STUDY ON POST-COVID PANDEMIC PUBLIC TRANSPORTATION

SUBMITTED TO THE MINNESOTA LEGISLATURE ON BEHALF OF THE METROPOLITAN COUNCIL

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EXECUTIVE SUMMARY

As directed by the Minnesota Legislature in Article 4 §143 of HF2887 (enacted May 2023), this study synthesizes the observed impacts of the COVID-19 pandemic on public transportation in the metropolitan area, and forecasts expected impacts after the pandemic is substantially curtailed. A primer on regional transit ridership is followed by chapters on how COVID-19 changed transit ridership; the dynamics of regional active transportation and transit demand; the operational revenues and expenditures of Met Council fixed route transit budgets; and scenario exploration of future trends in ridership and financial flows.

A key contribution of this study is documenting the relationship between transit ridership and transit accessibility (access to opportunity). As the COVID-19 pandemic demonstrates, external forces on travel behavior can alter demand, but regional transit agencies have much more influence on transit supply. In areas where access to opportunities via transit is higher, ridership in those neighborhoods increases, even in the COVID era. To the extent that ridership is a primary goal of regional transit agencies, bolstering the network that provides high accessibility to destinations will lead to success.

The COVID-19 pandemic triggered significant changes in the funding composition for public transit. Despite this, the Metropolitan Council was able to cover its transit operating expenses thanks to the Council's reserves and the inflow of federal funding. Thanks to action by the Minnesota Legislature, the Council and regional providers are expected to continue covering their transportation expenses in the coming years, with revenue from the Metro Area Transportation Sales and Use Tax playing a key role in the face of increased uncertainty over ridership and operational costs.

The most significant impact to both ridership and operational budget balance has come from the COVID-induced prevalence in remote work, which has persisted in the region since 2020. While not the majority of trip purposes even before the pandemic, the pre-COVID regularity of the four- or five-day office commute led to predictable ridership and bookable revenue from associated pass programs. This regularity has disappeared, and with it the strongest motivators for riding transit to downtowns and paying for an all-you-can-ride pass to do so. The fare revenue from these passes is not likely to return in the near term, meaning operational budgets must be balanced by revenue outside of fare programs. Additionally, ridership changes have been proportional to the office commute trip purpose share pre-COVID, with Northstar commuter rail experiencing the largest ridership drop.

Additional key insights are highlighted in the areas of study specified by the original Legislative direction.

RIDERSHIP ANALYSIS

Ridership is the intersection of transit supply, and demand for travel. The regional transit providers influence the supply of opportunities, which can be measured as destination accessibility. Throughout the region, both before and during the COVID pandemic, higher destination accessibility on transit leads to higher ridership in those neighborhoods. This effect is strongest in the core urban areas of the metropolitan area, where the number and type of destinations reachable on transit is highest.

- Ridership was strongest in the COVID-era on route types with all-day, all-purpose service, such as arterial BRT lines and other METRO network lines
- Ridership dropped the most on route types which had the highest proportion of office commute trips pre-COVID
- Boarding patterns throughout the day have changed, with morning peak travel reduced much more than afternoon peak travel, reflecting trips made for multiple purposes and destinations

Who Rides transit in the metropolitan region is important to understand for operational success in meeting customer needs, and for accurate understanding of ridership trends.

- While nearly everyone who rides transit is employed, a student, or both, transit trips in the region are most often taken for purposes *other than* travel to work
- Before the pandemic, 64% of regional transit trips were made by people without access to a car for that particular trip; in the COVID era this rose to 82% of trips
- Before the pandemic, higher proportions of regional transit trips were made by Black, Indigenous, Hispanic/Latino, Asian, and other people of color than their proportion of the metropolitan regional population. In the COVID era, BIPOC riders made 55% of weekday trips, while comprising only 30% of the regional population

These and other demographic findings indicate that transit is used by many in the region to support all kinds of daily life maintenance trips, and that there is a large potential market for expansion of this trip making in places with all-day access to all purpose destinations.

ACTIVE AND PUBLIC TRANSPORTATION MODE DEMAND

For over 92% of transit trips in the region, passengers are pedestrians or cyclists before or after riding transit. Active transportation, defined as walking, rolling, and biking to reach destinations, inherently supports public transit success. Examining latent active transportation demand within the region suggests an opportunity for growth in the trip share of active and public transportation.

- Enhancing the infrastructure for safe active travel and integration of bicycles, e-bikes, and shared micromobility with public transit is crucial for expanding accessibility and encouraging multi-modal travel behaviors
- E-bikes and shared micromobility devices offer potential to meet unfulfilled demand, enhance accessibility, and supplement public transit
- The lack of comprehensive active transportation data and data integration across entities hinders our ability to understand current usage patterns and effective interventions

TRANSIT SERVICE LEVELS

In response to travel demand which was radically altered by the arrival of the COVID pandemic, regional transit providers reduced supply of opportunities to travel on transit by suspending routes, reducing frequencies, and reducing span of operations.

- Service reductions impacted suburban areas most strongly, with 30% - 50% reductions in transit access, though this differed by provider service area. Suspensions, reductions, and alterations of commuter and express routes led to significant reductions in access via the regional park and ride network
- Core urban markets experienced 10% - 20% losses in transit access on average, with some areas gaining access due to new METRO network lines
- Reductions were deepest in 2022, during the most acute period of a transit driver shortage, and availability of workforce continues to constrain transit service levels

REVENUES AND EXPENDITURES

Revenues and expenditures were examined in detail for the Metropolitan Council's Transportation division budget, including Metro Transit and Metropolitan Transportation Services (MTS) operations.

- Total fare revenue declined by 60% from pre-COVID levels in FY2021, and currently is half of pre-pandemic levels. The decline is largely attributable to the reduction in guaranteed revenue from commuter pass programs, which in turn is due to the rise of remote and hybrid work
- Fare revenue declines were offset by Federal aid which allowed maintenance of service during the first years of the COVID era. Since 2023, revenues from the Metro Area Transportation Sales and Use Tax replaced revenues from the county transportation sales taxes and provide a sustainable revenue stream for transit operations
- Operational expenses have increased during the COVID era, despite a frontline workforce shortage
- The procyclicality of sales tax and motor vehicle sales tax revenue can increase the budget's vulnerability to economic downturns, increasing the importance of building up reserves

FORECASTING LONG-TERM IMPACTS

Examining possible futures using scenarios, we contrast the ridership and financial outcomes expected under different conditions of travel behavior and public finance.

- A scenario of continued growth on the trend since June 2020 would result in ridership at 75% of pre-COVID levels by 2029. Higher growth rates are possible, but would result from travel behavior changes which seem unlikely
- Planned increases in access to destinations on transit will result in higher ridership in those communities, especially in the core urban service areas, with lesser ridership growth from suburban areas
- Transit service designed to provide universal coverage, such as suburban local, suburb-to-suburb, and demand-response microtransit can be a key addition to regional mobility
- Growth in transit operations expenditures without an increase in fare revenue will require leveraging the regional sales tax to balance the operational budget

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LIST OF ABBREVIATIONS

AFC	Automatic Fare Collection
APC	Automatic Passenger Counter
APTA	American Public Transit Association
ARP	American Rescue Plan
AVL	Automatic Vehicle Locator
BIPOC	Black, Indigenous, People of Color
BRT	Bus Rapid Transit
CARES	Coronavirus Aid, Relief, and Economic Security
CATS	Charlotte Area Transit System
COVID-19	Coronavirus disease 19
CRRSAA	Coronavirus Response and Relief Supplemental Appropriations
DART	Dallas Area Rapid Transit
DVS	Minnesota Department of Vehicle Services
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FTE	Full-time Employee
FY	Fiscal Year
LBS	Location-Based Services
LOST	Local Option Sales Tax
LRT	Light Rail Transit
LTS	Level of Traffic Stress

MaaS	Mobility as a Service
MnDOR	Minnesota Department of Revenue
MnDOT	Minnesota Department of Transportation
MTS	Metropolitan Transportation Services
MVST	Motor Vehicle Sales Tax
MVTA	Minnesota Valley Transit Authority
NACTO	National Association of City Transportation Officials
RTD	Regional Transportation District, Denver
TBI	Travel Behavior Inventory
TMA	Transit Market Area
TNC	Transportation Network Company
TPP	Transportation Policy Plan
USDOT	United States Department of Transportation
UTP	Universal Transit Pass

CHAPTER 1: UNDERSTANDING TRANSIT RIDERSHIP

1.1 OVERVIEW

Transit ridership measures trips made in the course of daily living. There are many dimensions of transit ridership that can help explain how, where, when, and by whom transit is predictably used. This report emphasizes geographic determinism: *where you are* defines your mode choices, by providing certain opportunities at certain costs. For transit, this means considering where people live is the first and most important determinant of whether they will use transit, how, and how often. Characteristics of land use, the built environment, and the local residential population define the boundaries of possibility for transit success. This chapter analyzes patterns of ridership before 2020, referred to as pre-COVID pandemic ridership.

1.2 WHAT RIDERSHIP MEASURES (AND DOES NOT)

In plain language, the concept of transit ridership describes the use of transit service. This can be measured in a variety of ways, including the number of boardings, the number of journeys or "linked trips" (each leg plus transfers), the length in miles of a passenger's trip, or the frequency of use in times per week, month, or year. The Federal Transit Administration collects these concepts under Service Consumed[1] but uses the specific variables being measured to describe transit use, rather than providing a definition of ridership.

In practice, **ridership is measured by boardings** which represent the origin of a trip on a transit vehicle. Partly this is a measure of longstanding convenience, as passengers create a record in a farebox or automatic fare collection system (AFC) as they board and pay for their trip. A boarding is also a discrete event which can be measured easily by human counters or drivers, or by widely implemented technology like automatic passenger counters (APC). These systems are now ubiquitous in the regional transit fleet, and record boardings on vehicles whether or not a passenger interacts with a fare system as they board. For instance, on the METRO network of light rail and bus rapid transit routes, passengers pay or tap their pass before boarding and can use any vehicle door to board. In the metro region, a combination of AFC, APC, and human counting are used to measure boardings.

Describing ridership with boardings means capturing origins of a trip. **A trip refers to a single ride on a transit vehicle, for any distance.** One implication is that journeys which involve a transfer from one transit vehicle to another are not linked, and are counted as two trips. For instance, a passenger arriving inbound to Target Field station on the Northstar train on a weekday morning might transfer to the Blue Line light rail train to travel two stops into downtown Minneapolis. This would be measured as one trip

[1] https://www.transit.dot.gov/ntd/national-transit-database-ntd-glossary#S

each on Northstar and on Blue Line. A reverse trip in the afternoon would be an additional two trips; four total trips would be created by the person on that day.

A nearly complete accounting of boardings can be attained with the combination of methods mentioned above, but **other attributes of each trip must be estimated from samples**. This includes information about how many vehicles are boarded by an individual during a one-way journey, how long (in distance or time) each person travels, the method of access to and egress from the transit stops and stations, and anything about the demographic identity of the passenger or the purpose for the trip. Well-established methods using both automated data collection, and online and in-person survey techniques, can provide this information. But the most readily available information is a count of individual boardings, which in this report we term “ridership.”

An important clarification about the terminology is that **ridership does not describe people, but activity** in the form of transit trips. Someone may drive a car for one daily trip, be a transit passenger for another, and walk for a third. Each person who uses transit selects that trip from among the choices available to them in their particular geographic, economic, and other social circumstances, as well as the fit for the transit trip to their desired destination. The choice to board a transit vehicle for that trip is made by each passenger, who may make a different choice on a different day under different circumstances. One way to consider ridership is it is a description of the successful intersection of *demand* for travel to destinations, and *supply* of opportunities to reach those destinations.

Finally, **some characteristics of trips and the people making them make transit use more likely**. Trip origin points near a high supply of transit which provides connection to many opportunities, should have more trips taken, all things being equal. Because transit schedules vary across the day and week, when the trip is being made will make transit use more or less likely. The options for trip modes is more constrained for some people than for others–people who are wealthy enough to own their own car and a place to park it, will have more options available for any given trip than someone who cannot afford to own a car, or is not yet old enough to be able to do so. Someone with a transit pass which allows them to ride unlimited times may board more often than a person who must pay at the origin of each trip. These and many other facets of travel behavior, economic and social condition, and personal choice interact with the service being provided by the transit agencies to create ridership. Some of these important factors are highlighted throughout this report.

1.3 PRE-COVID RIDERSHIP PATTERNS IN THE METROPOLITAN AREA

Below are highlighted descriptive attributes of transit ridership prior to the outbreak of the COVID pandemic in the U.S. in March 2020. These patterns were relatively consistent though pre-COVID change trends are discussed. The ridership can be analyzed in terms of what service was being used; for what purpose; and by which people. These attributes are examined in turn.

1.3.1 Share of trips by route type

The Met Council regional transportation policy plan (TPP) provides a standard classification of different types of transit service, for which trips are counted and regularly reported. The “Regional transit design guidelines and performance standards" or Appendix G[2] defines the route types, their standards of application, and the types of land use and geography for which they are appropriate (Table 1).

Table 1-1 Regional public transit route types

Metropolitan region transit route types	
Route type	**short description**
Core Local bus	regular bus serving dense urban markets, connecting to downtowns
Supporting Local bus	regular bus serving dense urban markets, crosstown and connecting core local, and METRO network routes
Suburban Local bus	regular bus providing coverage service in less dense suburban markets
Arterial BRT	fast, frequent bus service in mixed traffic in high demand urban corridors (part of METRO network)
Highway BRT	fast, frequent bus service operating at least in part on highways, in shared or dedicated guideways, connecting suburban areas to urban downtowns and other activity centers (part of METRO network)
Light rail (LRT)	electrically powered passenger rail cars on fixed rails, in combination of dedicated right-of-way and mixed traffic / intersections (part of METRO network)
Commuter & Express bus	bus service operating in peak direction and travel time from suburban areas to urban downtowns and other major employment centers, typically operating non-stop on a highway for part of the trip
Commuter rail	rail operated using diesel-power locomotives and passenger coaches on traditional railroad track, operating mostly in peak direction and travel time from suburban areas to urban downtowns (operated as Northstar)
Demand response	small transit vehicles operating to serve trips as requested, in a defined area without a defined route schedule (operated as TransitLink, and various microtransit services)
Commuter vanpool	rideshare program for regular commuters who pool together and rent a passenger van for shared trips from Met Council
Dial-a-ride ADA paratransit	paratransit public transportation for certified riders who are unable to use the regular fixed-route bus due to a disability or health condition

[2] https://metrocouncil.org/Transportation/Publications-And-Resources/Transportation-Planning/2040-TRANSPORTATION-POLICY-PLAN-(2020-version)/Appendices/Appendix-G.aspx

Adding the trips taken on routes in each classification, across all days and all schedules in a year, gives the annual regional ridership. **In 2019 the regional ridership was 82,486,307 trips.**[3] Of this total, 42% of trips were on core local bus, 29% on light rail trains, and 14% on commuter & express bus. Together the top three modes represented 85% of regional transit ridership (Figure 1.1).

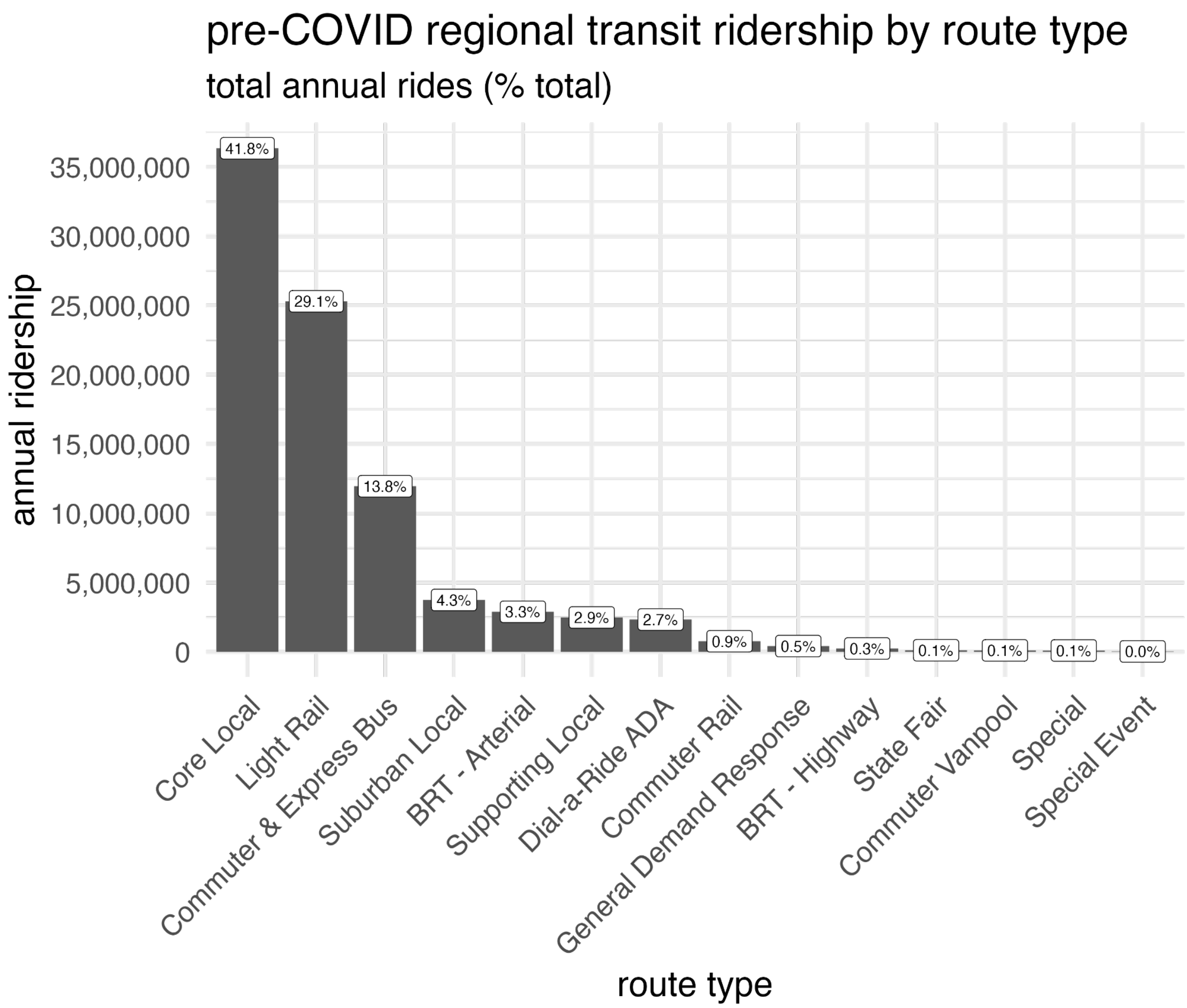

Figure 1.1: Total annual trips in 2019 taken on regional transit by route type

The dominance in ridership of the services which serve dense urban markets does not mean other services are unimportant or unsuccessful, but as higher use of transit service reflects better match

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[3] https://metrocouncil.org/News-Events/Transportation/Newsletters/Regional-Ridership-Report-2019.aspx

between supply and demand, there were more matches between desired travel and opportunity to travel in the routes in these service types.

1.3.2 Share of trips by purpose

As part of regional transportation planning, the Met Council conducts a regular, high-sample, intercept survey of transit passengers in the Travel Behavior Inventory program.[4] This transit on-board survey samples passengers by randomly encountering riders as they use the system, according to the number of trips made on each route, type, and segment. A thorough sample allows statistical extrapolation to the entire system, as well as by route and route type. The last transit on-board survey conducted prior to the COVID pandemic was in Fall 2016, and is considered representative of transit trips made before COVID on a typical weekday. There were over 30,000 individuals sampled during their transit trips for the pre-COVID survey.

