INTRODUCTION

E-scooters' introduction to the world was far from productive or welcome. First appearing in 2018, the world's cities that were subjected to what amounted to product dumping were ill-prepared for the problems or ire that they created.[1] Owned and operated by private companies who worked independently of local governments, several cities opted to ban e-scooters due to myriad public safety and accessibility concerns. These bans, compounded by the early days of the COVID-19 pandemic, proved to negatively impact e-scooters and micromobility options in general. However, studies show that the usage of e-bikes and scooters increased throughout the pandemic as some cities that experienced a reduction in public transit services observed a rise in micromobility usage, availability expanded beyond the world's largest metropolises, and cities imposed regulatory environments.[2] As of July 2022, the US Bureau of Transportation Statistics data show that, excluding university- and employer-specific campus systems, 300 e-scooter systems were operating across the United States.[3] E-scooter systems have become more ubiquitous compared to dockless bikeshare, serving 158 cities vs. 35, respectively.[4] With a global initiative to reduce car dependency and a belief that micromobility may bring mobility equity to marginalized communities, many cities across the nation have adopted E-scooter pilot programs to assess the efficacy of the scooters in their respective communities. This blog analyzes e-scooter pilot programs in four cities, discusses patterns that emerged from the data, and compares these observations to Pittsburgh's own pilot. We then offer considerations for more effective applications should policymakers decide to continue to allow for-hire e-scooter systems to operate in Pittsburgh.

METHODOLOGY

Mobilify analyzed existing pilot programs in Baltimore, Seattle, Tampa, and Oakland, CA, because they provided extensive demographic data, with Baltimore and Seattle specifically being selected due to their equity emphasis. The main questions we wanted to explore were:

1) What is the racial, age, and gender representation among scooter users in each city?
2) How do these e-scooter representation metrics compare to their respective city's profile?
3) What types of trips were being taken?
4) What modes was e-scooter usage detracting from and why?
5) What did users have to say about e-scooter usage benefits and problems?

We then compared this data – especially Seattle's and Baltimore's - to Pittsburgh current program due to their intentional focus on mobility equity. Finally, we provide a subsection in the findings to discuss the Seattle and Baltimore equity programs in a little more detail.

[1] San Francisco's Scooter War: City Hits Back as 'Unlawful' Schemes Flood Streets. The Guardian, August 17, 2018. Retrieved April 19, 2023.
[2] National League of Cities. (2020). Micromobility in Cities: The Current Landscape.
[3] *Bikeshare and e-scooters in the U.S.* Bureau of Transportation Statistics. (2022, August 17). Retrieved April 10, 2023, from https://data.bts.gov/stories/s/fwcs-jprj
[4] Ibid

A word about the data

Data collection and presentation differed slightly across all cities. For example, Seattle's survey respondents could select more than one racial identity, resulting in a total racial makeup of Seattle scooter users greater than 100% in Figure 2. Baltimore used different age categories from other cities, and Tampa either did not collect or chose not to disclose user age data.

Finally, it must be noted that the data from all five cities is almost exclusively self-reporting survey data from e-scooter riders. Collection methodologies are also far from standardized across the cities. It is a far from perfect approach to evaluating the efficacy of any program. Mobilify recognizes that unscientific collection yields unscientific results, and readers should recognize this when considering our findings and discussion. Regardless, broad patterns did emerge that are worth exploring, which we discuss in the findings below.

FINDINGS

Age

Figure 1 displays the reported scooter usage age distribution among the four cities reporting age data. Overall, survey results show that e-scooters tend to attract a younger user cohort. Most survey responders in Oakland, Seattle, Baltimore, and Pittsburgh reported between the ages of 17 and 44. Although survey reporting methods differ slightly across cities, most Baltimore, Seattle, and Oakland users fall within the ages of 25-34 (25-39 in Baltimore). This is slightly different in Pittsburgh, where nearly half of all scooter users fall within the ages of 18-24, which may be attributed to over 40% of its users being students. Contrarily, 30% of Baltimore survey respondents users fall within the ages of 40-54, which is notably higher than that of users within this age range in the other 3 cities. As stated prior, Tampa's evaluation did not collect or disclose user age data.

