frontiers | Frontiers in Sustainable Cities

TYPE Perspective
PUBLISHED 03 October 2022
DOI 10.3389/frsc.2022.926549

OPEN ACCESS

EDITED BY
Yonn Dierwechter,
University of Washington Tacoma,
United States

REVIEWED BY
Roger Behrens,
University of Cape Town, South Africa
Matthew Ford,
University of Washington Tacoma,
United States
Sujit Sikder,
Leibniz Institute for Ecological Urban and Regional Development (IOER), Germany

*CORRESPONDENCE
Chandra Ward
chandra-ward@utc.edu

SPECIALTY SECTION
This article was submitted to Innovation and Governance, a section of the journal Frontiers in Sustainable Cities

RECEIVED 22 April 2022
ACCEPTED 06 September 2022
PUBLISHED 03 October 2022

CITATION
Ward C and Oakley D (2022) Equitable, inclusive and sustainable public transit mobility through mobility on demand? A critical perspective.
Front. Sustain. Cities 4:926549.
doi: 10.3389/frsc.2022.926549

Equitable, inclusive and sustainable public transit mobility through mobility on demand? A critical perspective

Chandra Ward[1]* and Deirdre Oakley[2]

[1]Department of Social, Cultural, and Justice Studies, University of Tennessee at Chattanooga, Chattanooga, TN, United States, [2]Department of Sociology, Georgia State University, Atlanta, GA, United States

In recent decades, public transit authorities have increasingly opted to invest in commuter transit that caters to a whiter, wealthier demographic as opposed to lower-income transit-dependent populations. In addition, urban-suburban population shifts caused by central-city gentrification has meant that those who depend on public transit the most have been forced to move outside the city center. This presents challenges for transit-dependent riders, particularly in sprawling, car-dependent Southern US cities where transit agencies are spatially constrained and underfunded. Quite simply, the transit does not reach the destinations where the people who need it most are moving. Mobility-on-demand (MOD) has emerged in recent years as an innovative approach to sustainability through mobility. Increasingly, scholars are exploring its ability to increase access to opportunity areas (i.e., shopping, employment, social commitments) previously disconnected because of transit spatial mismatching. In this paper, we situate the discussion of MODs within the larger context of the unequal development in cities. We discuss extant research on MODs, and an initiative being piloted in a medium-sized Southern US city, Chattanooga, Tennessee. Using a transit equity lens we explore, within the context of historical and present uneven development, whether MODs are truly disruptive in reducing transit disadvantage, can address the limits of the "city-centric" nature of fixed and sparse public transit in areas of the country with a poor history of public transit investment (e.g., the US South), and respond to the dynamic nature of regional migration that constitute cities in the 21st century.

KEYWORDS

public transit, MaaS (mobility as a service), low-income access, equity, governance

Introduction

To have mobility is to have access. Mobility is having transportation options that you can count on to get you where you need to go. Is one able to get to places necessary for living a healthy life such as one's job, school, doctor's offices, community centers, parks possible? Mobility plays a significant factor in creating and perpetuating social inequality (Wachs and Kumagai, 1973; Lucas, 2012). Considering this, transit equity needs to be

studied and applied in all transit decision-making and policy for a truly sustainable city, one that is inclusive of all its citizens.

This article offers a brief history of public transportation in the United States with a subsequent critical discussion on emerging tech-based transit modalities that characterizes Mobility-on-demand (MODs). To accomplish this objective, we focus on the transit challenges in Southern US cities, using Chattanooga, Tennessee as a case example. We reflect on what needs to be considered when in making MODs more accessible in metro areas with sparse public transit systems such as those in the south. We attempt to contribute to the ongoing conversations concerning transit equity by applying an equity lens to the discussion of MODs and thinking more broadly about accessibility to include the patterns of migration in urban areas that transcend fictitious metropolitan municipal borders brought on by policy and market forces. More specifically we ask whether MODs are truly disruptive in reducing transit disadvantage, can address the limits of the "city-centric" nature of fixed and sparse public transit in areas of the country with a poor history of public transit investment (e.g., the US South), and respond to the dynamic nature of regional migration that constitute cities in the 21st century.