The on board survey asks passengers about themselves (see “Who takes trips on transit?”), but also about their origin place type (for instance, “home” or “work”), and destination place type (for instance “a restaurant” or “a medical clinic”). The time of survey encounter is also recorded. Using these answers each of the observed trips can be coded into a type. For instance, if a passenger is on a trip from “home” and to “work” at 8AM, the trip is coded as “peak work commute.” If a trip began at work with a destination of a social gathering, the trip is coded as “social / community.”

By adding up the weighted responses from the random proportional sample, a robust inference about the system as a whole is obtained. In 2016, representative of pre-COVID travel, the most commonly taken trip on transit was a commute to or from work in the peak directional period (e.g., trip from work to home in the 4 - 6 PM hour was classified as a peak work commute). These trips were not a majority of trips taken on the transit system, however, as they comprised only 31% of weekday trips. Adding in other types of commutes (off-peak work travel, commutes to and from university / college or student commutes to K-12 schools), **the total work and school commute share pre-COVID was 62% of weekday transit trips** (Figure 1.2).

[4] https://metrocouncil.org/Transportation/Performance/Travel-Behavior-Inventory.aspx

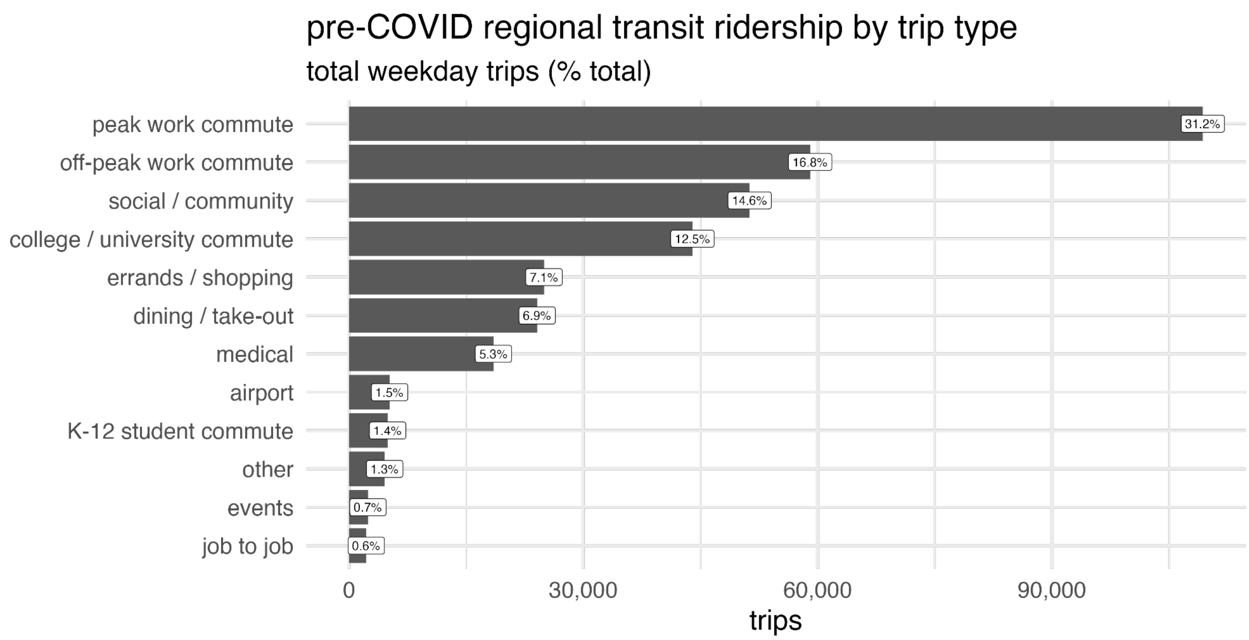

Figure 1.2: Fraction of weekday trips on regional transit routes, by trip purpose

Despite a widely held perception that transit was used mostly for commuting to and from school, people used the transit system for many different trip purposes in pre-COVID times. The most frequent trip classification after work commute was for a "social / community" purpose at 15% of weekday transit trips, followed by "errands / shopping" at 7% of weekday trips, and trips to or from dining or recreational locations making up another 7%. Special events were not specifically included in the sampling design for the TBI on board survey, which was designed to capture regular daily travel. However, less than 1% of trips intercepted by the survey were traveling to or from special events like concerts and sporting events. Summaries from boarding data (see Figure 1.1) suggest the 1% trip share is a good estimate for these large but infrequent events.

1.3.3 Focus: Commuter & Express and Northstar

Together, Commuter & Express bus and Northstar commuter rail made up about 15% of total trips on regional transit in 2019 (Figure 1.1). These services run schedules with transit vehicles designed to efficiently and quickly bring commuters to and from suburban areas to downtown Minneapolis and St. Paul, and other activity centers such as the University of Minnesota Twin Cities campus. The efficiency of service is aided by collecting passengers at regional park-and-ride lots, where the riders can leave a parked car for free to begin and end their trip. Speed and reliability is enhanced by the ability of buses to bypass congestion by traveling on highway shoulders, a transit advantage coordinated through MnDOT and the regional transit agencies.[5]

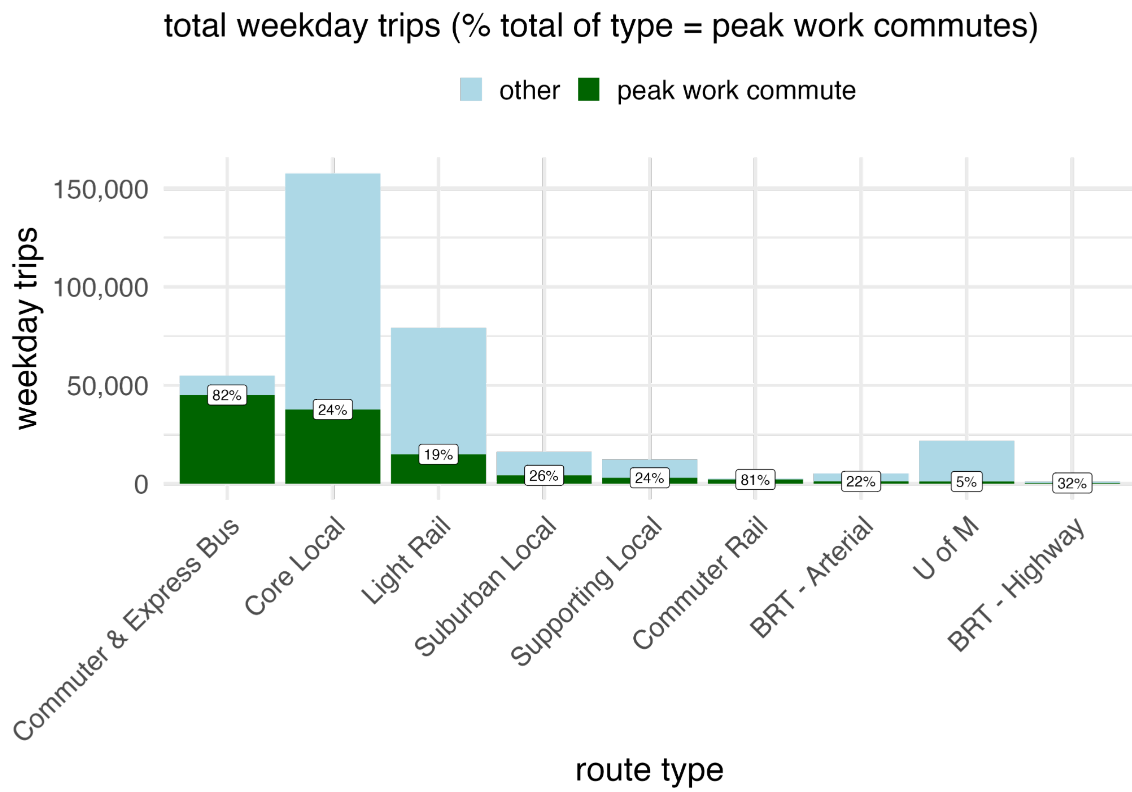

Figure 1.3: Weekday trips by trip classification as peak commute, by route type.

Commuter & express services do not only serve peak office commute trips (for instance, special Northstar service is often provided to and from major sporting events). Additionally the single busiest route in the Commuter & Express classification is Route 94, which travels the interstate between downtown Minneapolis and downtown St. Paul, and serves many different trip types. However, the overwhelming majority of trips on these two types of service prior to the COVID pandemic, were peak work commute trips. This contrasts with every other route type, on which peak work commute trips were taken, but were nowhere near the majority of trips, even on core local bus (Figure 1.3). The volume of these trips was substantial however; even though only 24% of core local bus trips were peak

[5] https://www.dot.state.mn.us/metro/teamtransit/documents.html

work commutes, this represented almost as many total work commute trips as the 82% of Commuter & Express route trips.

1.4 WHO TOOK TRIPS ON TRANSIT PRE-COVID?

By definition, public transit is open to all, but trips on transit are consistently made more often by people who live in places with high accessibility (see Transit Accessibility) and where transit works well (see Attributes of High Ridership Transit). Within these places, some people who share certain household economic characteristics ride transit more than others. There are also higher rates of transit use among certain socially defined and demographic groups, such as those with limited personal mobility, people in certain ages or life stages, and immigrant newcomers. We describe people with characteristics of higher than average transit trip-making, given the same level of service availability, as having "high propensity" to ride transit. We *do not* characterize people as being "captive" to public transportation, or on the other hand as "choice riders." These frameworks remove agency from those who do make trips on transit, can lessen urgency in transit agencies to improve existing service, and are intertwined with racial inequities whether explicit or structural.[6] All transit riders have choices.

1.4.1 The Car is the competition[7]

What many frequent transit riders do not have access to for every trip, is a car. That is an example of a household characteristic strongly influencing propensity to use transit for at least some trip making. This need not be solely economically determined; many people who could afford to do so do not own a car, or have fewer cars than adult drivers. Others who might afford a car do not themselves drive, due to age, health, personal circumstances, or inability to obtain a license. But whether economically determined or not, in the metropolitan region most transit trips are taken by those who do not have a car available for that trip. In the 2016 transit on-board survey, transit passengers were asked a series of questions about the number of cars they had at home, whether they had a driver's license, and whether the car was available for the trip on which they were surveyed. Combining responses to these questions gives an ordered series of response of car availability, from not having one at all, to having one available for the transit trip (meaning that trip was a direct mode choice for transit). **Pre-COVID, nearly two-thirds (64%) of transit passengers did not have a car available for that trip** (Figure 1.4).

[6]Christof Spieler, 2020: Racism has shaped public transit, and it's riddled with inequities

[7] this pithy and powerful phrase is from the Transit Center Who's On Board reports

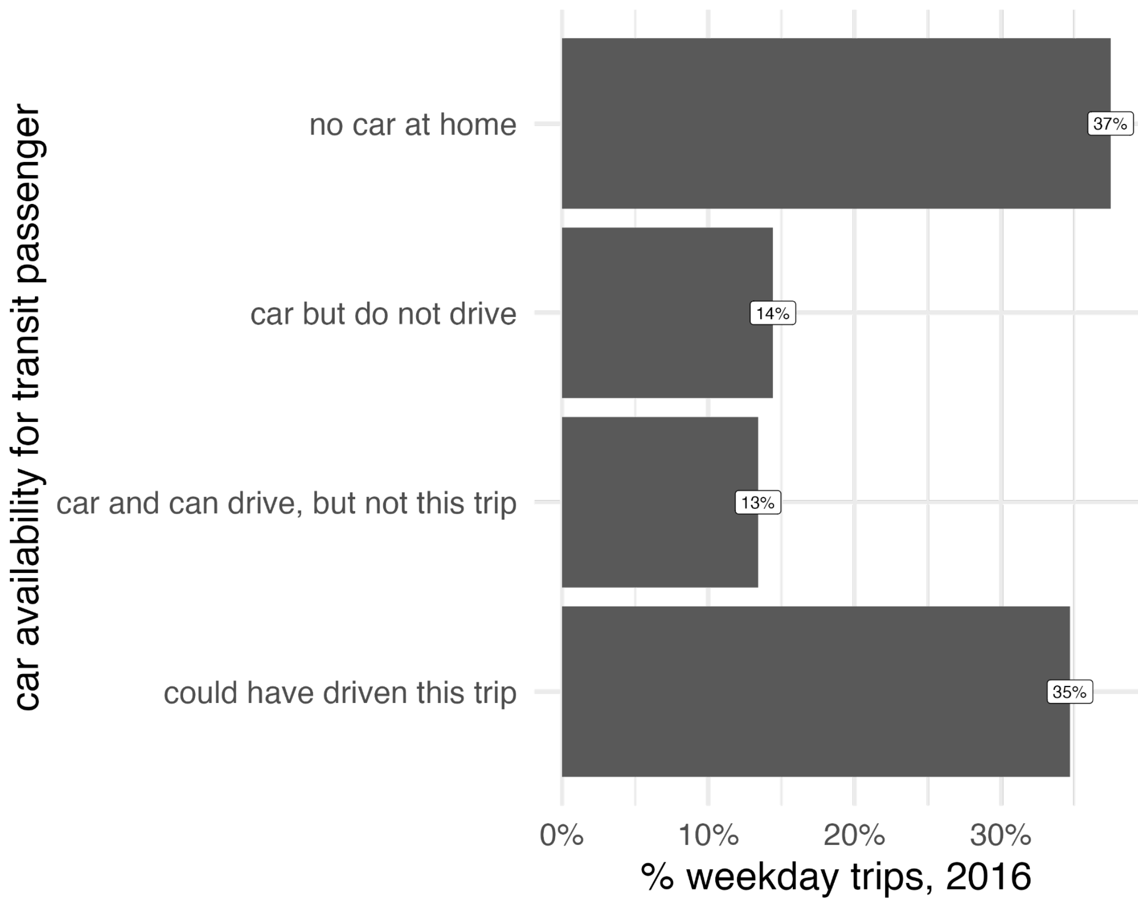

Figure 1.4: The percentage of weekday trips on regional transit pre-COVID, that indicated car availability for the trip on which they were surveyed

Importantly, car availability is not a fixed household or personal characteristic but can vary by *trip*. A car can be unavailable due to someone else using it, being in the shop for repairs, or without enough funds to fill a gas tank. In all these situations the propensity to use transit for trips at this time is increased, even if the household would not be characterized as car-free, car-less, or at an "auto deficit." Similarly, for those without a car in their possession, transit propensity will be less if they have means and preference for summoning a taxi with an app or otherwise using a car they don't own.

1.4.2 Most trips are by riders with lower than median income

Aside from car availability, higher propensity to use transit is seen in those who have other economic circumstances in common. For instance, the household income of those taking transit trips tends to be lower than the median household income (about $74,000 pre-COVID[8]) in the metropolitan area. In 2016 this was about two-thirds of riders, accounting for the response bins that straddle the regional median value (Figure 1.5). Since by definition, half the households in the region make less than the median, that indicates a stronger propensity to ride for households below the median value.

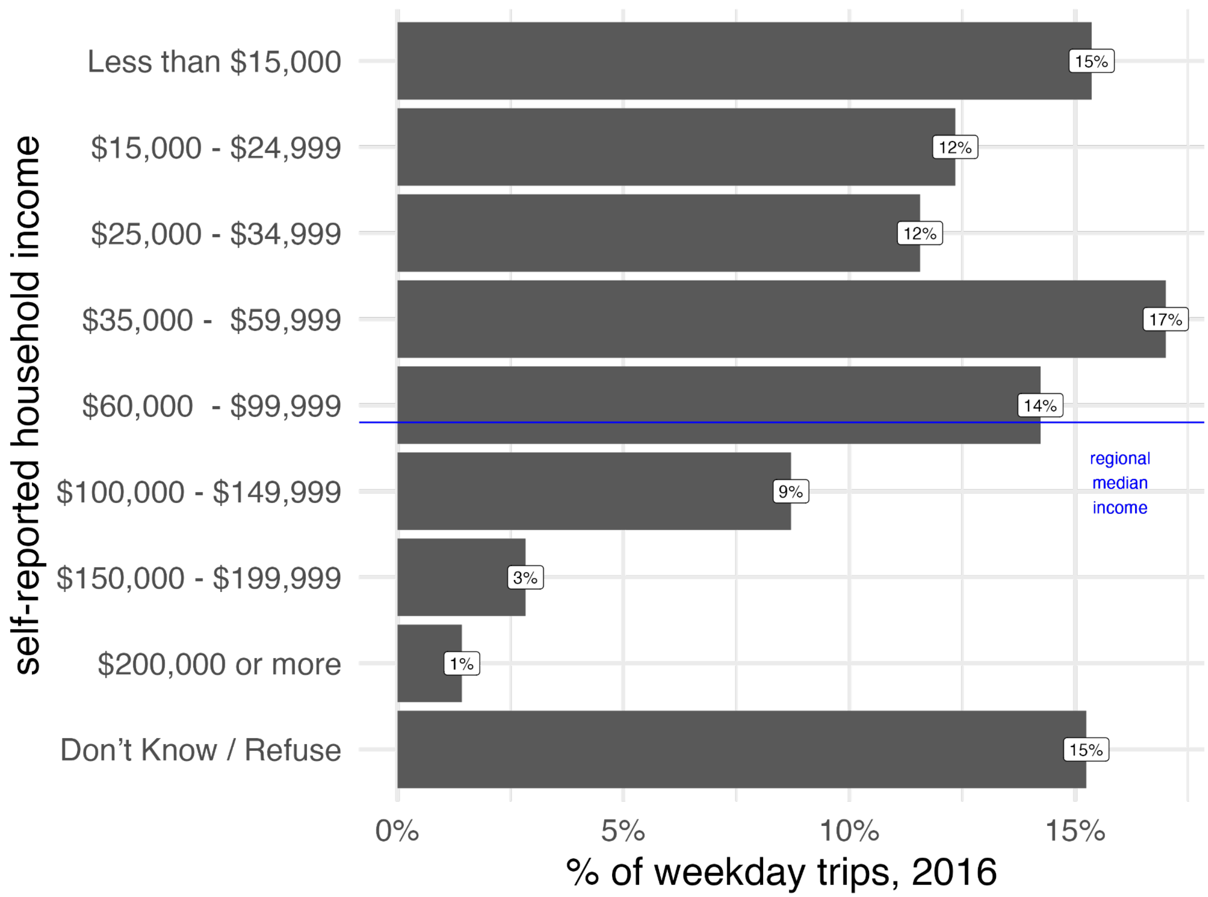

Figure 1.5: The percentage of weekday trips on regional transit pre-COVID, by their self-reported household income for the previous year

As a corollary, lower income households are more likely to rent rather than own their home. Metro Transit has also identified that geographic areas which have a higher percentage of households who rent, have a greater propensity to ride transit, even accounting for the fact that rental housing is often in areas of higher density served by more transit (see “Attributes of High Ridership Transit” below).[9]

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[8] https://stats.metc.state.mn.us/profile/detail.aspx?c=R11000#medianincome

[9] Network Next Arterial BRT Corridor Evaluation, 2020

Pre-COVID, transit ridership did include a mix of middle and high income households, though even including an assumption that most refusals to answer were from higher income households would bring the higher than median households to a third of weekday trips.

1.4.3 Students are Riders

Whether through age (too young to legally drive), economic circumstance, or both, full-time students have higher transit trip making propensity than the typical resident of the region. Two lines of evidence support this. First, from the 2016 transit on-board survey **fully 30% of weekday trips were taken by riders who identify as a student** (Figure 1.6), whether they were traveling to and from school for that trip or not, and whether they were employed or not. This includes 22% of typical weekday trips made by college or university students, 6% by K-12 students, and 2% by vocational and technical school students. The student life stage is also apparent in the age of those making transit trips: 30% of trips pre-COVID were made by people under 25, which matches well their share of the regional population by age.[10] Workers who are not students make the overwhelming share of trips on transit pre-COVID, whether they are traveling to or from work or not on the given trip.

