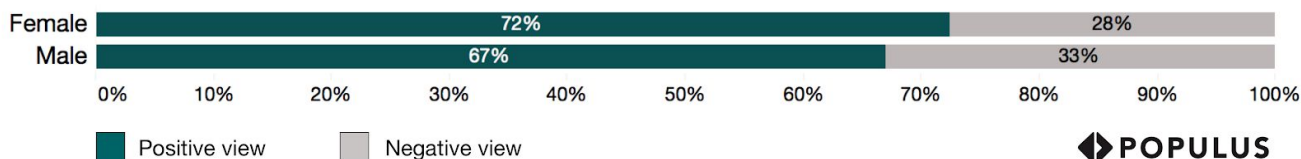


Source: Populus 2018 Groundtruth

<sup>7</sup> Heinen, E., Maat, K., & Van Wee, B. (2011). Day-to-day choice to commute or not by bicycle. *Transportation Research Record: Journal of the Transportation Research Board*, (2230), 9-18.

Consistent with electric scooter adoption data, we also find that slightly more women have a positive view of electric scooters than men (see Figure 5). This early data on e-scooters provides evidence that newer, micro-mobility services might achieve greater gender parity than previous station-based bikeshare systems have, provided cities can expand safer infrastructure for biking and mobility services. If successful, they could promote growth in the utilization of station-based services as well.

**Fig 5. OPINIONS OF E-SCOOTERS BY GENDER**

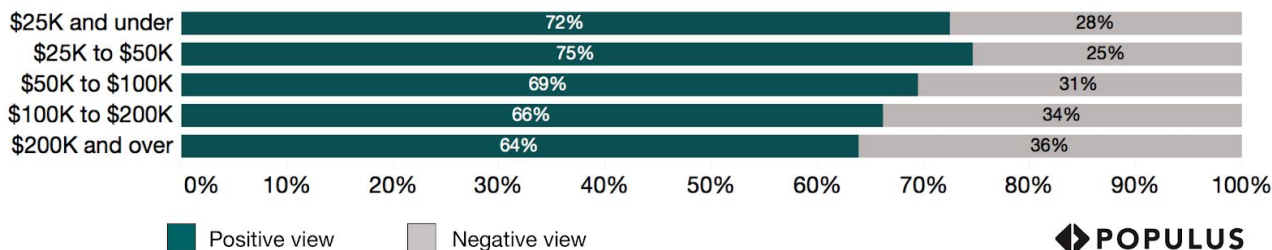


Source: Populus 2018 Groundtruth

## SUPPORTING TRANSPORTATION EQUITY

In an age where private mobility services have expanded quickly, many cities are concerned about meeting transportation equity goals. Prior station-based bikesharing systems were criticized in some cities for disproportionately establishing stations in wealthier communities, with limited accessibility in low-income and minority neighborhoods. Our initial findings on electric scooters indicate that public support for micro-mobility services is higher among lower income groups (Fig. 6).

**Fig 6. PUBLIC PERCEPTION OF E-SCOOTERS BY INCOME**



Source: Populus 2018 Groundtruth

Given the minimal infrastructure required for dockless shared electric bikes or scooters, many cities now look to newer micro-mobility services as a potential opportunity to improve transportation equity. Our initial data suggest that low-income communities have a positive view of these services.

# CONCLUSIONS

The explosion of electric scooter services in the United States in 2018 took many by surprise - both in the public and private sectors. While many cities are working to determine how to develop policies and frameworks for managing this latest wave of transportation innovation, this study presents independent analysis on the adoption and perceptions of electric scooters to help guide mobility strategies.

Without data, the public sector will struggle to craft effective transportation policies and plans that can help them achieve their goals of safety, equity, and efficiency as new private mobility technologies continue to evolve. However, with cooperation and access to data for monitoring progress towards public goals, cities have the opportunity to harness new private investments in mobility for a better transportation future.

## KEY TAKEAWAYS

**The adoption of new mobility services is accelerating and becoming ubiquitous. Cities must plan for them.** Adoption of electric scooters has grown rapidly, mirroring a broader trend in the acceleration of mobility services accessible through GPS-enabled smartphones.

Electric scooters, which have been available for only a short period of time, already enjoy a healthy adoption rate and may continue to grow. Cities should develop mobility strategies to more effectively integrate new services into the broader transportation ecosystem, while harnessing anonymized mobility data that can help them measure progress towards public goals.

**Micro-mobility services could provide cities with the public support they need to develop better active transportation infrastructure.** People in cities have an overwhelmingly positive (70%) view of micro-mobility, considering them a great alternative to owning a person vehicle or making short trips that they would normally make in a car (their own or a ride-hailing service).

Furthermore, there is currently greater gender parity for e-scooter services than bikesharing. Globally, it is well known that cities which design active transportation infrastructure that women feel safe using is safer for everyone, and can facilitate the adoption of active transportation options which are more space and energy efficient. Transportation planners and policymakers could harness this latest wave of innovation to bring much-needed improvements to city design in the United States.



## ABOUT POPULUS

Populus delivers current data on how people move in cities to key stakeholders who shape our transportation systems. With roots at MIT, UC Berkeley, and Stanford, our team of leading experts has built advanced models to simulate the current state of, and future of transportation for local and federal public transportation agencies. We aim to transform urban transportation through better data to facilitate a safe, equitable, and efficient transition to the future of mobility. Populus is based in San Francisco, California.

## CONTACT

For more information about how to access the data featured in this report, please visit our website at:

[www.populus.ai](http://www.populus.ai)

If you have further questions, members of our team may also be reached at:

[contact@populus.ai](mailto:contact@populus.ai)



Charts and graphs extracted from this report must be accompanied by a statement identifying Populus as the publisher and the study from which it originated as the source.

© 2018 Populus Technologies, Inc. All rights reserved.

**populus.ai**