Historical context of the emergence of MODs

Public transportation has long been considered a communal resource, one that's considered a civic good for citizens. By the mid-20th century much of the nation's public transit systems were privately-owned and nearing bankruptcy because of Great Depression neglect and World War II gas rationing (Hess and Lombardi, 2005). According to Hess and Lombardi (2005), only a few large cities had public transit systems: Cleveland, Detroit, New York, San Francisco, and Seattle. Major public investments at the time meant that most large city transit systems were publicly-run, albeit underfunded, by the 1970s (Hess and Lombardi, 2005). Ironically, during this same period, the 1949 Housing Act created a redlined suburban boom leading to the demand for more commuter highways and white flight from the urban core. This was followed by the Federal Highway Act of 1956 resulting in 41,000 miles of interstates crisscrossing the country and destroying Black and Brown neighborhoods everywhere in favor of downtown connectors, exit ramps, and parking lots (Semuels, 2016). Highway development, shaping the preeminence of the automobile, and discriminatory housing practices amplified the racialization and divestment in public transit. These policies and their consequences are typically referred to as "urban renewal".

By the time the gas shortages of the 1970s hit, the automobile completely dominated the transportation policy landscape (Semuels, 2016). The divestment in public transportation and investment instead being diverted into large highway projects now meant long lines at the gas stations throughout the 70s. Unfortunately, at the time, this energy crisis did not lead to a reinvestment in public transit. In short, the long-term consequences of a neglected public transit infrastructure have reinforced persistent inequality for racial minorities, the greatest users of public transit.

Today, we find ourselves in a similar position as it relates to the transit landscape, with soaring gas prices and yet continued uneven investment in transportation options that perpetuate unequal access to mobility. Since the start of the 21st century, "smart cities" have come to symbolize the city of the future. The smart city technologies draping the urban landscape today are all but ubiquitous. There has been a lot of successful innovation around transit such as the ascendance of ridesharing services by companies such as Uber and Lyft. Additionally, city dwellers have had to embrace the good and the bad with the popularity e-scooters (Johnston et al., 2020). While rideshare and more so, e-scooters, cater to the individual rider, there have been other, less successful transit innovations to emerge out of the transit innovation space, such as micro-transit. All the alternate mobility options powered by internet and communication technologies (ICTs) we have today make up the mobility on demand (MOD) landscape.

Proponents of MODs look to them as disrupters to the conventional transportation landscape that have the potential to alleviate urban issues such as traffic congestion by offering alternatives such as e-scooters and bike share to keep people moving with efficiency across cities, while reducing carbon emissions. This pleases urban leaders and administrators in their aspirations toward being labeled a "sustainable" city, which bodes well for making the "most livable cities" list. Sustainability is often the touted benefit of transit innovations such as the autonomous vehicle (efficiency, fewer accidents), e-scooters and bikeshare (efficiency, environmentally friendly). Sustainability has three components: environmental, economic, and social. While environmental and economic pillars are oftentimes the foremost thrust of innovation in micro-mobility, the social is oftentimes an afterthought in developing new technologies.

As MODs are increasingly adopted across US cites, the authors focus in on the social component of sustainability and ask whether MODs initiatives, as they currently exist, contribute to the goal of transit equity? To answer this question, we explore discussions around transit equity, examine the fragmented nature of public transit in the Southern United States, and discuss a proposed MOD initiative being introduced in Chattanooga, Tennessee. We will then turn our attention to the emergent MOD transit initiatives shaping the transportation ecosystem. Finally, we will discuss the barriers to transit equity with MODs as well as policies that could move MOD transit initiatives toward greater social equity.

Transportation equity

Transportation equity refers to transportation benefits and burdens being equitably distributed across people and places (Karner et al., 2016). Academic discussions on transportation equity, or justice, have existed since the 1960's and has been gaining greater visibility and engagement over the last couple of decades (e.g., Kain, 1968; Wachs and Kumagai, 1973; Pereira et al., 2017). At the same time, within the broader umbrella of transportation, there has been little focus on how benefits are distributed among the population, and oftentimes the promotion of the benefits for the masses are at the expense of the most marginalized (e.g., highway construction) (Sen, 2009; Pereira et al., 2017). Three overlapping areas emerging out transportation equity work are "inequalities of transport-related resources, observed daily travel behavior, and transport accessibility levels" (Pereira et al., 2017, p. 183). Accessibility can be conceptualized as both access to use mobile technologies and transit, as well as how transport systems and land-use patterns enhance an individual's ability to access people, places, and things (Pereira et al., 2017). All three should be addressed when introducing MODs into an urban area.