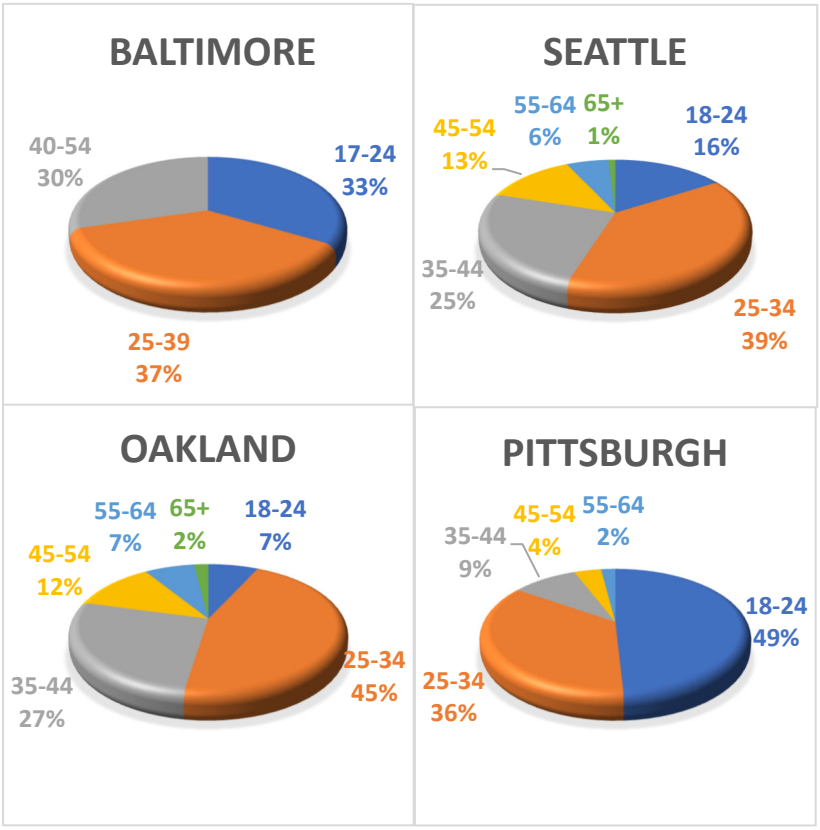

Figure 1
Age Distribution of Scooter Users by City

Race

Figure 2 displays the racial composition of scooter survey respondents vs. their respective city's, while Figure 3 illustrates Pittsburgh-specific comparisons. In every city but Baltimore, most users were white and male. Oakland and Tampa white e-scooter users were highly overrepresented, and BIPOC users highly underrepresented, vis-à-vis their respective cities' racial composition. Latino/a/x and Black rider representation was up to 50% and 80%, respectively, below their overall representation in these two cities. Black e-scooter representation in Baltimore was also one-third that of the city's population share, but, along with Pittsburgh, was the only one of the 5 cities reporting racial data where Black usage was over 20% of the total usage. Also in Pittsburgh, the reported racial composition of survey responders closely mirrors the city with only Seattle coming close to mirroring this pattern.