[10] https://stats.metc.state.mn.us/profile/detail.aspx?c=R11000#

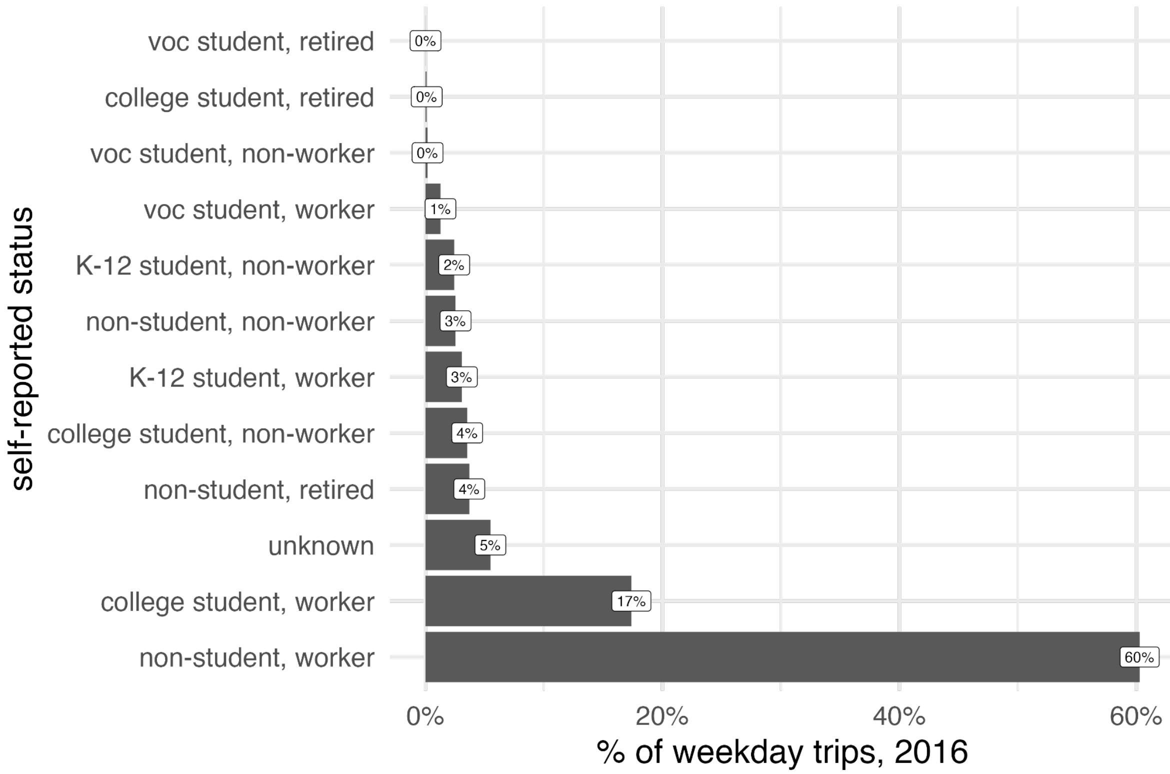

Figure 1.6: combined self-reported and student status of trips made as a percent of weekday total, pre-COVID

1.4.4 Racial Diversity is onboard

In the onboard survey, riders are asked to self-identify their race and/or ethnicity according to U.S. Census categories or their own identification, including all races and ethnicities with which the rider identifies. These data show that people making transit trips are more likely to self-identify as Black, Indigenous, or People of Color (BIPOC) than the region as a whole (Figure 1.7).[11] While only 10% of the regional population identify as Black, **24% of trips pre-COVID were made by riders identifying as Black/African American.** Trips by riders identifying as Native American (asked in the 2016 survey as "American Indian/Native Alaskan") were also more common than the regional population; while less than 1% of the regional population is Native, **fully 2% of transit trips pre-COVID were made by those identifying as Native American.** Trips made by riders identifying as Asian (7%) and Hispanic/Latino (5%) were close to their regional population shares. In a region which is overwhelmingly white, trips on transit are considerably less so. With 73% of the regional population recorded as white non-Hispanic, **only 54% of trips were made by those identifying as white.**

[11] all regional statistics from https://stats.metc.state.mn.us/profile/detail.aspx?c=R11000#POPRACEETH

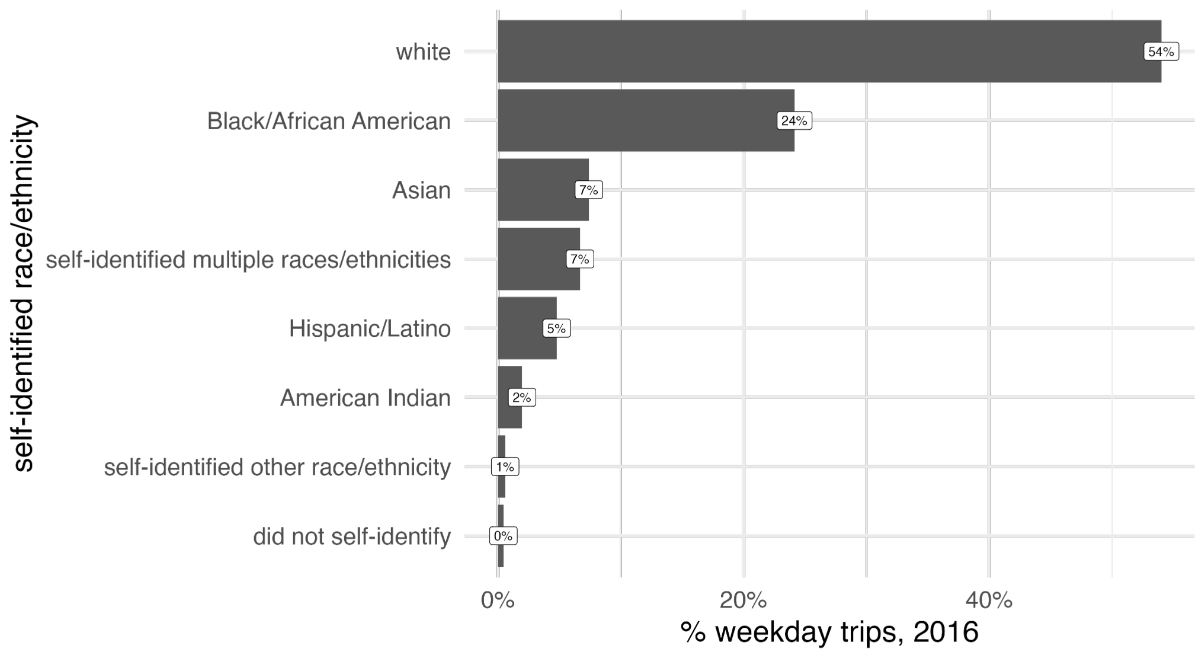

Figure 1.7: self-reported race / ethnicity of trips made as a percent of weekday total, pre-COVID

1.4.5 Cultural Diversity is onboard

The Met Council does not ask about immigration status in its survey practices. However, both the TBI program and the Census ask about languages spoken at home, and proficiency with English. Whether recently arrived or a multi-generational family, the diversity of languages spoken at home by people making transit trips is remarkable. On the transit system pre-COVID, **up to 16% of daily trips are made by people who speak a language other than English at home** (Figure 1.8). In addition to prominent regional languages like Spanish, Somali, and Hmong, other well-represented languages spoken at home of riders include French, Chinese, Hindi, and Arabic, as well as many different Native American languages.

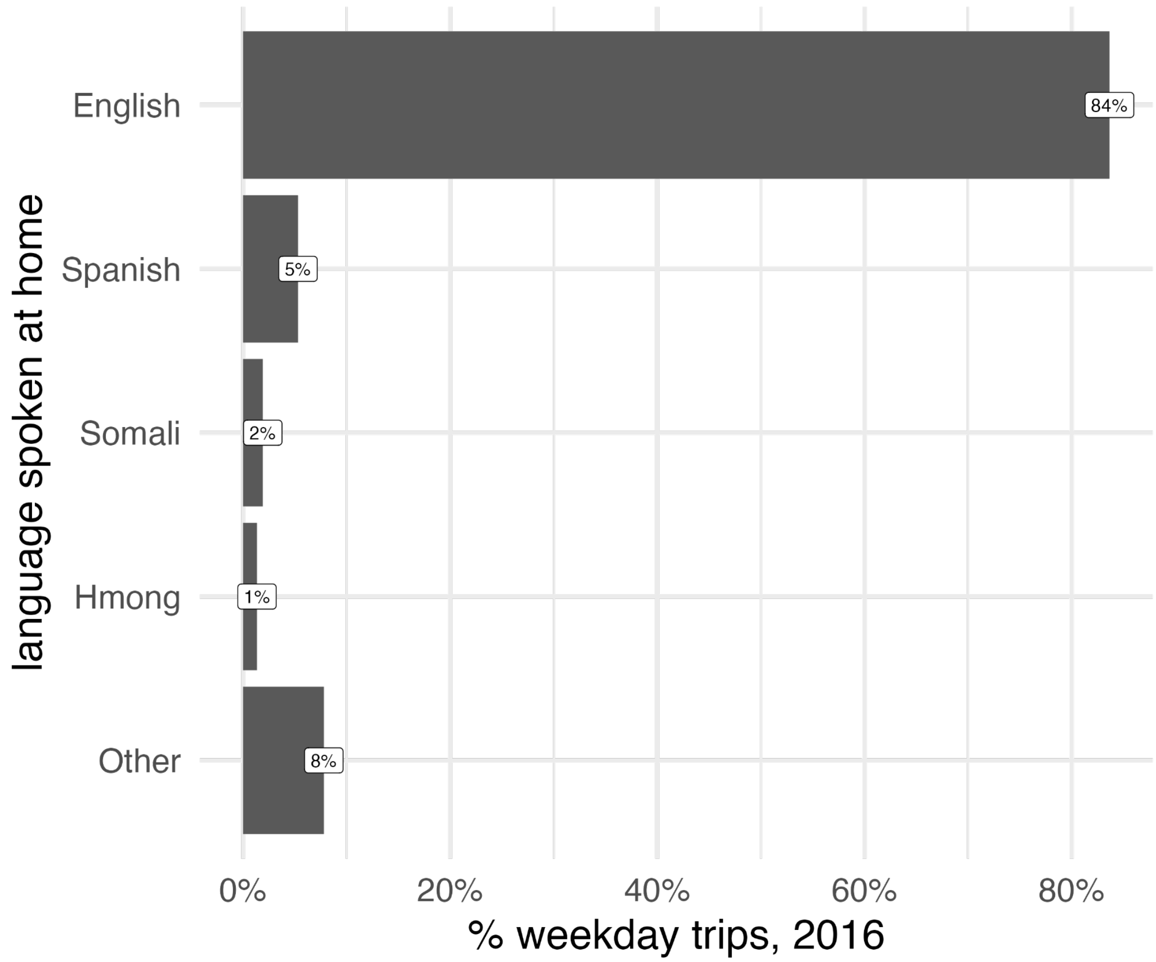

Figure 1.8: Percentage of weekday trips by the self-reported language used at home by the transit passenger. "Other" includes over 120 reported languages

1.4.6 Focus: Who took Commuter & Express and Northstar pre-COVID?

The demographic profile of riders on board Commuter & Express service and Northstar was significantly different than the profile of people making trips across the system in general. Specifically, commute service riders were extremely likely to have a car available for the transit trip: in contrast to the breakdown in Figure 1.4, **85% of trips on Commuter & Express bus and Northstar were made by riders who indicated they had a car available for the trip**. Considering the park-and-ride focus of commuter service, this makes sense. However it also indicates that these riders might be the most sensitive to changes in conditions such as traffic congestion or parking prices, since they are choosing on a trip basis to leave the available car, and take transit.

Commuter service trips were also more likely to be made by people who are above regional median income, as compared with transit riders as a whole (Figure 1.5). **Pre-COVID, 55% of weekday trips on commute service were by riders with median or higher income.** This included 10% of commute trips being made by those earning over $150,000 per household. Riders of these services were also overwhelmingly of working age, with **95% of trips on commute services made by riders between the ages of 18 and 64**, despite roughly 60% of the regional population in this age bracket.[12]

Finally, commute service trips were significantly more likely to be made by riders who identified themselves as white, than riders on the system as a whole. Pre-COVID, **72% of weekday trips on commute service were made by riders who self-identified as white, non-Hispanic**. This is nearly identical to the regional population which in 2019 was around 73% white non-Hispanic according to Census estimates.[13]

1.5 TRANSIT ACCESSIBILITY: AN INTEGRATIVE MEASURE OF SUPPLY

A primary purpose of public transit is to connect people with the places they need or want to go. In addition to measuring the use of transit in ridership, or surveys of people who do use it, there are methods to quantify the potential connections to destinations that transit provides. These potential connections are often referred to as Access to Destinations, or Accessibility. **Accessibility in this report refers to the ease of reaching valued destinations**, which is broader than (but does include) the idea of services available to all people no matter their ability.[14] Accessibility can be measured for various transportation modes, to different types of destinations, and at different times of day. There are a variety of ways to define accessibility, but the number of destinations reachable within a given travel time is highly comprehensible and transparent—as well as the most directly comparable across locations.

This study focuses on access to jobs. In daily travel, jobs represent a significant non-home travel destination. Of course, as quantified above, transit was used to reach many other destination types in addition to workplaces, in pre-COVID times. But job locations also serve as stand-ins for activity, places where things are happening: one person's job is another person's night out at a restaurant; places where lots of people travel to work typically also have other opportunities nearby. This report uses access to jobs as a generalizable measure of potential destinations, that is grounded in high quality Census data.

To calculate Accessibility, travel time is estimated from each place (Census block) in the metropolitan region, to every other place (block) in the region that could be reached in 60 minutes or less, using a

[12] https://stats.metc.state.mn.us/profile/detail.aspx?c=R11000#

[13] https://stats.metc.state.mn.us/profile/detail.aspx?c=R11000#POPRACEETH

[14] a recent National Cooperative Highway Research Program report has great detail about the background and use of Accessibility in transportation planning and performance management: https://nap.nationalacademies.org/catalog/26793/accessibility-measures-in-practice-a-guide-for-transportation-agencies

combination of walking or rolling plus public transit. The blocks which can be reached are assigned the number of total jobs located in that place, as recorded by the U.S. Census.[15] The travel time to those jobs is then used to decide which blocks' jobs should be summed to give the total access count. To do so a cutoff of travel time is established so that for a given travel time (e.g. 45 minutes) the jobs are counted if reachable in 45 minutes or less, but not counted if it takes 46 min or more to reach them.[16] The access to jobs measure is thus simply, the total number of jobs one can reach from the origin block traveling for that amount of time. This process is repeated for every block within the metropolitan planning area, and includes destinations (and their jobs) outside of the planning area but reachable from within it.

To calculate the travel times, we use standard trip planning analysis software[17] which relies on the detailed schedules provided by transit agencies. For the pre-COVID evaluation of access to jobs on transit, we used the combined schedules published by Metro Transit and including service provided by SouthWest, Plymouth metrolink, and Maple Grove Transit; and the stand-alone schedule published by MVTA.[18] Because the trip planning is specific to the minute of departure, it is important to consider the schedule of service, as well as account for variation due to the match between departure time and transit vehicle stop or station departure. We calculated the accessibility using a weekday schedule during a non-holiday week (Wednesday, Sept 25, 2019) departing each location between 7am and 9am (so-called "AM Peak" travel). The median travel time (50th percentile) is calculated across each of the 120 possible departure minutes during the two-hour window, giving a robust estimate for the typical number of jobs reachable from that origin in the window, considering all possible transit routes, transfers, and wait times.

After calculating the value of access to jobs for each spatial location, we transform that data to a more meaningful estimate through weighting by *residents* in those origin places. The goal is to report **the average number of jobs reachable by a person starting out from their residence in a given area**. A place with very high access to jobs where no one lives (the Mall of America, for instance) would be given no weight in the average calculation of access for the City of Bloomington; a place with dense housing

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[15] LEHD LODES data, updated annually with around a two-year lag. https://lehd.ces.census.gov/

[16] Other methods, including some used by Metro Transit staff in evaluating service plans, are more sophisticated about weighting access by travel time, including assigning small but non-zero values to jobs reachable beyond a time threshold. The cumulative metric here is preferred for simplicity of communication, and is highly correlated with other approaches.

[17] Conveyal R5, https://github.com/conveyal/r5

[18] Metro Transit combined GTFS published 2019-09-21, and MVTA GTFS published 2019-09-03, downloaded from https://www.transit.land/

and moderate access would improve the average for the city more than a high transit access place with only a few residents nearby.

Figure 1.9 shows the map of block group, weighted average access to jobs on transit as a percentage of the total regional jobs (that is, the sum of all the jobs denoted by the Census in blocks within the metro area; in 2019 this was 1,836,004 jobs). Figure 1.10 shows a subset of the region focused on the core urban areas of the region. Both maps show the outlines of cities and townships within the metro.