Transit in the Southern United States—The case of Chattanooga, Tennessee

The Southern region of the US has had a long history of disinvestment in public transit, while investing heavily in highway development, often purposefully functioning as a tool of racial spatial containment. Chattanooga, Tennessee originated as one of the Southern transportation hubs in the 19th and early 20th century (Scheuer, 1962). Like cities across the US, the Black population in Chattanooga was disproportionately affected by urban renewal (Knapp, 2018). For example, according to Castor (2015), the Golden Gateway (see Figures 1A,B). urban renewal began in 1958 and took 20 years to complete. During that time, 1,200 buildings were razed, and 1,436 families and individuals were forced to relocate—often against their will. In short, the project included the tearing down and rebuilding of Chattanooga's Westside. It was finally completed in 1978. Concurrent investments in highway development contributed to white suburbanization and reinforcing racial segregation.

Today, like many other US cities, Chattanooga is experiencing an urban renaissance attracting white, upwardly mobile residents back to the urban core. During the mid-20th century, whites were incentivized nationally to move to the suburbs. Now, whites and other upwardly mobile citizens are being incentivized to repopulate the urban core. Chattanooga has employed aggressive marketing and investments in attracting the high-tech industry and the creative class to the city (De Barbieri, 2022). For example, in 2012 the Geek Move program was created, giving mortgage forgiveness and covering relocation costs to high-tech professionals willing to relocate to the city and purchase houses in gentrifying areas (Knapp, 2018). As one might expect, the overall effect of this targeted investment and revitalization strategy has largely excluded and further marginalized Black Chattanoogans because of uneven and unequal development. With the dismantling of public housing developments and historically Black urban core neighborhoods becoming quickly gentrified, many Black Chattanoogans with fewer affordable quality options for housing and schools have been priced out of the city, resulting in a steady decrease in the city's Black population over time. According to the 2020 census, the Black population in Chattanooga decreased by over 5,000 people, while the white population increased by about the same amount from 2010 to 2020.[1] The data reveal that much of the loss of Black population occurred in the city's urban core (Chilton, 2022).

Black Chattanoogans are being disproportionately negatively affected by the unequal development that appears to be pushing them out and disconnecting them from friends, family, jobs, and public amenities that would otherwise connect them to and help them to benefit from the ascending progression of Chattanooga. What's been referred to as, "The Chattanooga Way" or more derisively, Chattanooga's new urban renewal, the extensive development in and around Chattanooga's urban core has also resulted in the displacement of thousands of Black Chattanooga's (Systo, 2020). What is now considered Chattanooga's renaissance, a result of public policy and large-scale investment, has placed a disproportionate burden on the city's Black population, while disproportionately benefitting white residents (De Barbieri, 2022).

Data suggest that former Black residents are moving to areas around and outside of Chattanooga, which are more affordable for working-class families (Chilton, 2022). These areas, however, lack a major resource—public transit (Fletcher, 2020).

We argue that to mitigate these disadvantages faced by Chattanooga's Black residents, public transit must be responsive to the socio-economic shifts caused by the city's bold planning and uneven development that shapes where people live, where jobs are and the ability to connect those who rely on public transit to people and places they could not access otherwise. Currently, the city's public transit authority, Chattanooga Area Rapid Transit Authority (CARTA), does not operate beyond the city's boundaries (see Figure 2). Older inner-ring suburbs such as Hixon, East Ridge, and Ooltewah either never had CARTA services or CARTA no longer operates in the area, as in the case for East Ridge.

Results from the 2020 census show not only an overall decrease in the Black population for Chattanooga in general, but

1 https://data.census.gov/cedsci/table?q=chattanooga,%20tennessee&tid$=$DECENNIALPL2020.P1