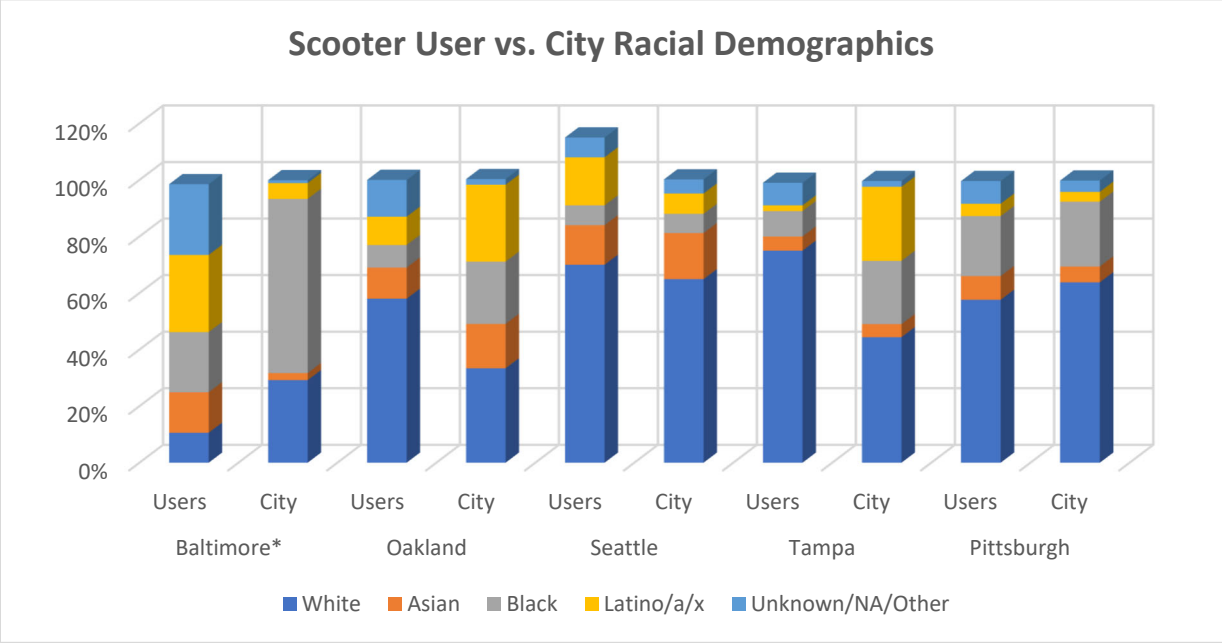

Figure 2:
Scooter racial backgrounds compared to host city's racial demographics. Note that Baltimore ridership data is from the everyday user cohort and that Seattle allowed survey respondents to select more than one identifies, hence a total greater than 100%

Baltimore's other minority representation, however, was close to five times above their respective citywide representation; despite 2.5% Asian and 5.6% Latino/a/x representation citywide, 14% and 27% of daily-user Baltimore survey respondents identified as Asian and Hispanic, respectively (displayed in Figure 2). Also, the average percentage of usage in Oakland, Tampa, and Seattle is highest within the race that is most represented in their respective cities (white), while this is not the case in Baltimore, where only 21% of everyday users identify as Black when 61.6% of the city's racial demographic is Black.

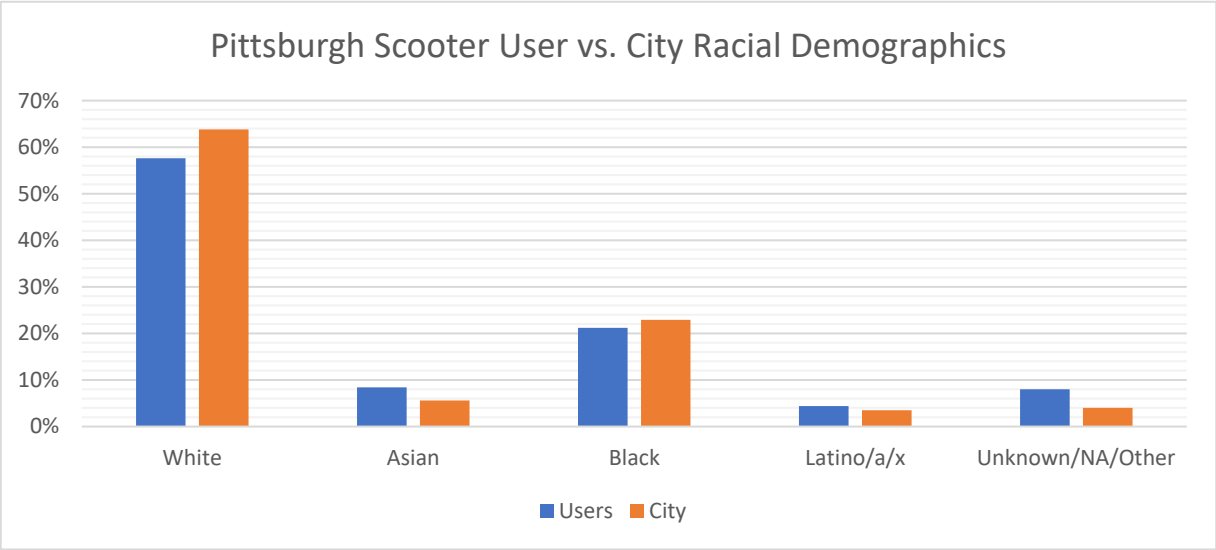

Figure 3:
Pittsburgh scooter users compared to the city's racial demographic.