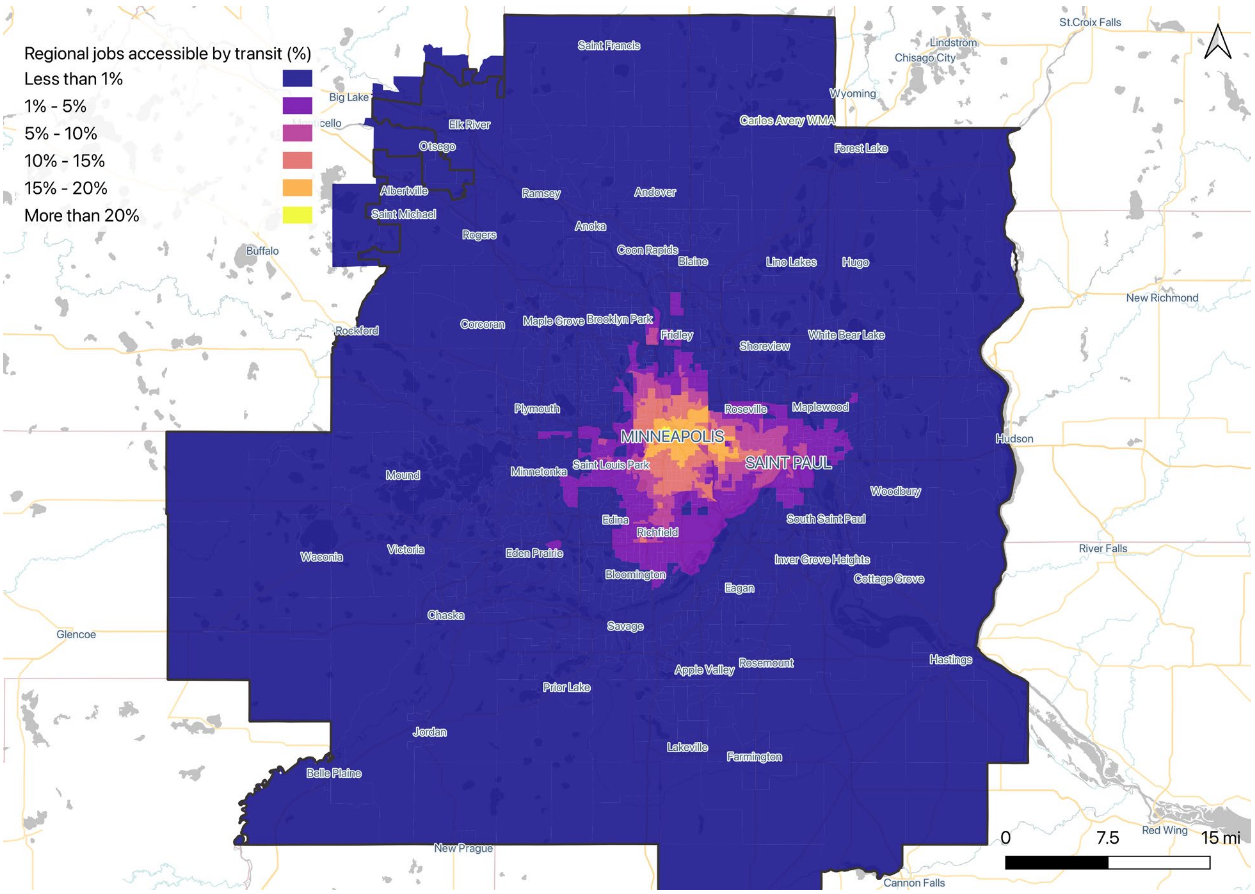

Figure 1.9: block group average access to total jobs as a percentage of the regional total available, for departures between 7am and 9am from each origin, traveling for 45 minutes with walk/roll + transit

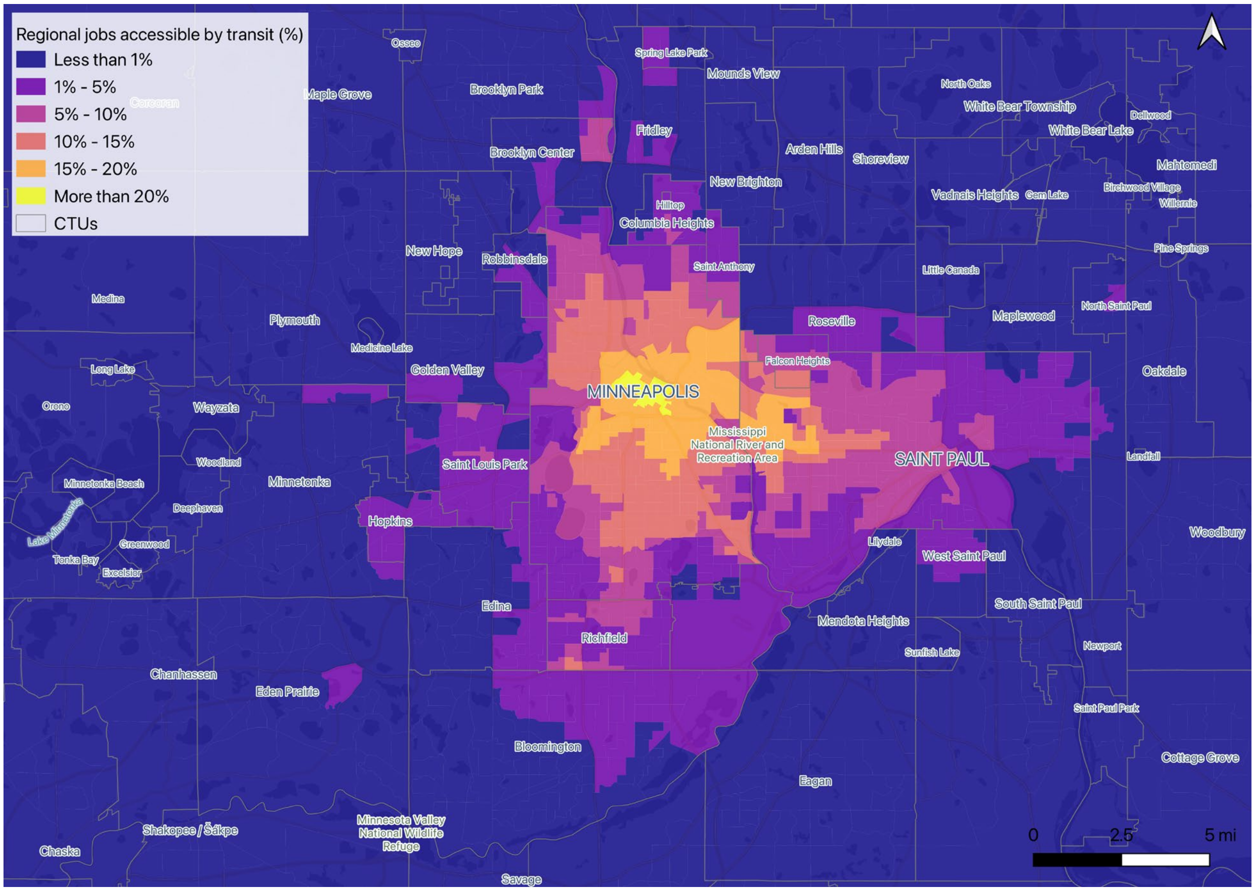

Figure 1.10: block group average access to total jobs as a percentage of the regional total available, for departures between 7am and 9am from each origin, traveling for 45 minutes with walk/roll + transit

From both maps a few trends are apparent in considering the structure of the transit system, and in 2019, the job locations in the region. First, the overwhelming concentrations of jobs in the downtown of Minneapolis, the University of Minnesota campuses, and downtown St. Paul are reflected in high access to jobs in places which are connected by direct, frequent service to those locations. The neighborhoods along the Blue Line and Green Line alignments stand out to those familiar with the geography of those routes, as do the areas along core local routes which connect much of south Minneapolis to its downtown. Suburban areas where transit service is not frequent, walkable, or not highly populated (or sometimes all three) do not show very much average access on the map. Because the trips being evaluated here include walk or roll as the mode to get to and from transit, park and ride access to jobs is not included in the values.

The other trend readily apparent from the access to destinations maps is that the geographies of high access appear to mostly be the areas where the highest ridership services are. Core Local bus and LRT, which in Figure 1.1 are reported together as making up 71% of annual trips, operate by definition in the urban core areas, where they are meant to provide exactly the sort of access to opportunities mapped here. In the next section, we investigate whether this apparent pattern can be made more quantitative.

1.5.1 Focus: Park & Ride Accessibility pre-COVID

Transit accessibility to destinations is calculated using the travel time components of the transit trip, including getting to the first transit stop, waiting time (for the first vehicle and any transfers), and getting from the last transit stop to the destination. Because walk (or roll with a mobility device like a wheelchair) is the dominant mode of connecting to transit, transit accessibility is typically reported for this combination. However, the Commuter & Express Bus and Northstar services rely in large part on trips which use a private auto to reach transit, from a rider's origin to a park & ride lot where the first transit leg is boarded. The rider would then still walk or roll from their last transit stop to the destination, for the inbound commute trip. Calculations using walk mode to first reach transit thus undervalue the access to destinations provided in suburban areas organized around the park & ride service (Figure 1.9 highlights this poor access with walk to transit in areas outside the core urban areas).

We estimate total transit accessibility including park & ride access by the following method, which we apply to the areas of the region for which park & ride service is designed (Transit Market Areas III and IV).[19] We use observed travel speeds by road segment to calculate the auto travel time in the AM Peak period between each origin block in the study region, and park & ride lots having service in Fall 2019. We ignore travel times greater than ten minutes, to approximate the travel time of the walkshed used for reaching transit in the walk + ride method.

With the combination of auto + transit mode, access to jobs in 45 minutes from suburban areas increases greatly, though not evenly around the region (Figure 1.11, compare to Figure 1.9). Most importantly, the scale of access provided to suburban commuters is much higher than walk to transit access, with some areas able to reach 50% of the regions total jobs in 45 minutes (largely owing to the concentration of jobs in downtowns and the University of Minnesota area). However much of this increased access is in the areas of Transit Market Area III closest to a park & ride facility near the urban core. Still, the average resident could reach 20-30% of the regions jobs across a large number of neighborhoods in the suburban ring, using a car to reach transit at a park & ride.

[19] https://metrocouncil.org/Transportation/Publications-And-Resources/Transportation-Planning/2040-TRANSPORTATION-POLICY-PLAN-(2020-version)/Appendices/Appendix-G.aspx

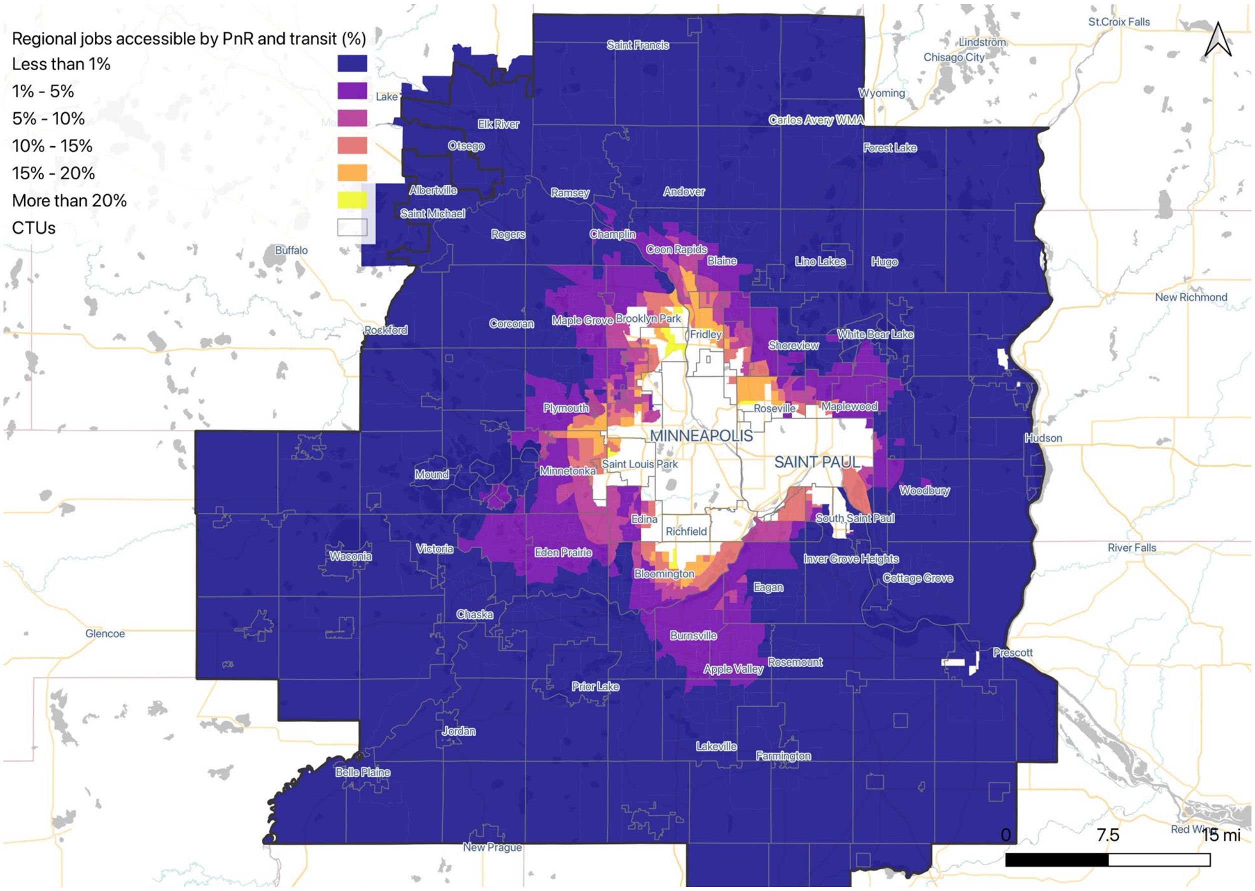

Figure 1.11: Access via auto travel to a park & ride (ten minutes or less), combined with transit + walk travel to job destinations, for commuter service area. Access from core urban areas is not mapped

1.5.2 Accessibility Predicts Ridership Return

Accessibility metrics are used to describe what is *possible*, the opportunities which may or may not be taken by any one traveler. Still, all else equal, the access to opportunities measured for residents of a place should be predictive of the number of trips that are made on transit. This relationship has been explored at the level of commute share in the metropolitan region (Owen & Levinson 2015, Wu et al. 2021), and more recently researchers elsewhere have attempted to model the relationship with finer-grained ridership data as well (Cui et al. 2022). These investigations have emphasized that the supply of transit in the form of its potential use (accessibility) does explain some amount of the ridership observed across a service area, though many other characteristics about people and their environment predict transit use as well (see "Who took trips on transit pre-COVID").

To quantify the influence of transit supply on transit use in the form of trips, we construct a statistical model of ridership explained by transit access, after controlling for other known factors of importance. Specifically, our variable of interest to be analyzed is the average summed daily boardings from all stops within a block group in the metropolitan region in Fall 2019.[20] Although block groups are artificial boundaries from a transit perspective (people of course cross streets to board), this spatial aggregation allows connection to important demographic and jobs information useful for predicting ridership. We use boardings since we quantify access at the residential block location, as in the origins of trips. To predict variation in the trip making we use the average number of jobs reachable in 30 minutes in a walk + transit trip, departing at 8AM on a typical weekday in Fall 2019.[21] These values are calculated at the block level, then a weighted average by resident workers is used to scale up to the block group level to match the scale of other predictors. To control for other important contexts involved with the urban form and characteristics of residents, we used two density measurements. First, the density of jobs (of all types) in each block group was used to control for non-residential trip origin sources and destinations. Second, the density of renters in the origin block was used to control for the socioeconomic status of a neighborhood. While many other dimensions (for instance, median income) can capture socioeconomic status, the renter density variable captures a broader variation from block group to block group, and reflects the unique interaction of residential location with economic limitation which could explain higher transit use (Ding et al. 2022).

Because of the vast differences in accessibility due to the service supplied in different Transit Market Areas, we construct a model which tests different responses to changes in access within each area. The predictors and response variable (daily trips originating in a block) are log-transformed for modeling, which has the benefit of producing a model output called *elasticity* of response of ridership to access. This gives the scale of the response as a percent change, given a percent change in the predictor. With this model we seek to answer the question, **given a 10% increase in job access in a given neighborhood, what percent change in transit ridership is expected?** The answer to that question is expected to differ by Transit Market Area.

In fact after controlling for density of jobs and the density of renters in a given neighborhood, we find that accessibility has measurable explanatory power in the daily trip origins from that place. Specifically the elasticities range from 0.02 - 0.04 (Table 1.2), meaning a 10% increase in access to jobs via transit should produce a 2 - 4% increase in transit ridership, all other things being equal. This is comparable if slightly higher than a similar analysis performed in Portland, Oregon during a similar pre-COVID period, which found elasticities close to 0.02 (Cui et al. 2022).

The responsiveness of transit ridership to access to destinations via transit is much higher in TMA I and II, even after accounting for the higher levels of job density and renters in these areas (Figure 1.12). This

[20] https://gisdata.mn.gov/dataset/us-mn-state-metc-trans-stop-boardings-alightings

[21] Metro Transit combined GTFS published 2019-09-21, and MVTA GTFS published 2019-09-03, downloaded from https://www.transit.land/

indicates that **for a given change in accessibility, a higher ridership return will be gained from applying that accessibility improvement in TMA I and II than in the other market areas**.

Table 1-2: Estimated coefficients for model of ridership (total weekday trips in block group) in Fall 2019

Mean, standard deviation, and high probability region for each coefficient is given, in elasticity units (log-log change).

Coefficients predicting ridership				
predictor	**mean**	**sd**	**5.50%**	**94.50%**
density of jobs	0.31	0.03	0.26	0.36
density of renters	0.12	0.03	0.08	0.17
access to jobs (TMA I)	0.40	0.01	0.38	0.42
access to jobs (TMA II)	0.42	0.01	0.41	0.44
access to jobs (TMA III)	0.31	0.01	0.30	0.33
access to jobs (TMA IV)	0.32	0.03	0.26	0.37
access to jobs (TMA V)	0.19	0.08	0.07	0.32
access to jobs (TMA III+)	0.39	0.04	0.32	0.46
access to jobs (TMA IV+)	0.31	0.07	0.21	0.42
variance	1.60	0.03	1.55	1.65

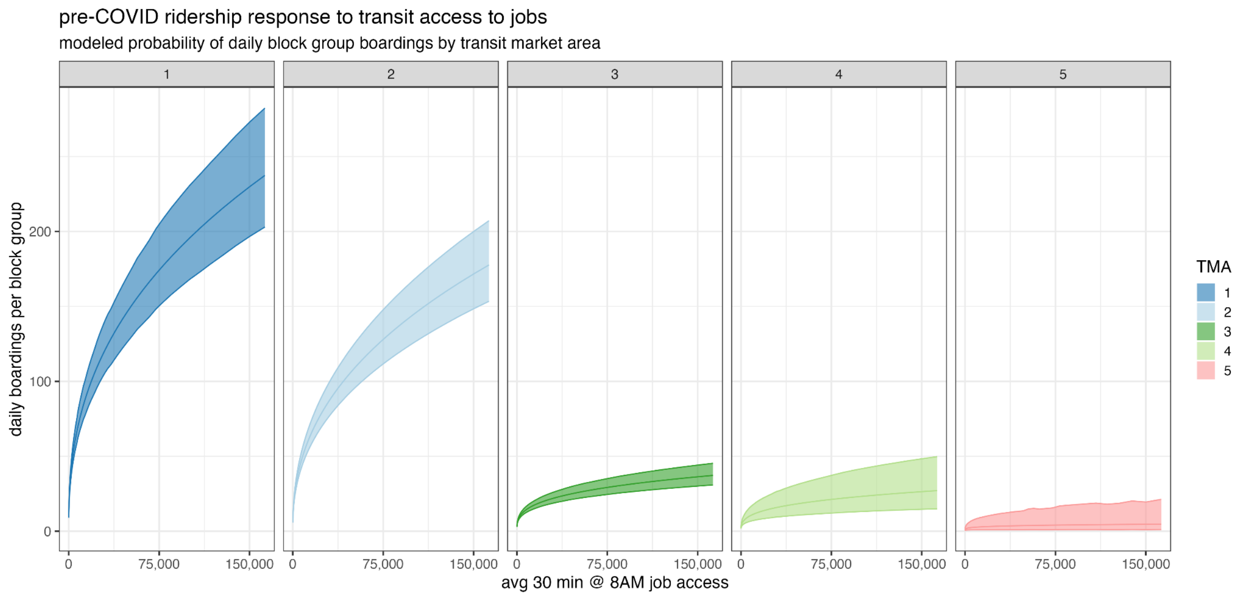

Figure 1.12: Predicted intervals of ridership response to access within each Transit Market Area

Shaded area represents the 95% credible interval of the modeled predicted average block group total rides, as accessibility (on the horizontal axis) changes. These predictions are independent of the job density and renter density components, which also strongly influence expected ridership.

The responses in Figure 1.12 depict the direct effect of access to jobs on daily boardings, but the *total* effect in the model is a combination of the access in the specified TMA along with the impacts of density and resident demographics at each site. Figure 1.13 plots the same response estimates as in Figure 1.12, but with observed data points plotted. The predictive axis of accessibility is limited to the observed access to jobs in each TMA, and observed boarding locations with > 2000 daily boardings are omitted from the figure. Divergence of points from the accessibility relationship is due to the influence of job density and renter density in those locations.

In summary, access to opportunity on transit has a predictable, positive influence on the ridership of a particular geographic neighborhood of residents. Specifically, after accounting for known influence of factors like job density and demographics of residents, the number of jobs reachable in a location using walk plus transit during the AM Peak hours, has an elasticity of 0.02 to 0.04, depending on the transit market area of the residential neighborhood. This indicates a 2 - 4% increase in ridership should be expected with a 10% increase in Accessibility. For reference, a previous study (Owen & Carlson, 2020) by the Accessibility Observatory identified that implementation of the E, D, and B Line arterial BRT routes would result in widespread positive changes in access to jobs well over 10%, both near station areas but also through network effects in places far from the lines being studied (Figure 1.14). Increases in frequency and speed resulting in 10% increases in access to jobs are not easy, but are definitely possible and according to our work, will result in additional ridership.