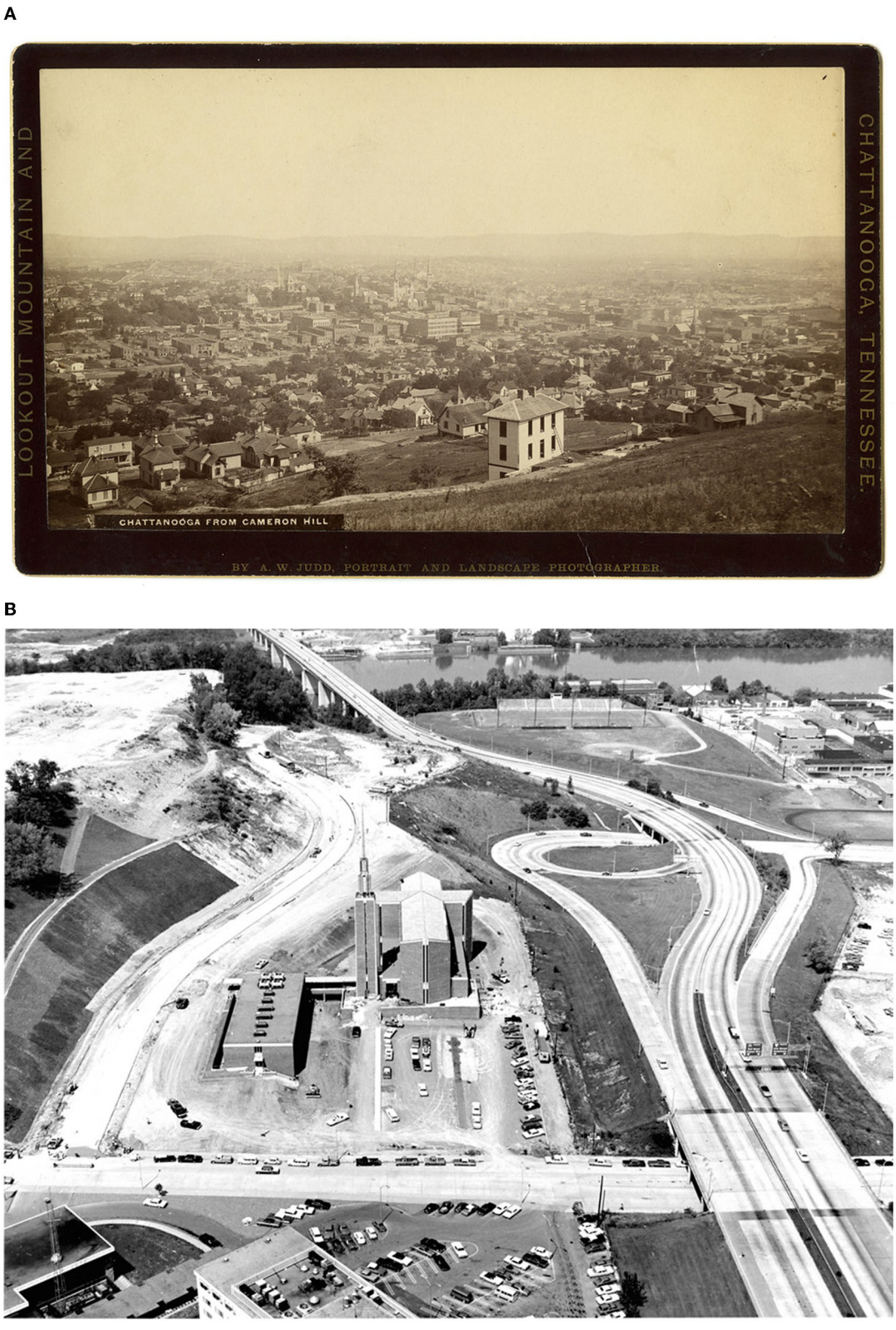

FIGURE 1
(A) Cameron Hill before urban renewal. **(B)** Cameron Hill after urban renewal.