Trip Purpose and Mode Shift

Most survey respondents reported their typical trip length to be less than 1.5 miles. With the exception of cities with formal equity programs – Seattle and Baltimore – personal trips and recreational usage dominated e-scooter trip types. Baltimore is unique with close to 38% of all trips being for work. Seattle and Pittsburgh followed Baltimore with 22% and 21.5%, respectively of trips being for work, then Tampa at 10%. Other primary Pittsburgh purposes included social engagements (26%), followed by commuting (21.5%) and recreation (19.5%).[5] Oakland's survey reporting format hindered our ability to identify trip purpose. The primary reason was that scooters were seen as the fastest way to travel.

Mode shift away from automobiles was significantly impacted across all cities, with respondents stating that scooters displaced between 24% (Seattle) to 45% (Tampa) of their car trips. Scooters detracted significantly from car usage in Pittsburgh, as 35.7% say they would have opted to use personal vehicles alternatively. All cities but Tampa reported that scooters may also have displaced ride-hail – i.e., Lyft/Uber and taxi – trips by between 30% (Seattle) and 51% (Baltimore), with Pittsburgh at 9%. However, scooters appear to have also adversely impacted modes equated with sustainability, equity, and community. In Oakland and Seattle, 40.97% and 56% of survey responders stated that the scooter trip replaced walking. Baltimore respondents stated that 16% of bike trips were displaced by scooters. 20% of transit trips in Seattle and Baltimore, respectively, were replaced by scooters. Baltimore respondents stated primary purpose for using the scooter was trip time: over 73% of daily users felt that it was the fastest way to travel. In Pittsburgh, survey responders stated that 29% of scooter trips displaced a walking trip, and 16% a transit trip.

[5] Move PGH; City of Pittsburgh Department of Mobility & Infrastructure. (2022). Move PGH Mid-Pilot Report. Pittsburgh.

Conflicts & Complaints

One of the prominent complaints documented across all cities pertained to the usage of scooters on sidewalks and conflicts and collisions with pedestrians. In Tampa, 76% of pedestrians feel unsafe when scooters are ridden on sidewalks and 79.5% of drivers feel unsafe when they are ridden on street lanes.[6] Baltimore's scooter riders reported that those who ride exclusively on sidewalks are more likely to experience crashes and close calls.[7] While Baltimore and Tampa data show that there is a correlation between riding scooters on sidewalks and crashes, neither city has adopted policies to manage where scooters are used. Seattle DOT, however, banned the usage of e-scooters on sidewalks and observed a reduction in obstructions in the third quarter of their pilot compared to the first, going from 21% to 8%.[8] Furthermore, Pittsburgh noted a strong correlation between high scooter usage routes and the availability of bike infrastructure. Banning scooters from sidewalks is a consistent solution across all cities as Baltimore and Tampa offer this recommendation in their reports.

Equity Intentionality: Seattle and Baltimore

Although every sample city offered discounted rides for qualified applicants, Baltimore and Seattle had more intentional equity programs. Both cities offered equity permits that low-income users could take advantage of and had designated equity zones/neighborhoods where their respective Departments of Transportation mandated deployment and outreach across the city and to specific locations. These efforts seemed to be more rewarding in Baltimore as weekly equity zone ridership increased during the program,

Baltimore	Seattle
1. Equity Plans- Each permit holder is required to provide a low income, a non-smartphone, and a cash-based plan. Permit holders are allowed to set the specifics of their plans, with BCDOT's approval. 2. Equity Zones- BCDOT mandates equitable deployment and outreach—vehicles must be equitably deployed each morning across the city and to specific locations; outreach events must be hosted in locations across the city.	1. SDOT requires vendors to deploy at least 10% of their devices in equity focus neighborhoods. 2. SDOT uses program funds to support Equity-focused outreach and engagement efforts in equity focus communities. 3. SDOT requires vendors to offer reduced fare plans for qualified low-income users, capped at $1.50 per hour. 4. SDOT requires vendors to offer translated materials about available programs.

Figure 4: Equity policies in Baltimore and Seattle

[6] Zhang, Y., Aung, S. T., Guo, Y., & Jackman, J. (n.d.). Performance Evaluation of E-scooter Sharing in the City of Tampa. Tampa; University of South Florida.
[7] Baltimore County Department of Transportation. (2020, May). Baltimore City Dockless Vehicle Pilot Program Annual Evaluation Report. Baltimore.
[8] Edmonds, B., Harber, O., Dawes, M., Sutphin, A., & Rula, K. (2022, March). Seattle Department of Transportation E-scooter Share Pilot Evaluation. Seattle; Seattle Department of Transportation.

even in the early stages of the pandemic.