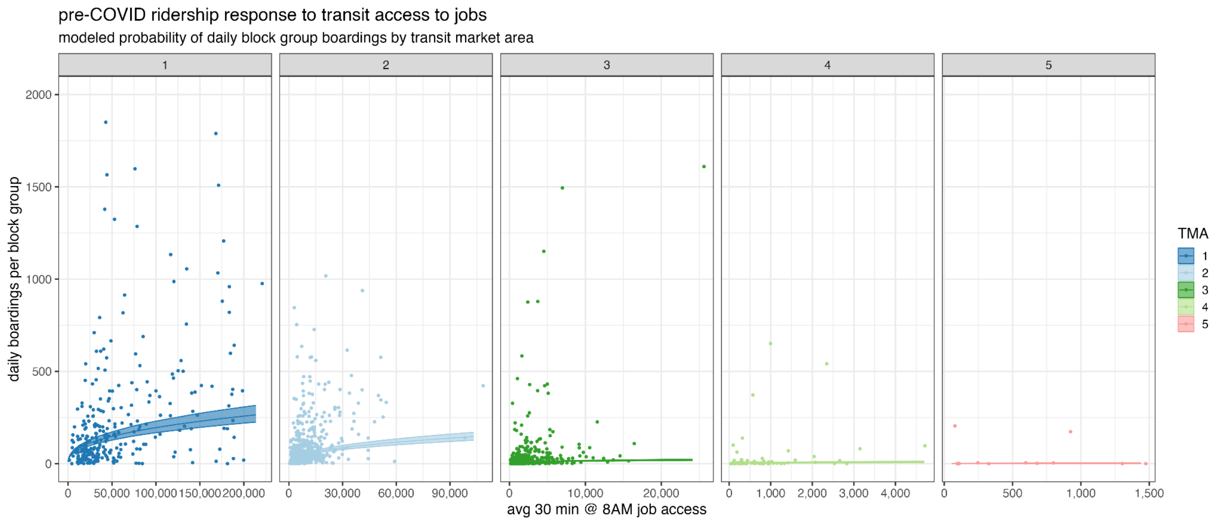

Figure 1.13: Predicted intervals of ridership response to access within each Transit Market Area, along with observed boardings per block group in Fall 2019

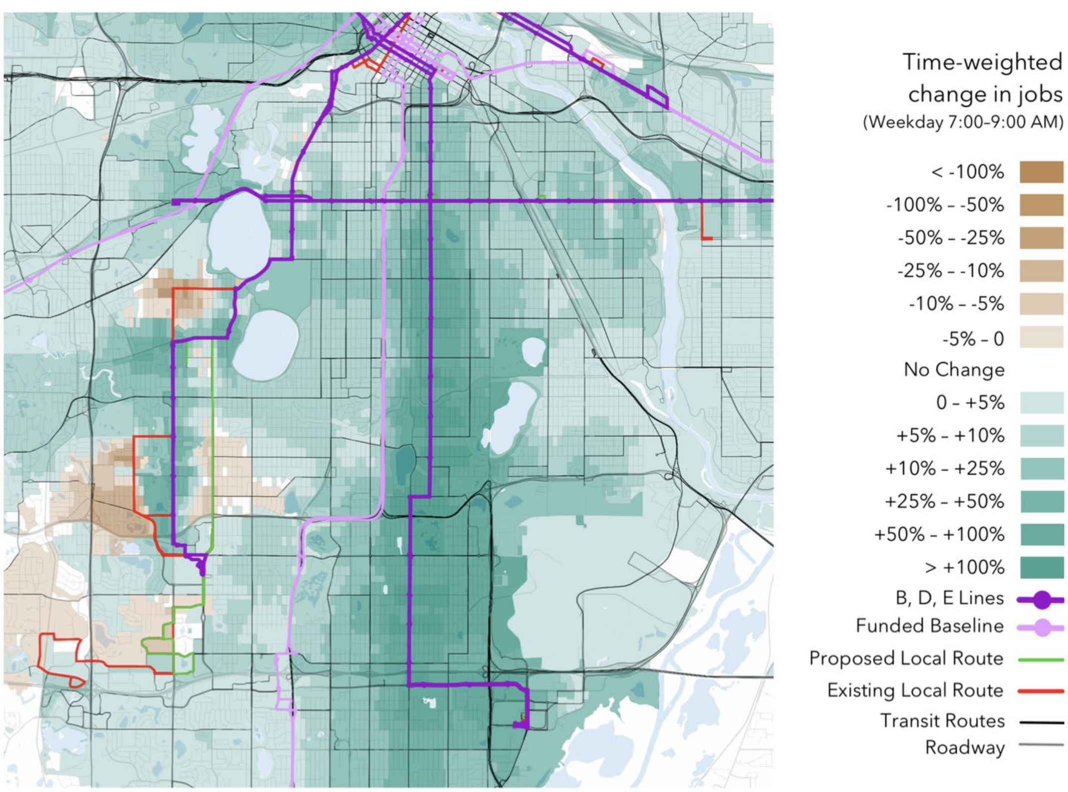

Figure 1.14: Changes in access to jobs, time-weighted change between baseline and scheduled implementation of E, D, and B Line BRT routes (Owen & Carlson 2020)

1.6 ATTRIBUTES OF HIGH RIDERSHIP TRANSIT SERVICE

The goals of providing transit service is not necessarily only to achieve the maximum possible number of boardings, or boardings per unit of cost (so-called "productivity"). Other goals, like providing an option for everyone to get around an area without a car, even if few people consume trips on that service, can be a valid purpose if it is so stated.[22] However, as most measures of transit performance rely at least in part on the consumption of the transit service in the form of trip-making, the fundamental, theoretical and applied basis of transit success in this dimension is explained here.

The attributes described below are of the transit service itself, rather than of the people who may generate the met or unmet demand to travel on transit. However, the reciprocal interaction between land use and the transit being provided means that factors outside of the control of a transit provider will always influence ridership return. Nonetheless, the following descriptions of transit service generalized from first principles are the most reliable descriptors of highly productive transit service, producing more boardings per unit input.[23]

1.6.1 Transit Serves Density

The most basic attribute of efficient, high ridership transit is serving places where lots of people are or want to be, since those are the places where trips of many different types can be collected onboard a single vehicle. In planning, density is separated into residential density and job density (which can stand in for destination density, to a point). In the metro region, the distribution of the highest densities of population and jobs are somewhat different, with population density concentrated in core urban areas while job density is high in downtowns, the University of Minnesota campuses, and the Mall of America, but also in suburban highway corridors not easily served by transit.

1.6.1.1 Transit Serves High Propensity Neighborhoods

In addition to general population density, neighborhoods of people which share certain characteristics are more likely to use transit, as identified by the TBI transit on-board surveys. Places where transit propensity is high include those with high density of residents without a car, a high number of renters, a high concentration of young people, density of people with low income, and a higher concentration of

[22] the ideas of productivity and "coverage" service (known to be unproductive but provided for a different public purpose), were explored in the Met Council Service Allocation Study report produced in 2020. https://metrocouncil.org/Transportation/System/Transit/Studies/Transit-Service-Allocation-Study.aspx

[23] these concepts are described by Walker, 2024 and are somewhat embedded in the statistical definition of Transit Market Areas which guide transit investment in the region

those identifying as Black, Indigenous, and People of Color. **These attributes do not necessarily co-locate in the same neighborhood or identify the same people**.

1.6.2 Transit Serves Walkability

1.6.2.1 Transit is pedestrian infrastructure

The overwhelming number of transit trips begin or end on one end, and typically on both, with a walk or roll. **Pre-COVID, 95% of transit trips included a walk or roll at one end, with 83% walk or roll both to and from the transit vehicle.** Simply put, transit trips overwhelmingly include walking or rolling as part of the journey. Thus where transit stops and stations are located, and the pedestrian environment around the stops and stations, can either facilitate or inhibit trip making on transit directly through the impact on the pedestrian experience. The key environmental factors encouraging walk or roll access to transit include infrastructure for safety, snow clearance, adequate lighting, and even attractive nearby buildings (Cao et al., 2017). Places with no, missing, or poor pedestrian infrastructure, inhibit and discourage transit use even when otherwise favorable to high efficiency service. **In Minnesota, areas which are rendered impassible to pedestrians on a regular basis through lack of snow clearing, result in lower transit use than otherwise might be expected from those locations.**

1.6.3 Transit Runs Frequently, Directly, and Reliably Throughout the Day, Connecting Nearby Destinations

In Jarrett Walker's phrase, "Frequency is Freedom" (Walker 2024). The greater number of times a transit vehicle is available for boarding at a stop, the greater utility to a large number of people (assuming the route serves destinations and people of interest). This is because **a significant component of most transit journeys is the wait for a transit vehicle at the originating or transfer stop or station**. Reducing the wait time decreases the total journey time, increasing the overall speed of the trip, with a number of other benefits. While the wait time burden can be made more tolerable through interventions by the transit agency like providing shelter, seating, heat and light, and real-time information (Fan et al., 2016), ultimately increased frequency of service results in actual reduced waiting time.

Total walk, wait, and transit vehicle time add together to make the travel time of the transit trip. These times, combined with the nearness of the origins and destinations, influence the access to opportunities, which are demonstrated to influence ridership. Briefly, routes which directly connect nearby places with high density of opportunities will result in the highest accessibility, and thus ridership return. Interventions like stop spacing adjustments, transit advantages versus general purpose auto traffic, and direct routing with fewer turns can improve in-vehicle travel time and reliability. Finally, access to opportunities via transit can change drastically across a single day, as routes appear and disappear from potential trip plans. Routes which only run for a limited set of times during the day (for instance, only the two hours of morning and evening "peak"), constrain potential passengers by changing even high access to opportunity values back to near zero within a few hours. **Consistent access to opportunity across all hours of the day produces the greatest potential for demand to match that opportunity, and for a trip on transit to be the result.**

CHAPTER 2: HOW COVID-19 CHANGED PUBLIC TRANSIT RIDERSHIP

2.1 INTRODUCTION & BACKGROUND

Already a deadly disruption worldwide, the COVID-19 pandemic arrived suddenly in Minnesota the second week of March 2020. As the work week of March 9 began, school and work commutes went on as normal. On Friday March 13, Minnesota Governor Tim Walz declared a state of emergency; over that weekend, schools, bars, restaurants and other public places were ordered closed. Many would not open again until Fall 2021. On March 25 an executive order mandated all Minnesotans to stay home, with the exception of travel for certain purposes including travel for "Critical Sector work."[24] Public transit workers were explicitly exempted from the prohibition of travel to work, and Metro Transit continued to provide transit service to support other essential workers and travel needs.

The stay-at-home order was relaxed May 17th, 2020, allowing residents to resume daily movements. But in the intervening month, workplaces and work travel in the Metropolitan region had changed permanently. Work from home practices became widespread, particularly in higher income jobs. Schools, restaurants, bars, and indoor public spaces remained largely closed out of concern for public health, and habitual travel patterns were disrupted. On May 25, Minneapolis Police Officer Derek Chauvin murdered George Floyd in public view, captured on video. The resulting outcry, popular demonstrations, and property destruction culminated in further disruption to daily movements via a nighttime curfew and travel ban on May 29, supported by the deployment of the National Guard into Minneapolis and St. Paul. The curfew was lifted Friday June 5, after days of protest which included extensive damage to buildings in urban neighborhoods. The first few days of June 2020 would be the only time during the COVID era that transit service was fully suspended in the Metropolitan region.

These events and the resulting travel behavior changes of residents have hugely impacted the patterns, purposes, and performance of public transportation in the region. This report summarizes at a high level what the changes in travel behavior are, how regional transit providers have responded to those changes, and how those responses have interacted with continuing evolution of regional daily travel in the pandemic era to impact ridership.

2.1.1 Causality: Travel Behavior and Transit Ridership

The suddenness of the transition into the COVID-19 era results in dramatic images when transit ridership is graphed over time (Figure 2.1). Plots like these emphasize that the arrival of the COVID-19 pandemic fundamentally changed transit ridership. While ridership growth has been steady since early

[24] Executive Order 20-20, Directing Minnesotans to Stay at Home

2021, and there are echoes of previous seasonal travel patterns, the level of patronage is still "COVID era" well into 2024, hovering at around 65% of 2019 levels. But the pandemic impacted all facets of life, and abruptly altered many time series like these, from auto traffic[25] to home purchasing[26] to movie ticket sales[27]. What were the mechanisms of change in transit during the COVID era? And especially, what mechanisms are operating as they did in early 2020, and what mechanisms have been fundamentally altered?

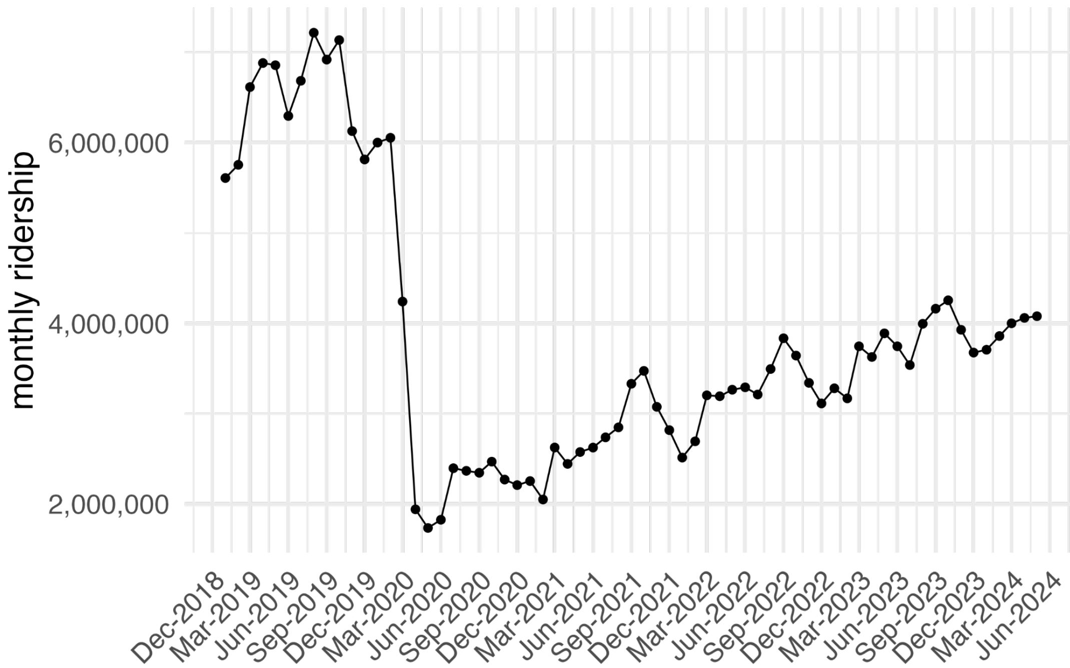

Figure 2.1: Monthly total fixed route ridership, Metro Transit, Jan 2019 through May 2024

The order of causality is especially important in considering what transit agencies can influence, and what they cannot. Transit ridership in the form of trip making represents the successful intersection of an opportunity supplied by the transit agency, and a demand for travel. The supply and demand have reciprocal feedbacks on each other, depending on the context and travel market. The COVID-19

[25] https://metrocouncil.org/Transportation/Performance/System-Measures/Freeway/COVID-19.aspx

[26] https://www.mortgagenewsdaily.com/data/existing-home-sales

[27] https://www.calculatedriskblog.com/2024/01/update-on-high-frequency-indicators.html

pandemic ruptured the balance of these feedbacks, in a particular sequence that helps explain the ridership changes.

2.1.1.1 COVID-19 caused travel behavior changes

The COVID-19 pandemic is the primary cause of ridership change through its impact on individual travel behavior, and demand for trip making. Direct impacts were created immediately from pandemic stay-at-home orders, curfews during unrest following the murder of George Floyd, and closures of destinations in the name of public health. These were general changes to travel behavior, across any mode, not specific to transit ridership.[28] People changed their habitual, regular travel patterns, literally overnight, due to the fact that the regular trips could not be made any more. These changes ranged from a change in mode, to beginning to telework, to being furloughed from a job altogether.

Indirect effects of COVID-19 persisted longer than direct restrictions on trip making. Most prominently, the widespread availability and acceptance of telework, long after formal restrictions on daily movements were lifted, allowed some workers to continue their reduced travel to and from work. Commute trips, the most prominent and typically longest single component of general daily travel, were redistributed among modes which included not traveling at all (Figure 2.2). Both low-income and higher income workers had drastic changes to their travel patterns, not limited to those who used transit to travel to and from work.

[28] The Metropolitan Council conducted a wave of surveys during 2020 capturing rich detail on these travel behavior changes: https://metrocouncil.org/Transportation/Performance/Travel-Behavior-Inventory/Data/2020-Household-Survey-Results-COVID-19-Trends.aspx

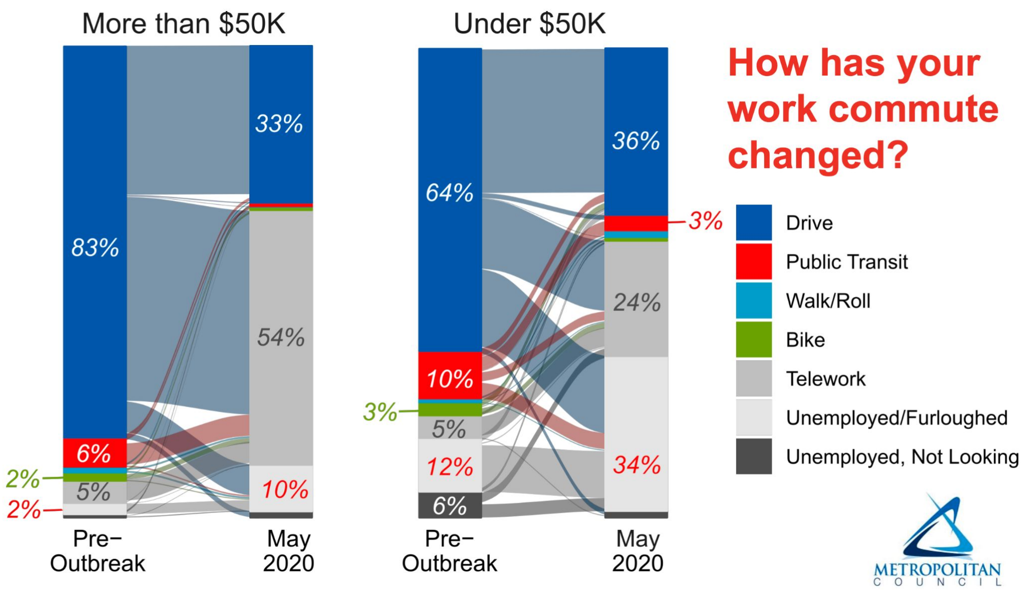

Figure 2.2: Early COVID-19 pandemic travel behavior changes in the Metropolitan region

2.1.1.2 Travel behavior changes reduced transit ridership

The dramatic change in need or ability to travel meant the number of people making trips of all modes declined in May 2020, and the reduction in regional trip making in general persisted far longer than the official restrictions on travel, with Metro freeways 20% below pre-COVID levels through the middle of 2021.[29] Public transit ridership also declined and remained low during this period of general low travel demand. The fact that Metro Transit and other providers were able to continue to provide a robust level of service, thanks to CARES Act funding and the commitment of their workforce, indicates these ridership changes reflected a demand impact. **The lack of demand for regular daily travel, especially the types of travel that had been habitual on transit prior to the pandemic, was the primary initial cause of the decline in ridership**.

Other social factors created disincentives for those that were still traveling, to use transit to do so. First and foremost, transit vehicles represented shared, indoor public space at a time when people were being advised to avoid such places in the name of public health; Metro Transit itself advertised that only Essential Trips should be made on its service, to allow for safe distancing and prevent overcrowding.[30] The same concern for passenger and operator health meant that facemasks were required for riders, by

[29] https://metrocouncil.org/Transportation/Performance/System-Measures/Freeway/COVID-19.aspx

[30] https://www.metrotransit.org/your-covid-19-questions-answered

state and federal order, into 2022, by which time public transit vehicles were among the only places formally requiring them.