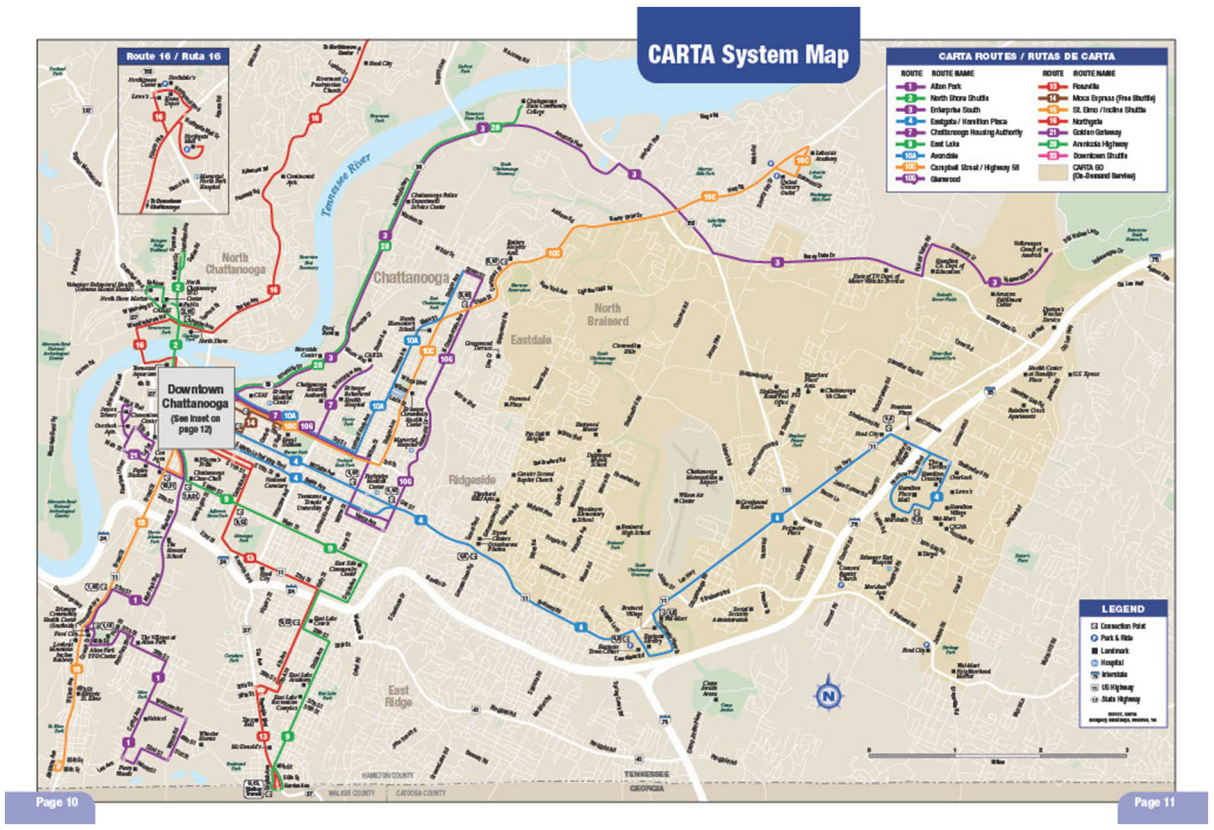

FIGURE 2
CARTA system map.

an increase in Black population in areas outside Chattanooga and areas to the South and eastern part of the city (Systo, 2020; Chilton, 2022). Specifically, the suburban cities of Hixon, Ooltewah, and all five of East Ridge's census (see Figure 2) tracts show some of the greatest increases in Black population (Chilton, 2022). Blacks are emptying out of the urban core, which saw some of the greatest losses in Black population, migrating to the northeast, southeast and due east of the city. Many of these areas on the edges of the city, and the entirety of suburbs, the existing bus system does not reach. However, these are not self-contained cities from the early 20th century where people lived, worked, and socialized within a short distance of one another.

Further, it is no longer an urban landscape where middle-class people lived in the suburbs and worked in the city, with Wilson's (1987) urban underclass occupying the urban core. We live much more fluid urban lives where, realistically, we live, work, and play in the urban core, the urban edges, as well as the suburbs meandering throughout. Since public transportation is left to municipalities, many localities that had been predominately white, especially because of 20th century white flight, actively fought against public transit expansion from the urban rapid transit agencies due to a resistance to any tax increase, even a cent, and what many have considered racial and class animus associated with public transportation expansion.[2] The geography of disadvantage is shifting from the urban core to the suburbs. However, due to the collective conceptualization of who comprises the suburbs, as well as long standing policies that fragment and disconnect metro areas, public transportation and any smart transit deployed by public transit agencies, likely the larger ones, will not be sufficient to meet the shifting needs of the 21st century, and reinforces the uneven development seen in the 20th century that disproportionately burdens low-income and working-class Black citizens.