While Seattle deployed an average of 15.5% of their scooters to equity focus neighborhoods, only 9% of trips started and ended in these neighborhoods[9] which could be attributed to the 500 scooters being deployed in these neighborhoods for the duration of the pilot program, which is only 10% of the scooter deployment in the most used zones.

When converting their dockless vehicle pilot into a program, Baltimore made some changes to mitigate availability inequities observed during the pilot. BCDOT designated the entire city as a service zone, mandated that zones must be rebalanced if 35% or more of scooters are in a zone at any point of the day, and allocated 3 vehicles per provider to each of their 20 equity zones.[10] As a result, there was a less pronounced concentration of scooters in each zone, leading to greater coverage across the city. The previously underserved regions (Northwest and Northeast) still averaged lower deployment rates than the city, but the deployment percentage in these zones grew from 2% to 5% after the changes.

Pittsburgh required Spin to deploy a certain percentage of their fleet in areas identified as having a higher need for micromobility availability, possibly correlating with 7% of Spin users reported using an e-scooter to connect to Transit (which is upwards of 40,000 trips).

DISCUSSION & CONSIDERATIONS

When deciding whether e-scooters have been "successful," what problem we hope to successfully address needs to be defined. This may seem obvious. But so often in transportation, the fascination with the new technology drives a political inertia and narrative that that technology will solve far more problems than it's capable of. This mindset isn't unique to scooters; TNCs, microtransit, AVs, EVs, and more all fall prey to this notion. Well-meaning or not, such a mindset immediately sets up conflict between skeptics and promoters, leading to failure and mistrust even if something good emerges. There is no transportation panacea and, especially with something new like e-scooters, deployment and evolution could be doomed before given a chance to prove itself.

If the questions are simply, "will people use for transportation purposes, and will they supplant car trips?" then scooters have succeeded. If we are asking, "are they helping people who otherwise have unworkable transportation solutions – especially our most vulnerable residents?" that answer is more nuanced. We attempt to address this below:

Defining Usage

With the limitations associated with this micromobility option, e-scooters seem to be plausible for select trip types, particularly as a first/last-mile option when nothing other than a privately-owned mode or one's own feet are capable but less desirous. The farther the trip, however, the seemingly less viable; e-scooters do not seem attractive for users facing 30 mins+ trips, for example, regardless of trip type or economic attainment. Cost may be the key driver, but there can be many additional reasons for this.

[9] Ibid
[10] Ibid (Baltimore County Department of Transportation)

Therefore, thinking of these vehicles as a replacement for public transit, or anything else, in certain situations and then judging them by that metric seems overreaching.

The cities we surveyed have demonstrated that, for able-bodied individuals, scooters can be one part of a mobility equity solution. However, this only happens with sustained intentionality. For example, defining equity zones and deploying a sizable fleet to neighborhoods that classify as transit deserts, and complementing that with true community engagement and workable payment methods that don't rely on modern cell phones or robust data plans. Furthermore, the ability for e-scooters to connect users to public transit is dependent on the effectiveness of existing public transit systems, which must be accounted for when considering improvements to the e-scooter model. Doing so, combined with favorable scooter – and bike – infrastructure, can be advantageous for users who need better connections to public transit and would give e-scooters a clearly defined use and necessity. Nonetheless, using e-scooters to connect users in transit deserts to public transit may not be the best means of usage in every city; cities must analyze usage patterns in their communities to determine which gap/need the scooters efficiently address.

Ultimately, however, we cannot allow scooters to distract us from the much larger, more complicated improvements to the modes that have long been documented as the primary mode of transportation in underserved communities, which is usually public transit and walking. While scooters have proven to be more useful for younger and abled populations, whom by no means should be neglected when considering target audiences for usage, applying this micromobility option to address gaps in the transportation ecosystem will take more intentionality in the implementation of each mode and more collaboration among their respective governing departments to yield desired results. The hardships that post-use abandonment have brought to the physically disabled cannot be understated and should not be ignored. Thus, the needs of those who are most reliant on non-automotive transportation must be prioritized when introducing new modes. Otherwise, we are working against, rather than toward, achieving mobility equity goals.