Broader social and behavioral changes also manifested themselves on transit and potentially caused reductions in transit ridership. Most notably, complaints from customers and the general public centered around feelings of safety being lower due to perceived homelessness, increases in on-board drug use, and other issues. The drop in general travel demand itself was in part responsible for the change in perception of personal safety; as the Metro Transit Safety & Security Action Plan, developed in 2022, recognized, "[r]iders are reporting feeling less safe because there are fewer people riding due to the pandemic."[31] The action plan laid out specific actions to address the situation, and Legislative direction required further programs to be put in place. Still, issues of concern about personal safety largely resulted from, rather than caused, changes in ridership levels.

2.1.1.3 Transit agencies altered service patterns

As the COVID era wore on, with regular daily travel patterns firmly in a new regime for many people, transit agencies nationwide began to confront a new challenge, in the form of workforce shortages (see examples in Literature Review and Peer Scan, Appendix A). Metro Transit confronted a severe driver shortage in fall 2021, as increased bus operator retirements and a self-imposed hiring pause during 2020 resulted in a wave of trip cancellations, up to hundreds each weekday. **To maintain reliability, service supply was reduced, focusing on trips, routes, and corridors that had lower ridership**.[32] These adjustments changed the usefulness of transit for some people, while maintaining an overall high level of average accessibility for the strongest transit markets (see How Accessibility Changed in the COVID era).

2.1.1.4 Transit ridership reflected new service patterns

As travel behavior patterns evolved throughout the COVID era, demand for transit began to increase as schools returned to in-person learning, social destinations like restaurants and bars again served people in person, and large events began to be held. This generated higher demand for trip making, and when people set out to travel they encountered a different set of opportunities provided by the regional transit system. **How those opportunities met and are meeting the evolving demand, is the focus of this report.**

[31] https://www.metrotransit.org/Data/Sites/1/media/blog/ssap-6-2-22.pdf

[32] https://www.metrotransit.org/Data/Sites/1/media/equity/2021_service-equity.pdf

2.2 TRANSIT ACCESSIBILITY DECREASED IN THE COVID ERA

Reacting to the COVID pandemic-induced changes in travel behavior, along with the cascading impacts of workforce shortages, providers in the regional transit system reduced frequency of routes, suspended operation of routes, and otherwise modified transit service. The impact of these changes can be quantified using Accessibility, or access to opportunity metrics, which describe the usefulness of the transit system in terms of reaching destinations in a certain amount of time (Figure 2.3). For the region as a whole, the average resident could reach 3.2% of regional job opportunities in 45 minutes on transit during the AM Peak on a weekday, and nearly 8% of the region's jobs on average in an hour's journey. These regional averages dropped initially in 2021, then even farther in 2022 as the worst of the driver shortage took hold, especially at Metro Transit. By Fall 2023, access to opportunity across the region had increased somewhat, but remained far below pre-COVID levels. The average resident in fall 2023 could reach 2.6% of regional jobs in 45 minutes, and 6.2% of regional jobs in an hour. **This represents 15,000 to 39,000 fewer jobs accessible via transit available to the average resident.**

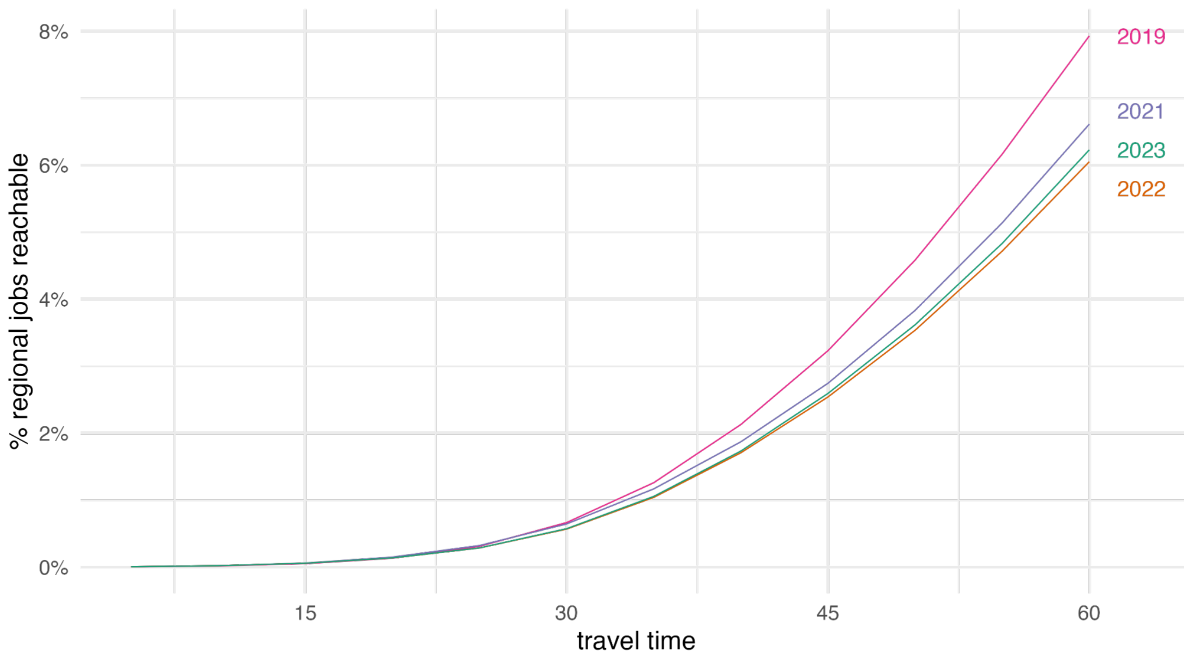

Figure 2.3: Cumulative jobs reachable by travel time, population-weighted regional average as a percent of total regional jobs, using walk + transit for each year

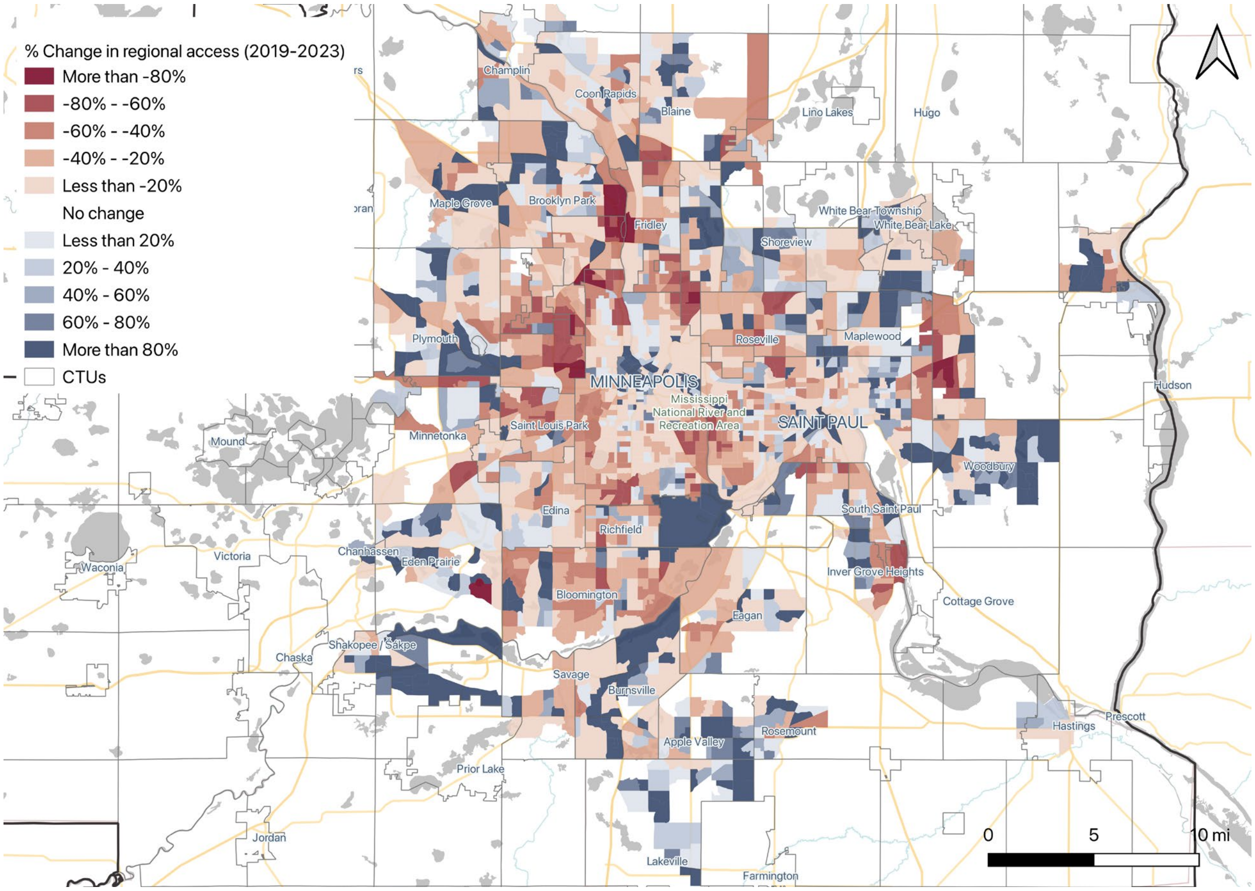

Figure 2.4: Map of percent difference in access to jobs on transit 2019 - 2023, 45 minutes travel during AM Peak

These regional averages integrate across many different transit markets and geographies, and changes in accessibility were not evenly distributed. The map in Figure 2.4 summarizes the changes in transit accessibility at the census block group level across the region. From 2019 to 2023, reflecting the overall decline depicted in Figure 2.3, most areas of the Metro saw a decline in access to jobs via transit. However, some areas, especially the job centers of downtown Minneapolis and St. Paul, and near the Mall of America, experienced increases in the opportunities available to residents.

Summarizing these changes to the Transit Market Area (TMA, Figure 2.5) reveals that within the changes over time, there were also changes in the geography of access. The chart compares the change in access to destinations as a percentage of what could be reached by the average resident of each area in 2019, before the COVID pandemic. The reallocation of service resulted in larger proportional losses of access to opportunities in TMAs II and III, with smaller decreases in TMA I. Modest changes to access to opportunity in TMA IV and V were not impacted by schedule changes over time, and likely represent changes to job locations and residences since 2019.

The changes in access captured in Figure 2.5 represent the outcomes of the planning decisions at agencies, especially Metro Transit, to modify their service so as to prioritize the highest demand, core urban areas (TMA I) over the demand from office commuting park-and-ride users (TMA III). This made sense given the COVID pandemic-induced changes in travel behavior discussed above. Overall, opportunities to reach jobs via transit declined most in the suburban areas of the region which were experiencing the highest rates of shift to telework.

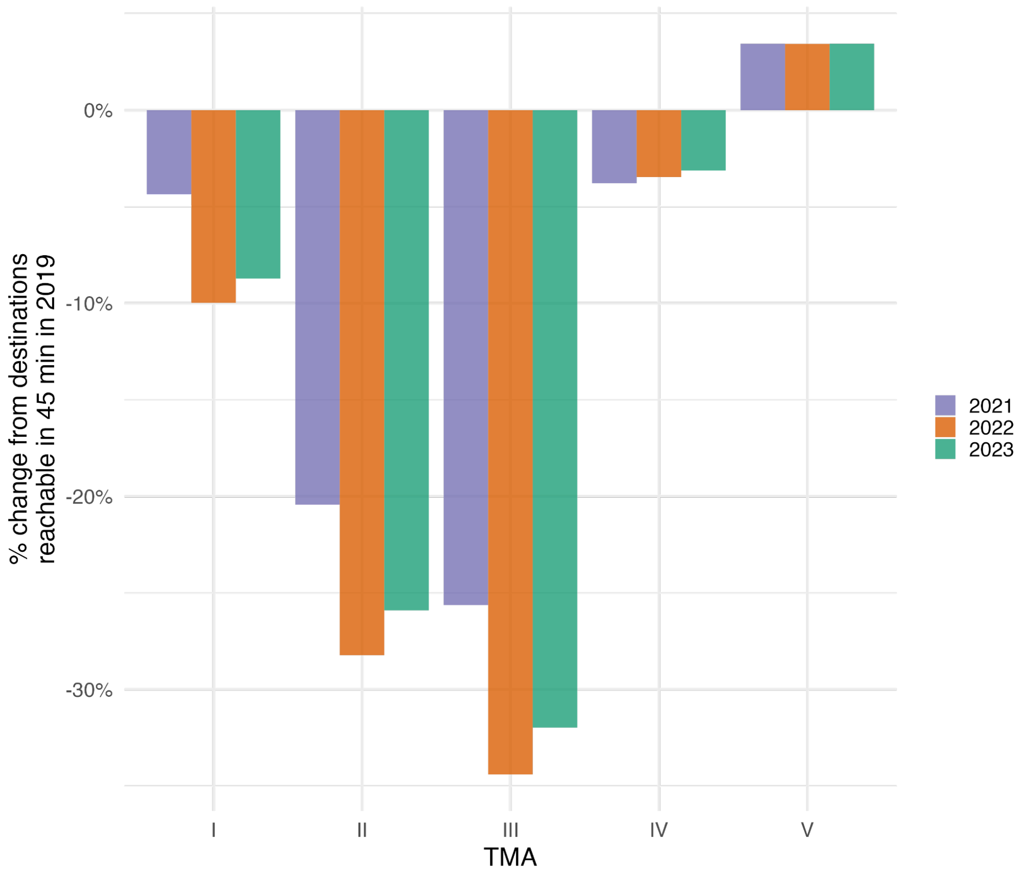

Figure 2.5: Annual difference from pre-COVID access to jobs via transit, by transit market area (TMA)

2.2.1 Expected Ridership Returns from Accessibility are lower in the COVID era

In Understanding Transit Ridership an explanatory model of transit ridership was constructed with inputs of job density, residential density, and accessibility, varying by TMA. The model was re-applied to the updated ridership and accessibility data, to compare the relationships between opportunities on the transit network and use in the form of ridership at the neighborhood scale.

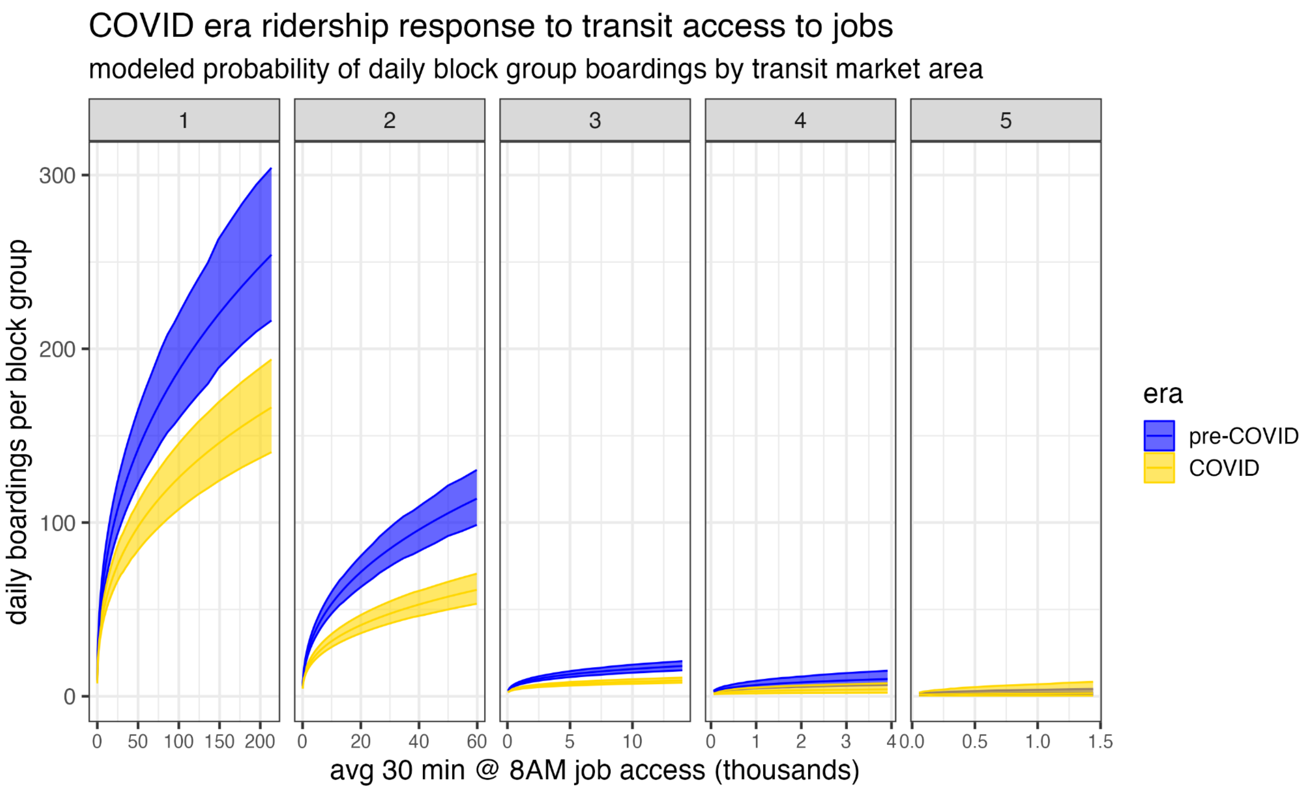

Figure 2.6: Expected ridership at varying levels of transit accessibility, other variables held constant, in pre-COVID and COVID era

As in pre-COVID times, higher transit accessibility produces higher ridership, and the elasticity of response to increases in access to opportunities is highest in TMA I and II. However, when compared to the response to changes in the pre-COVID model, the COVID era ridership is less responsive overall. The trends described in Figure 2.6 are generated by running model predictions on the post-COVID input data, meaning **the same supply of access to opportunities via transit produces fewer expected riders per unit than it did in 2019.**

The *causes* of the reduction in expected riders per unit of transit access provided are not in this model. In general this pattern can be described as reduced demand, external to the provision of transit itself. This reduced demand is likely a mix of change in travel frequency (e.g. due to telework and other job shifts), change in travel mode choice (e.g. change from transit to auto or bike), and change in trip ends (origins and destinations). These causes can interact, such as when fewer trips per week to a downtown job might lead a pre-COVID transit rider to choose an auto trip for those days, because any traffic or parking hassles are both lessened and more bearable.

2.2.2 Focus: Commuter & Express and Northstar Accessibility change

The COVID pandemic-induced shift to telework in the Metropolitan area was not spread evenly, but concentrated among office workers with household incomes over $100,000 (Lari et al., 2024). These workers, who previously might have used a car to reach transit through the extensive park and ride network in the region, were no longer making daily trips to the job centers of downtown Minneapolis, downtown St Paul, or the University of Minnesota Twin Cities campuses. In response to the disappearance of this travel demand, regional transit providers curtailed, suspended, and eliminated services which had been designed to serve these commute trips.

To capture how these changes in service supply manifested across the region, a multimodal accessibility analysis was constructed to reflect the auto + transit mode that Park & Ride service supports. First, residential blocks throughout TMA III, IV, and V (excluding the core urbanized area) were designated as origins, and the park and ride locations[33] throughout the region were used as destinations. From each origin home block, the travel time to all Park & Ride locations reachable in ten minutes by car was generated. Next, these travel times were grafted on to the travel times for transit + walking to all points reachable in 60 minutes, using the Park & Ride lots as trip origins. What results is a combination travel time matrix from each home block, to all reachable destinations in the region, assuming a ten minute or fewer drive from the origin to a Park & Ride facility. The accessibility via park & ride is then the sum of reachable jobs by total travel time threshold (drive time to park & ride, wait time, travel time on the transit vehicle, and walk time to job destinations). This analysis was performed for the transit schedules in operation in Fall 2019 and Fall 2023, using schedules from all regional providers.