CARTA is in the process of a network redesign in order to address issues such as decreased ridership, cost issues, and decentralization (Ziedan et al., 2021). One of the goals of such a redesign is increasing coverage and frequency, which oftentimes conflict with local transit agency budgets. Preliminary data suggests that those with lower incomes would not be willing to

2 https://www.ajc.com/news/local/gwinnett-marta-expansion-referendum-fails/oyW8Jt5of51LWlRblb7XRL/

pay more to go farther, while not surprisingly those with higher incomes were willing to pay more. Further, those who were regular bus riders preferred a system redesign that increased coverage, whereas those who were not bus riders preferred frequency over greater coverage. These differences in preference illustrate the desire for those who likely depend on public transit to get to places they cannot currently access using existing routes. CARTA is currently piloting a micro-transit option that would ideally be used in conjunction with its fixed-route system to address the first and last mile problem, provide service in low-service areas, and potentially increase ridership. It is not yet known if the micro-transit will be successfully adopted by existing public transit users, though measures are being taken to ensure riders can call for service, like a dial-a-ride. Additionally, unlike the preliminary studies, future studies for the micro-transit pilot seek to oversample for those communities that rely on public transit the most, and thus who would most likely benefit from a transit redesign that centers their lived experience. This is consistent with literature which proposes that policies should prioritize traditionally marginalized groups (Páez et al., 2010; Lucas, 2012; Pereira et al., 2017). Unfortunately, what the micro-transit option does not do, is go beyond CARTA's boundaries—suburban areas. Again, metropolitan areas have been experiencing a "re-urbanization" of cities for the last 20 years, primarily by middle- and upper-income groups. This migratory trend has squeezed many lower income urban residents facing economic pressure to move to more affordable areas, which are older, inner ring suburbs. Even for those who live in the urban center, a spatially bound micro-transit option does not get them to the better paying job in the suburbs. It does not connect them to family and friends if they live in the central city and social networks live in the suburbs and vice-versa.

While viewed as revolutionary by the tech and transit industry, the revolution cannot go beyond rapid transit authority boundaries, which precludes much of its outlying communities where increasing numbers of lower- and middle-income people of color are migrating to. The result of which reproduces the spatial mismatch problem which has been discussed by urbanists since the late 1960's (Kain, 1968). The introduction and adoption of innovative, tech-based transit cannot alone address social issues produced by unequal transit development. Southern metros are characterized by fragmented, local governance which affects transportation policy by creating suburban transit agencies that are separate from more robust central city transit, oftentimes rejecting expansion efforts of central city transit into suburban areas. In the Southern US especially, this has been rooted in racialized perceptions of the "inner city" that restrict the movement of lower-income Blacks. While perhaps without intent to harm, the effects or burdens are disproportionately placed on Black working class and poor citizens because they are the ones most likely to ride public transit, they are the ones being displaced from the urban core in many cities across the US and where the outer areas where they are relocating to, out of necessity, are in the Southern US likely disconnected from adequate public transportation options. With the increasing suburbanization of poverty, and re-urbanization of upper-income whites, you have a situation where those who need transit the most are now in suburban areas with little to no public transit infrastructure from years of divestment, and those with mobility privilege gaining access to a host of transit options. Planners and transit agencies must incorporate inclusive and equitable practices in transit planning, and design transit options that are responsive to the needs of the population with the least mobility to create sustainable cities of the future.

Promises of MODs in the literature

In the past decade we have seen the introduction of multiple tech-based transit options in major US cities. These include what can fall under the umbrella of "micro-mobility" and mobility on demand (MOD) which includes anything from e-scooters for individual, short-trip use to longer mileage use MODs such as ride-share. MODs are made possible using the Internet and communication technology (ICTs) and are intended to be used on an "as-needed basis in real time," providing flexibility and convenience to travelers (Yan et al., 2021, p. 4). In order to address the inability of transit systems to connect people from their origin point to their final destination point, or what is referred to as the first and last mile problem, proponents of integrating MODs with public transit suggest that this combination of services can solve the first and last mile problem that currently exists, fill gaps in low-service areas, and allows for the potential to be competitive with privately owned MOD companies (Johnston et al., 2020; Yan et al., 2021). According to Yan et al. (2021), the promises of integrating MOD with conventional public transit is its potential offer "affordable and convenient public transit services to areas that were unreachable to disadvantaged travelers" (p. 21). However, even with the proliferation and overall success of MODs and transportation network companies (TNCs) like Lyft and Uber, some of the most vulnerable, transit dependent populations remain locked out of this transit option (Johnston et al., 2020). Further, the piloting of MODs assumes there is a seamless and continuous transit system in each metropolitan area. It also assumes those who rely on public transit are not migrating outside the public transit system coverage area. In the case of Chattanooga, currently there currently are no plans to use MODs beyond its existing service area, and its service area is dependent upon the suburban jurisdiction voting on the expansion of service into its boundaries.