Physical Infrastructure

While fighting over who gets to use which part of the road distracts us from the real issue, some serious thought needs to be put towards creating/designating infrastructure that best suits e-scooters. Nearly every city reported problems with scooters riding on sidewalks and encountering – or even crashing into – pedestrians. Many in Pittsburgh have also highlighted how scooters impact the ability for people with disabilities to cross intersections, board buses, or generally make their way through a neighborhood. This may be due to several factors including lack of safe infrastructure, as users strongly preferred riding in bike lanes, or a shortage of designated parking areas, for example. Placing highly visible, designated parking areas in various locations across the city – particularly in high-destination areas - can mitigate post-use abandonment and mitigate many accessibility conflicts. Geofencing could curtail sidewalk riding and users could be penalized for abandoning their scooters on sidewalks or on curb cuts at the end of their trips. It should also accelerate implementation of its Bike(+) plan, which was designed to deal with new modes such as scooters while improving bikeability and walkability. Finally, as the City works to fix this problem, it should also take on the sidewalk obstruction crisis created by something much bigger: cars.

Further Considerations

When evaluating adverse impacts on modes like transit, we need to consider which trip is being taken away – or would not have happened – and why. This is not an easy question to answer. Baltimore, Pittsburgh, and Seattle scooter users reported that scooters replaced 20.8%, 16.4%, and 22% of their former transit trips, respectively. But what type of transit trip may have been supplanted? Was it during rush-hour when US transit is typically more plentiful? Was it an off-hours trip where transit is less available and reliable and therefore seen as riskier and the user feared losing their job for being late to work? Did their trip require a transfer and they therefore eliminated one leg of the transit trip? What impact did pandemic service curtailment have on their decision-making? Did transit service degrade in some way because of the loss of these riders and, more importantly, would more service be available if more people got on transit since US systems are rarely rewarded for higher ridership?

We Need Better Data

At the beginning, we made it a point to highlight the issues with data as it has been collected. A recent Journal of Nature report perhaps best sums up the issue:

"Causal evidence of the impacts of micromobility on urban sustainability outcomes has, to date, been relatively weak, relying on self-reported usage data from survey questionnaires, which is subject to hypothetical, hindsight or recency bias. Other evidence on travel mode choice has typically relied on simulations from smaller datasets, which present modelling challenges related to population sampling and endogeneity concerns. As a result, behavioural evidence on whether micromobility adoption displaces cars has generated contradictory claims."[11]

While we can never have perfect data and should guard against that stymieing new ideas, the entire e-mobility cost/benefits discourse is informed more with conjecture and will than hard numbers. We need to do better to have a richer discussion develop real solutions, and to re-establish trust.

A Way Forward

Finally, we must break the paternalistic cycle that heralds new transportation tech and imposes it on communities – particularly our most marginalized neighbors – as though it will solve all our problems. The problem is not necessarily the technology itself, but that technology is created and deployed by people. If decisionmakers believe that something like an e-scooter could solve problems, bring it to the people and have a discussion. Define the use case. Define the drawbacks. Manage expectations. Pay attention to the parts of the rest of the transportation system that have been long neglected, too often by a fascinated distraction with the newest way to get around. Pittsburgh had the benefit of learning from the early scooter-dumping fiascos of San Francisco, Paris, and others, and the program's thoughtfulness has improved over the past year, but the community must be included – not simply engaged – in the formulation of any project and its goals. Going forward, this should be a top priority in a reimagined micromobility program.

[11] Asenio, Omar Isaac; Apablaza, Camilia; Horner, Savannah J.; Chen, Edward W.; Lawson, M. Cade. Journal of Nature, Nature Energy. Volume 7, November 2022. Impacts of Micromobility on Car Displacement with Evidence from a Natural Experiment and Geofencing Policy. Published October 27, 2022, retrieved April 20, 2023. Link.

CONCLUSION

E-scooters can and, for some, have improved accessibility for a host of life needs. They have also left many behind and caused undue hardship for our most vulnerable neighbors, but they are reducing usage of the most inequitable and carbon-intensive mode out there, the private auto. Rather than banning them outright – which, with the rise of personal scooter ownership, may be impossible – we should learn from our and others' mistakes to create a better model, targeted at those marginalized but able-bodied users who most stand to benefit. However, further distractions from a city's core transportation directive – fixing and expanding our long-neglected sidewalks, keeping them clear of obstructions, rapidly expanding our bike network, and bringing dignity to the transit rider's bus stop – must be avoided because, without those fixes, everything we do works against mobility equity goals, not towards them.