The map in Figure 2.7 shows the impact of the Commuter & Express Bus service changes throughout the region. Deep red areas lost the ability to reach park & ride locations which had any service operating at them. Red and pale pink areas experienced deep cuts in transit accessibility. There are pockets of the region that saw maintenance or even increase in accessibility, but for the most part the suburban ring of TMA III shows a significant loss of access to jobs via Park & Ride transit service.

Identifying which home blocks are in which transit provider service area, does help identify that different providers took different approaches to service changes (Figure 2.8). While all providers saw an average decline in Park & Ride transit accessibility, MVTA actually increased access in almost as many residential blocks in its service area as saw declines. In contrast, SouthWest Transit service cuts resulted in around a 70% decline in Park & Ride access to residents in its service area. Plymouth Metrolink service

[33] https://gisdata.mn.gov/dataset/us-mn-state-metc-trans-park-rides-transit-centers

area residents saw a 25% decline in job access via Park & Ride service, while Maple Grove and Metro Transit hovered closer to 50% reductions in access for residents in their respective service areas. Metro Transit, the largest provider of service via Park & Ride, did have some notable increases in accessibility, particularly in the eastern suburbs of St. Paul, but the average Park & Ride user would find the service connecting them to many fewer opportunities in the COVID era.

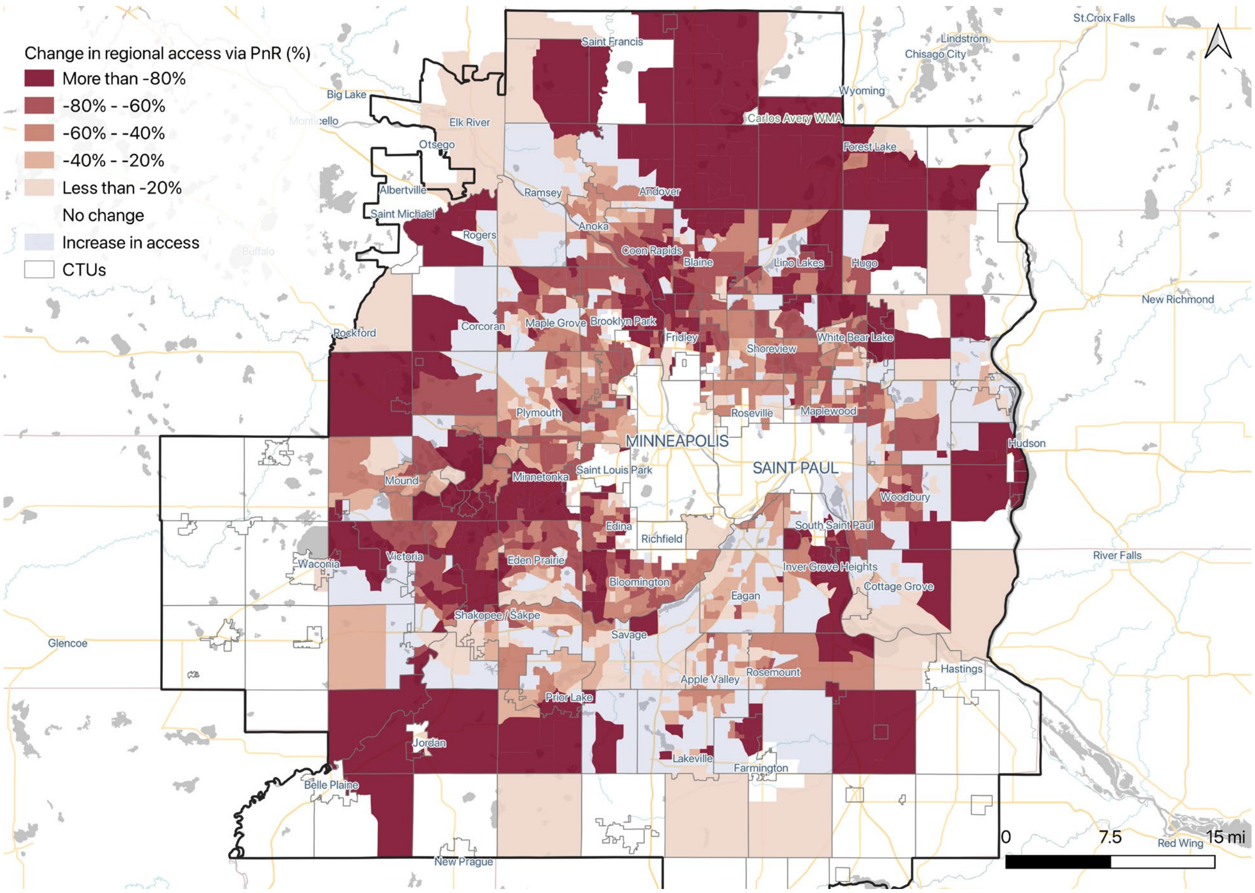

Figure 2.7: Map of change in access to jobs via park and ride transit service, 2019 to 2023, for commuter service area

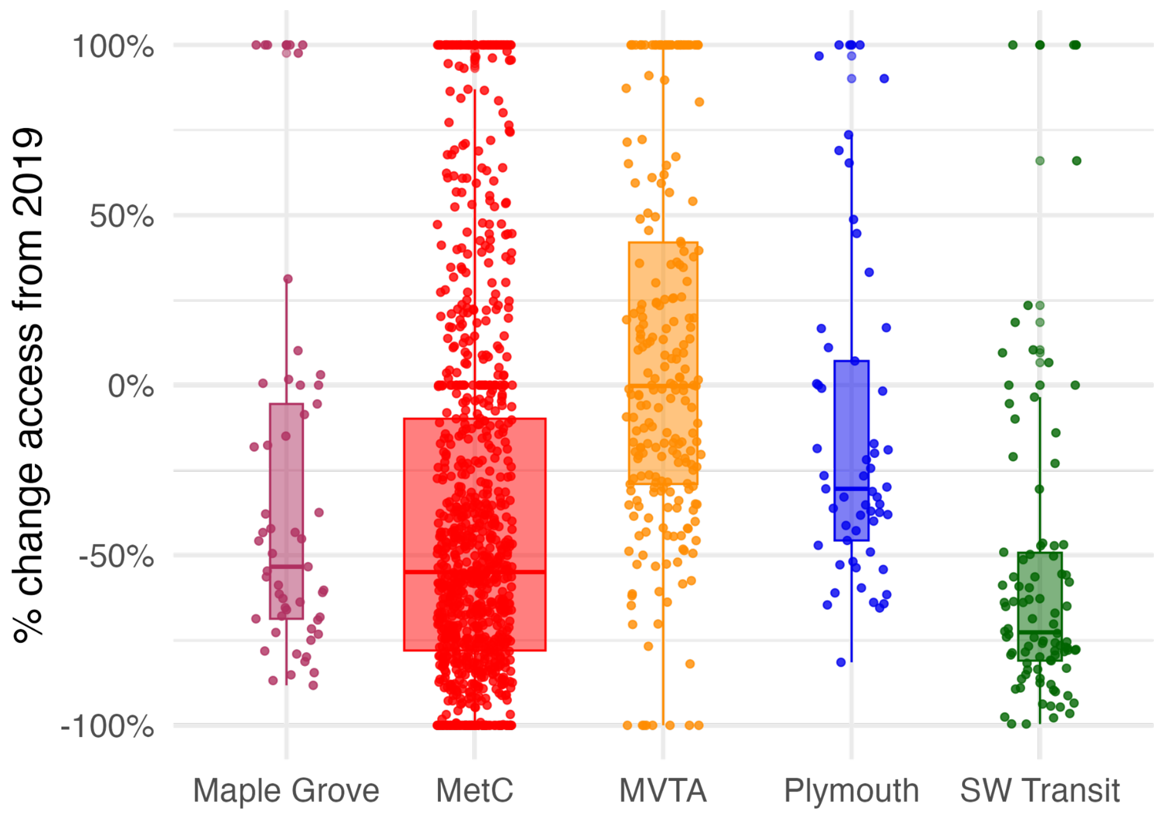

Figure 2.8: Change in access to jobs via park and ride transit service, 2019 to 2023, by transit provider

2.3 COVID-ERA RIDERSHIP PATTERNS IN THE METROPOLITAN AREA

Ridership—trip making on transit—reflects the intersection of demand for daily travel with the supply of opportunities on transit. During the COVID era, supply and demand were perturbed, but not simultaneously, and took different trajectories. Ridership is impacted directly by both forces as well as their reciprocal influence on each other, meaning examining the number of trips alone (as in Figure 2.1) does not provide much in the way of explanation or understanding of what has happened. Disaggregating ridership by elements of service, and by the people making transit trips during COVID, allows a clearer picture to emerge of how both the demand and supply side have evolved since 2020. Referencing the patterns and trends that were evident pre-COVID (2019 and before), also facilitates understanding of the changes that have occurred in transit ridership, as well as what providers might be able to do to shape future ridership.

2.3.1 Ridership declined during COVID, but not equally across route types

Figure 2.9 shows in absolute and relative terms how ridership changed during the COVID era (annual statistics for 2022 are the most recent and reflect COVID-era habitual daily travel). In the absolute sense, the routes with the highest ridership were also the ones to lose the most riders during COVID: core local bus and light rail routes between them saw a decrease of nearly 30 million rides, from a regional system that annually produced just over 80 million transit trips before COVID. At the same time, some route types saw absolute *increases* in ridership. **Specifically, the Metro Transit BRT system added an arterial route (the D Line, December 2022) and a highway route (Orange Line, December 2021) during this period, with ridership growth reflecting ongoing investment in service improvements even during the pandemic era.**

In relative terms, the most significant change was certainly in the Commuter & Express Bus route type. Pre-COVID, this service type represented 14% of ridership in the regional system; during the COVID era it made up only 4%, a ten percentage point drop in contribution to regional ridership. Close to 10 million fewer trips on Commuter & Express service were made in 2022 than in 2019. The implications of the loss of these trips goes beyond mobility and ridership, however. As explored in the Revenue and Expenditures chapter, in 2019 these trips were made by office workers with habitual travel patterns and especially, a MetroPass fare product. The loss of the habitual travel on this route type was accompanied by the loss of the guaranteed fare revenue from these all-you-can ride, pre-tax paycheck deduction passes.

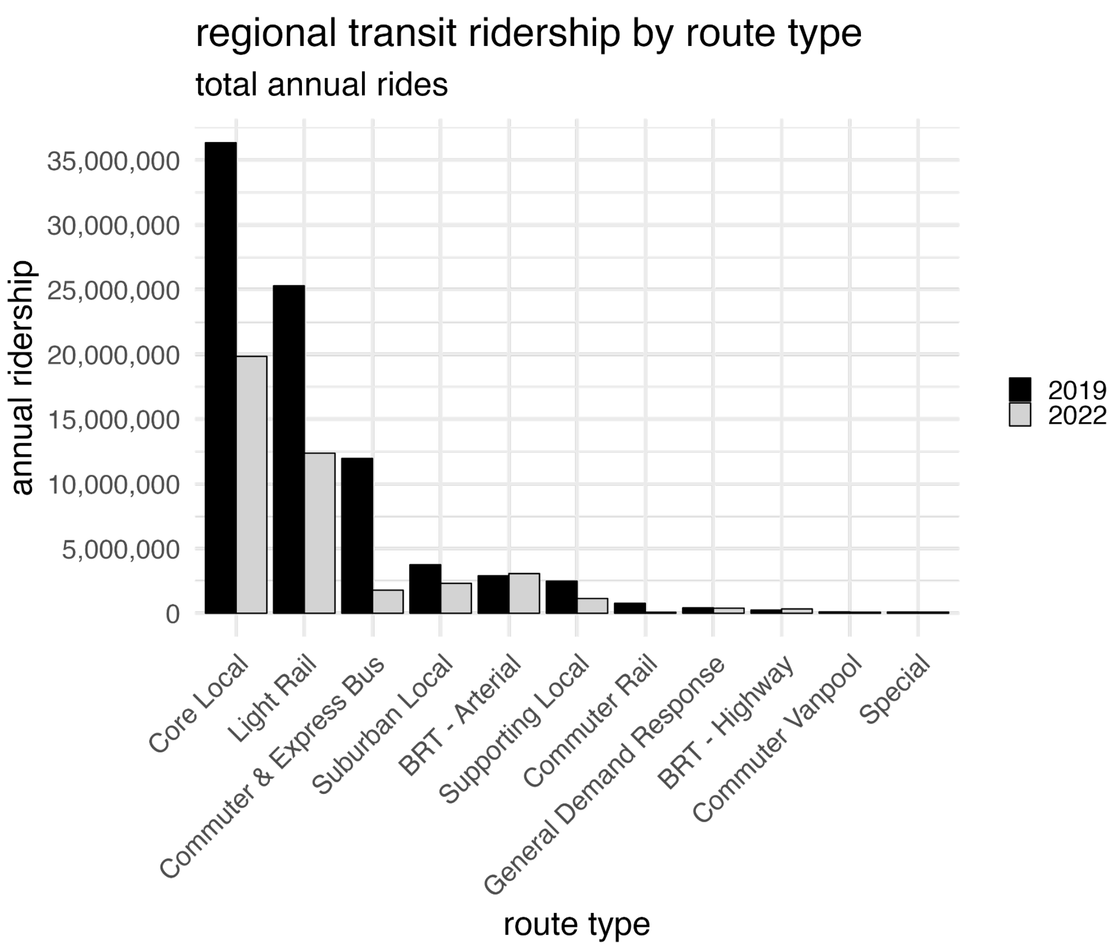

Figure 2.9: total annual regional transit ridership by route type, 2019 and 2022

Examining the COVID era alone, the distribution of ridership among the route types looks fairly similar to pre-COVID patterns. The route types designed to serve all-day, all-purpose travel dominate the trip making by passengers. Core local bus, light rail, and arterial BRT combine for fully 85% of regional transit ridership. Another similarity to pre-COVID distributions among route types is that while light rail (LRT) rightly attracts popular attention due to its unique mode and investment into infrastructure, the Blue and Green lines combined provide less than a third of regional transit ridership annually (30% in both 2019 and 2022). The regional transit system ridership is still overwhelmingly on board a bus.

Table 2-1: Percent total regional ridership by route type, 2022

route type	example routes	Percent of 2022 annual ridership
Core Local	21, 54	47.7%
Light Rail	Green Line, Blue Line	29.7%
BRT - Arterial	A Line, C Line	7.4%
Suburban Local	612	5.6%
Commuter & Express Bus	850, 460, 698	4.3%
Supporting Local	87, 30	2.7%
General Demand Response	Transit Link, SW Prime	1.0%
BRT - Highway	Red Line, Orange Line	0.8%
Special	Events, State Fair	0.4%
Commuter Vanpool	Metro Vanpool	0.2%
Commuter Rail	Northstar	0.2%

2.3.2 Ridership drop and recovery differs across transit providers

Just as relative ridership retention has been highest in the core urban areas of all-purpose trip making, agencies which serve more of these trips have recovered slightly faster in terms of regional ridership. In Figure 2.10, annual ridership by provider is plotted with reference to 2019, such that a level of 30% represents a 70% ridership loss since the COVID pandemic began. In addition to Metro Transit and MTS, which have a variety of services meeting the all-purpose trip needs, MVTA has provided a responsive set of local routes to residents in its service area, and seen faster recovery in ridership than providers whose focus remains primarily commuter and express service.

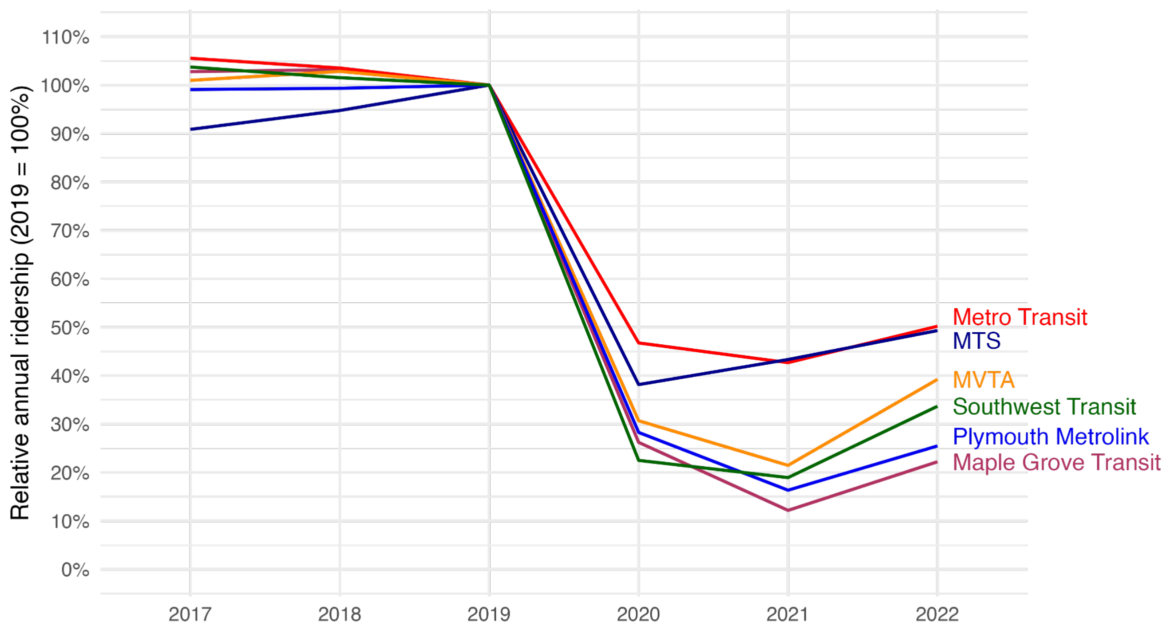

Figure 2.10: Relative recovery of ridership versus pre-COVID, by provider

2.3.3 Regional demand-response transit is approaching pre-COVID ridership

Regional providers offer a variety of forms of demand-response transit, which in 2022 made up a full percent of annual transit ridership (double its relative value pre-COVID). In addition to Met Council's Transit Link and book-ahead services like Maple Grove's My Ride, since the 2015 debut of SouthWest Transit's SW Prime service, multiple regional providers now offer "microtransit" service. This app-enabled demand response service is now provided in the service areas of Plymouth (as Click-and-Ride), SouthWest Transit (as Prime), MVTA (as MVTA Connect), and most recently in Minneapolis (as Metro Transit micro). Annual rides for these services, which are typically deployed in areas or for trip purposes which are not efficiently served by fixed route transit, approached 400,000 trips in 2022. This was just shy of the level in 2019, indicating demand that has not been dampened completely by the reduction in fixed route accessibility in many of the same service areas.