Studies on the efficacy of MODs in promoting transit equity

The few studies on e-scooters have thus far found mixed results regarding e-scooter use and income (Aguilera-García and Gomez, 2020; Jiao and Bai, 2020; Lee et al., 2021; Reck and

Axhausen, 2021; Tuli et al., 2021). One of the studies looking at the relationship between the demographic characteristics of users and e-scooter use found a negative causal relationship between being low-income and frequency of e-scooter use across four cities (Frias-Martinez et al., 2021). In a study on the built environment and e-scooter use in Austin, Texas found that higher e-scooter was associated with areas with high rates of employment and bicycle infrastructure (Caspi et al., 2020; Frias-Martinez et al., 2021). Other studies on the relationship between built environment and e-scooter usage find that presence of bicycle lanes, places of interest (POI), proximity to the city center area all associated with higher e-scooter use (Bai and Jnd Jiao, 2020; Liu et al., 2020). Multiple studies show mixed results in e-scooter's ability to solve the first and last mile problem of public transit. While city-level studies show users of e-scooters connecting to public transit (Lee et al., 2019; Jiao and Bai, 2020; Hosseinzadeh et al., 2021; Tuli et al., 2021), while other—for example in Atlanta, GA, found it to be cost prohibitive to combine the two (Espinoza et al., 2019). However, findings on built environment and e-scooters do consistently indicate that "population density, land use mix, transportation facility, open space, and parks are positively associated with e-scooter usage," while census tracts with higher crime rates and decaying road infrastructure have been found to be negatively associated with e-scooter use (Johnston et al., 2020; Tuli et al., 2021).

Similar results were found in research on bike share usage and the built environment, where bicycle infrastructure was positively associated with bike share demand (Buck and Buehler, 2012; Buehler and Pucher, 2012; Noland et al., 2016; Wergin and Buehler, 2017), public parks (Hyland et al., 2018) as well as employment density (Noland et al., 2019), while the crime rate of an area was found to be negatively associated with bike share (Sun et al., 2017; Hyland et al., 2018; Tuli et al., 2021). Findings were consistent across studies finding a positive association between higher income and bike share usage (Lewis, 2011; Ursaki and Aultman-Hall, 2015; Fishman, 2016; Hosford and Winters, 2018; Tuli et al., 2021).

A study on a MOD pilot program employing TNC's, the Los Angeles Metro Mobility on Demand, was found that the service did successfully connect people to transit stations (Brown et al., 2021). However, the study also found that users were more likely to be white, and owners of smartphones and bank accounts, compared to regular users of public transit. The program did not appear to increase access for traditionally marginalized populations. Researchers believed lack of use by this population was due to the design of the pilot, as opposed to interest in using the service.

Applying an equity lens to MODs

Researchers have identified several policy practices cities have employed to promote greater equity in e-scooter use such as low-income payment plans, a certain number of e-scooters in specified communities and incentivizing e-scooter companies to place scooters in those communities (Riggs and Kawashima, 2020; Frias-Martinez et al., 2021). Some cities such as Chicago, Washington DC, and Los Angeles have mandated that a minimum number of e-scooters are place in economically disadvantaged neighborhoods. LIME, a well-established e-scooter company, has developed LIME ACCESS, which provides discounted and cash-based payment options for low-income users in cities in which it operates (Frias-Martinez et al., 2021). Equity is about access, and to access the smart mobility ecosystem require a bank account or a credit card, and reliable internet access which many low-income people lack access to (Golub et al., 2019; Tuli et al., 2021).

Though it appears through initiatives like LIME ACCESS, there are some attempts to remove cost barriers to regular usage, these efforts do not address the larger, longstanding trends and practices affecting transit equity. Equitable distribution of MOD options means not only removing socio-economic barriers of access but removing transit barriers, including equitable road infrastructure and bike paths—both of which result from the fragmented and racialized governance that characterize metropolitan regions, especially in the US South. The very structure of transit agencies needs to adapt to the demographic shifts where such as lower-income individuals are migrating outside of the urban core, which in many cases mean they are outside the service area of adequate and reliable public transportation, let alone MOD options.

A study on resident's preference for a micro-transit option vs. fixed-route in metropolitan Detroit found that low-income and elderly residents were more likely to have challenges to accessing MOD options (Yan et al., 2021). Those who were not familiar with ride-sharing services, were currently adequately serviced by a fixed-route (Yan et al., 2021) and women, due to mistrust and safety concerns toward the ride-sharing model (Tussyadiah and Pesonen, 2018), were less likely to be willing to take MOD transit. College graduates, on the other hand, who were more technologically savvy and upwardly mobile were more likely to have favorable attitudes toward taking MOD transit (Yan et al., 2021).

Because public transit agencies are mandated by the Federal government to adhere to civil rights laws, agencies must ensure that it is accessible to those who need it. Thus, if transit agencies attempt to integrate MODs into their package of services, they should at the very least focus on meeting the travel needs of low-income, the elderly and persons with disabilities (Yan et al., 2021). However, we need to go further in thinking about barriers to use for our most marginalized communities. These barriers are the lack of coordination between metropolitan municipalities and their transit agencies. A regional approach is necessary. The

lessons learned from the deployment of the different MOD modalities can offer a roadmap for cities like Chattanooga looking to adequately address issues of mobility, access, and equity when introducing a MOD service such as micro-transit in the shifting urban environment of the 21st century.

Conclusion

Transport policies must prioritize marginalized urban populations (e.g., elderly, racial and ethnic minorities, the poor, and disabled) to mitigate the systemic disadvantages that impacts accessibility (Páez et al., 2010; Lucas, 2012; Pereira et al., 2017). As has been discussed, most MODs fail to do this. Multiple studies (Lewis, 2011; Ursaki and Aultman-Hall, 2015; Fishman, 2016; Hosford and Winters, 2018; Frias-Martinez et al., 2021) have found that users of MODs tend to be younger, have access to and knowledge of technology, upwardly mobile. E-scooters and bike share stations are generally located in lower crime areas, areas with sufficient bicycle infrastructure, parks, all places that tend to not be present in low-income neighborhoods. Micro-transit ride sharing fleets such as Via, market themselves as being able to "reduce traffic congestion," and as "environmentally friendly, and potentially 'reducing trip costs' for seniors and people with disabilities"[3] who rely on transit. The promises of micro-transit vehicles, however, do not address the realities of fragmented metropolitan regions. If a major metropolitan transit agency does not service its suburban regions, and if suburban regions insist on having a separate transit agency, if they have any transit agency at all, then it will place marginalized groups who may have to live in the places due to real estate market forces, are at a disadvantage.

Currently CARTA is collecting data from a variety of populations, but prioritizing lower income communities that use public transit and who are most affected by issues of access. Data collected seek to better understand issues of accessibility these communities face, and hopefully will provide justification for investing in a system redesign with micro-transit that will get people to places that exist beyond geographical borders originally designed to exclude people of color. If Chattanooga, and other metros lacking a robust transit system, seek to be sustainable, it must focus on the social, as well as the other pillars of sustainability. MODs must the capability to allow the user to convert resources, such as transit, into a quality of life made up of practices based on their own personal preferences (Pereira et al., 2017). Public transit does exist in low-income parts of Chattanooga's urban core. However, it is not that the transit doesn't exist, rather riders cannot effectively convert this resource into something that meets their needs, such as getting to a better paying job in East Ridge, a hike on Signal Mountain, or seeing family in Ooltewah. Again, as more Black Chattanoogans leave the central city, MODs being introduced need to focus on connecting people to the people, places and institutions that allow them to fully participate as urban citizens.

Transit policy needs to be sensitive to social processes in the urban landscape that affecting migrational shifts (i.e., gentrification) of the populations that rely on public transit the most. Without this consideration smart transit initiatives, such as MODs, may perpetuate spatial inequality. Micro-transit might just solve the first and last mile problem, but for whom? Thus far, micro transit appears to benefit and offer more options to those who already have mobility capital. If users of MODs are young, technologically literate, upwardly mobile urbanites who use MODs to employment centers and places of interest, then who are MODs really for? Implicitly, it is clear who it is not for, at least in much of its current iteration.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by University of Tennessee at Chattanooga. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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3 https://ridewithvia.com/resources/articles/what-is-microtransit/

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