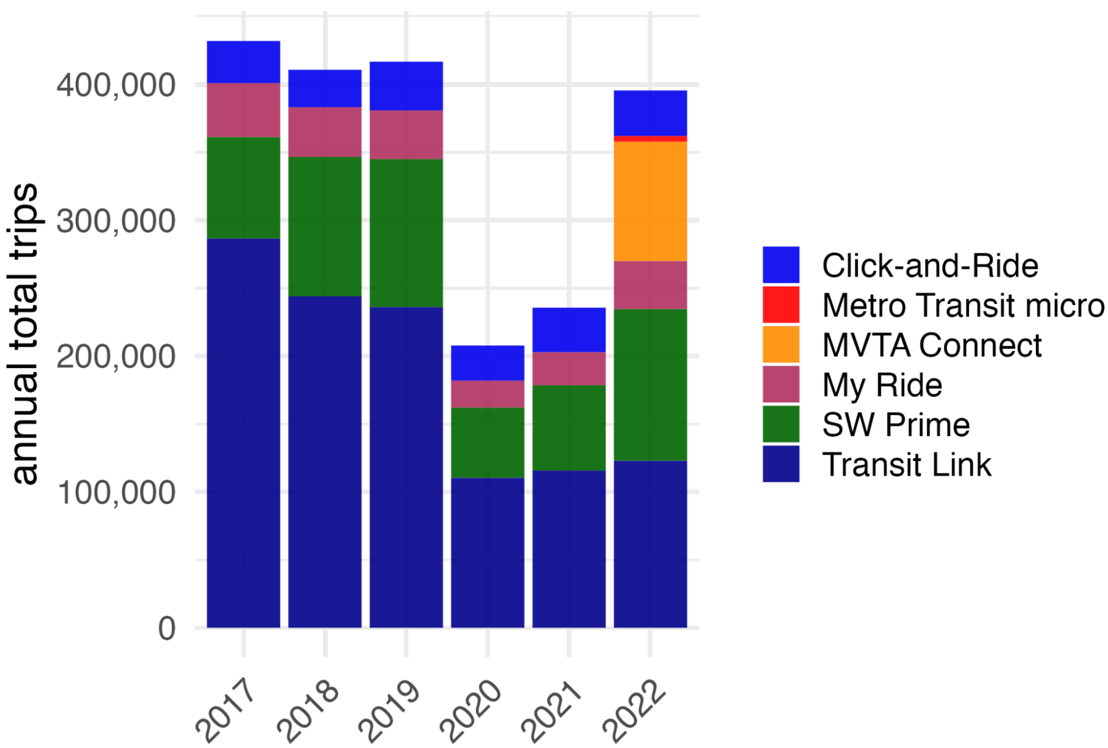

Figure 2.11: Annual total trips on various regional demand-response transit services, 2017-2022

2.3.4 Ridership has redistributed throughout the day

One of the most consequential and lasting changes to ridership during the COVID era has been a shift within weekday travel. In pre-COVID ridership profiles across a service day, sharp peaks in ridership appeared 7am and 4pm (light gray lines, Figure 2.12). The afternoon peak was always slightly broader (roughly 3 - 5:30pm) than the AM peak, which was more concentrated (7 - 8:30am). But most notably, the peaks were roughly equivalent—on average, the same number of boardings were happening in the morning as in the evening, highly suggestive of regular, round-trip commute like travel behavior.

Beyond the obvious drop in the absolute rate of boardings per hour, in the COVID era, there have been two highly significant changes to time of day boarding patterns. First, the afternoon peak has shifted to be earlier (3 - 4pm, dark line Figure 2.12). This peak corresponds much more closely to a concentration of school-related travel (by students and caregivers) and non-office work commutes (second shift workers in retail, food service, and entertainment). By the 5pm hour boardings have significantly declined on the typical weekday. Second, the level of boardings in the peaks are no longer equivalent. Especially since schools and colleges returned to in-person learning, a noticeable peak is measurable in the 7am hour on a typical weekday. But the level of boardings is far below that of the afternoon peak.

Instead of depicting symmetrical round-trip commutes of the pre-COVID workday, the COVID era time of day patterns are much more suggestive of weekend trip making. On weekends, individual traveler schedules are less synchronized in time (although many are traveling to work, most are not) and in space (destinations are not concentrated in job centers but include places of recreation, errands, social activities, etc). As a weekend day goes by, trips overlap and “pile up” in space and time such that a peak in the mid-to-late afternoon can be evident, and in fact result in unexpected traffic congestion or delay when traveling by auto, but it is of a totally different mechanism than the congestion caused by a rush hour commute. This accumulation of trips, for many different purposes, to many different destinations, but sharing transit routes and vehicles, produces the COVID era boardings profile observed in Figure 2.12.

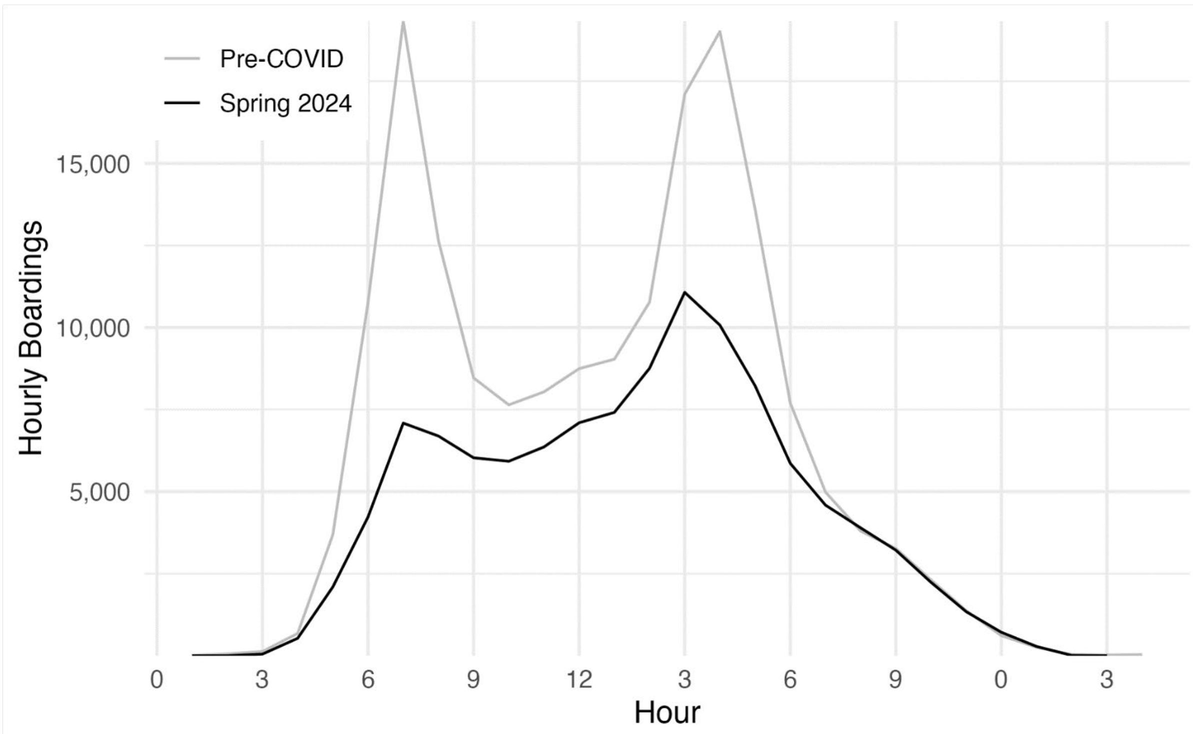

Figure 2.12: Profile of transit boardings by time of day, pre-COVID and 2024

The change in distribution across the day is consequential, and not just as an interesting travel behavior puzzle. Transit services, routes, and infrastructure that are designed to quickly and efficiently carry many people simultaneously to or from similar destination locations (i.e. commuter express service), lose their return on investment when there is no strong symmetrical peak in daily travel. Concentrations of riders in Park & Ride lots to fill buses which can “skip traffic” on highway shoulders into downtowns is not as effective if both car traffic and ridership are light. Operational practices like scheduling drivers on split shifts to drive three or four hours in the morning, and three or four hours in the afternoon, no longer make as much sense given the lower need for excess capacity and the burden it places on individual drivers.[34] The boardings patterns themselves only hint at the underlying travel patterns of individuals, but robust survey data in the COVID era allows us to better understand the people taking transit trips.

2.3.5 Travel to work is still the most common transit trip purpose, but it is no longer dominant

In pre-COVID transit ridership, 48% of all weekday regional transit trips were between work and home (combining direction to or from), with 31% of all trips being in the peak time and direction (towards work in the AM peak, towards home in the PM peak). In the COVID era, this trip type is still a plurality but no longer near a majority of purposes for trips on transit. **The COVID era work commute is only 36% of weekday regional transit trips, with only 20% being in the peak time and direction.** Adding in school (college and K-12) commutes brings the regular commute travel share to about 52% of trips, leaving about half of typical weekday transit trips to be made for purposes other than travel to work or school.

What types of trips are people taking during the COVID era? Shopping trips (including grocery, pharmacy, other retail and service trips) are the single largest category at 23% of daily trip making on transit. Social and community trips (seeing friends and family, religious destinations, community gatherings) represent 12% of weekday trip making. This is only slightly less than the pre-COVID estimate of 14% of daily trips made for this purpose.

[34] a typical Metro Transit split shift might report at 4:30am, drive until 8:30am, be off until 2:30pm, and then drive again until after 6pm.

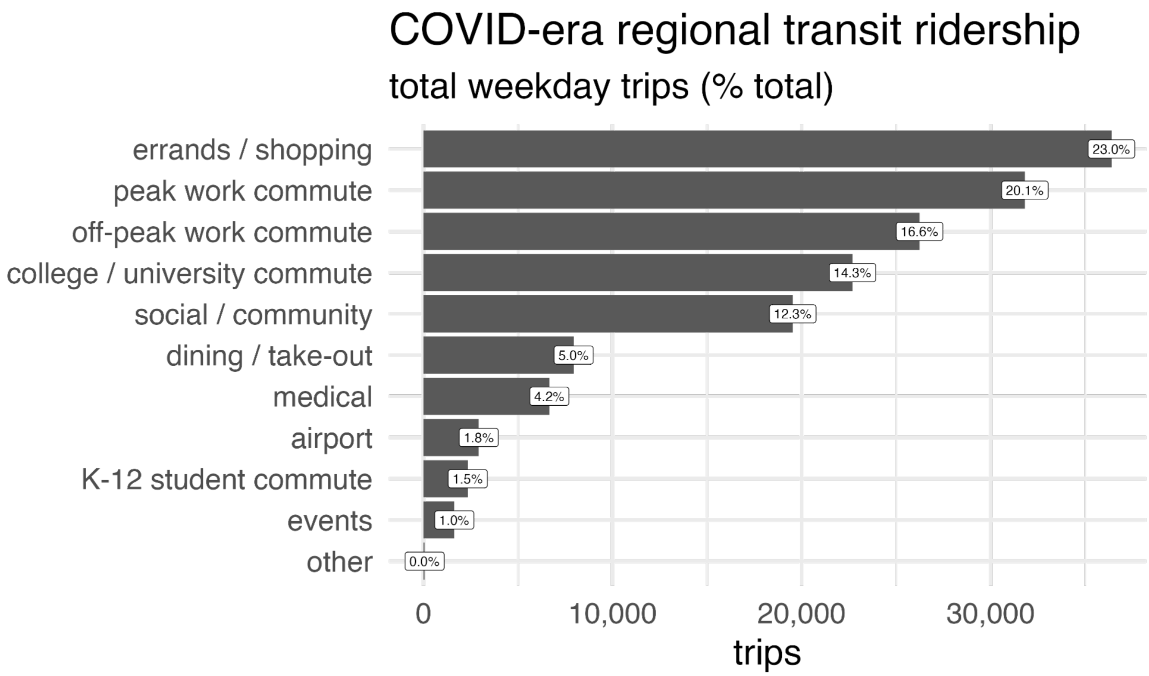

Figure 2.13: Average number of weekday trips and percent of total weekday trips by trip purpose, 2022

Rather than a shift in the types of trips being made, the change in trip purposes reflects the removal of many of the previously made peak directional work commute trips, highlighting trips that were always being made in pre-COVID times. Now, those trips make up a bigger fraction of the daily ridership. Regular trips on transit are made for a diverse set of purposes, across the entire day, for travel to fulfill daily needs. **The consequence of the trip purpose shift is that there are fewer chances that many people are traveling together simultaneously to the same general place.** In addition to commutes to job centers, events like the State Fair, arena shows, or sporting events are examples of these coincidental travel periods that are times are when public transit shines, and is most efficient. Occasional events continue to provide high density ridership, but amount to only about 1% of annual trip making on transit. The reduction in the demand for the most efficient commute trips means the structure and ridership expectation for the provided service, may have to be rethought.

2.4 FOCUS: COMMUTER & EXPRESS BUS AND NORTHSTAR

Together, Commuter & Express bus and Northstar commuter rail ridership made up around 15% of annual trip making pre-COVID. In the COVID era, that has dropped to under 5% (Table 2.1). Additionally, the absolute number of peak work commute trips is now highest on Core Local bus service, followed by light rail lines. In part because of changes in general travel behavior, and in part because of reductions in job accessibility on Commuter & Express bus service, the service designed to carry these trips is now in third place in absolute numbers of trips provided (Figure 2.14). A majority (62%) of trips made on Commuter & Express bus service are peak directional work commutes, but even more surprisingly that indicates that four in ten riders of the service are using it for a different purpose. In pre-COVID ridership, 82% of Commuter & Express bus riders were on a peak commute.

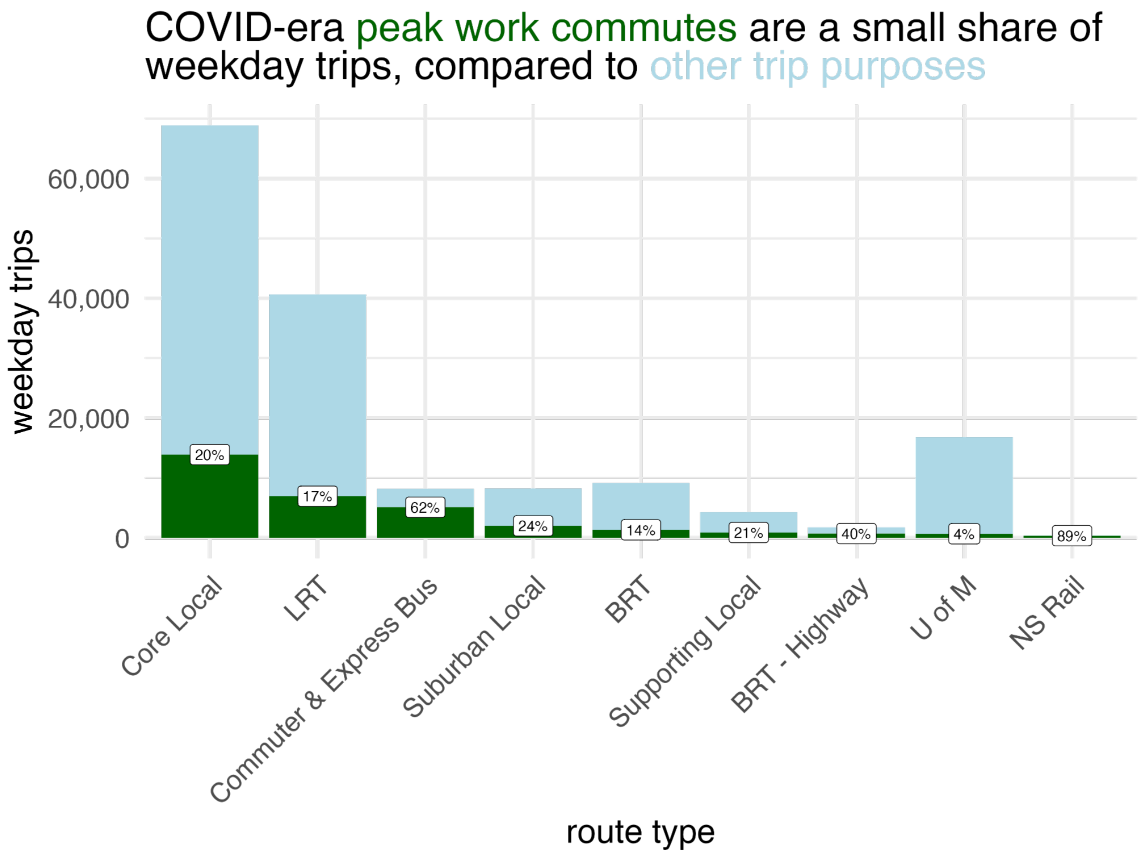

Figure 2.14: Number of weekday trips which are peak work commutes, or not, by route type, 2022

Northstar trip making is still dominated by directional peak work travel (89% of trips in the COVID era), which the service exists to facilitate (generally 80% of the Northstar trains run in the peak direction and time, with the other 20% in the peak time but opposite direction). In absolute terms, Northstar commuter rail did not contribute significantly to regional transit ridership, either before (only 1% of annual ridership in 2019) or during the COVID era (0.4% of annual ridership). In relative terms, however, Northstar represents the mode with the largest drop in ridership during the COVID pandemic, and has not shown signs of a change in trend since 2020 (Figure 2.15). Fall event service to Vikings games in downtown Minneapolis did boost ridership numbers in 2023, and additional trips were added in the Fall 2023 weekday schedule, which resulted in modest ridership addition. Still, through Spring 2024 Northstar ridership remains down over 80% from pre-COVID levels. Given the complexity and cost of the service, there are not simple adjustments to respond to the change in travel behavior which is driving this ridership pattern, though a recent Met Council study provided recommendations for policymakers to consider.[35]

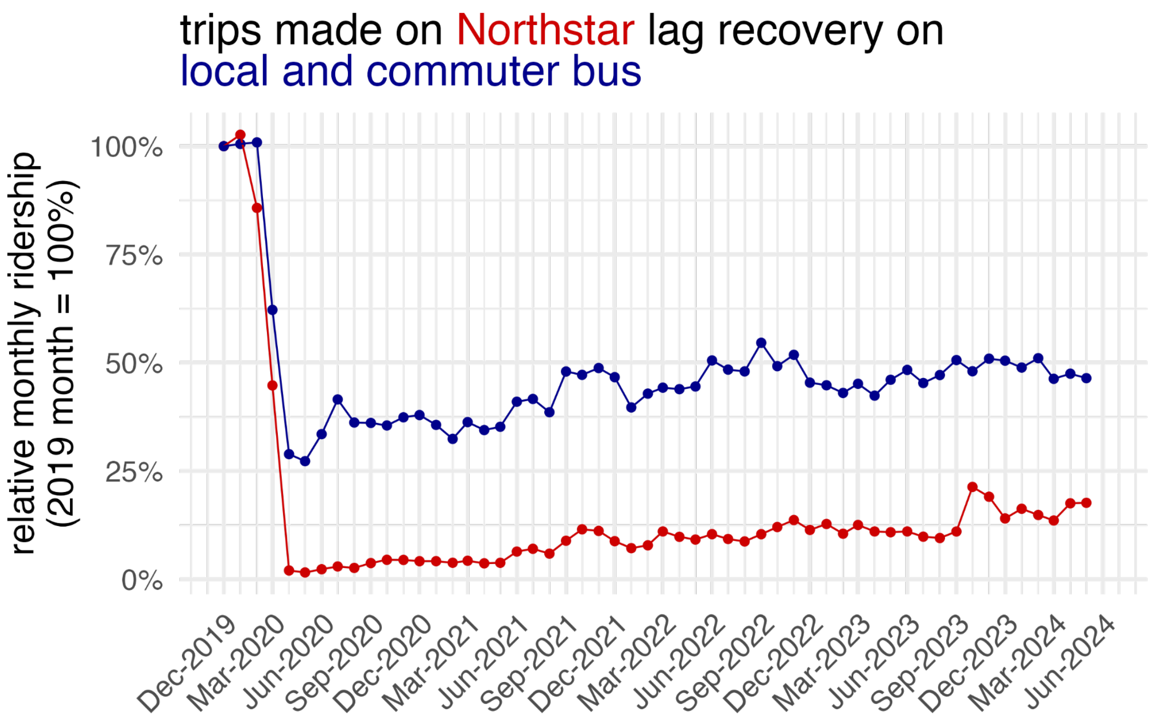

Figure 2.15: Relative recovery of monthly ridership compared to pre-COVID monthly average, Northstar commuter rail versus local and commuter bus

2.5 THE CAR IS THE COMPETITION: COVID ERA AUTO TRENDS

As depicted in Figure 2.1, the initial COVID-19 pandemic disrupted all regular travel, not just transit. In response to the same factors that led to transit ridership decline, auto use also plummeted in March 2020, through a combination of reduction in trips and shift to telework. In the Metro area, MnDOT maintains high frequency roadway sensors which allowed the Met Council to track and model freeway usage as the pandemic era began. The time series shows a steep drop and slow recovery of traffic

[35] https://metrocouncil.org/Transportation/System/Transit/Studies/Northstar-Rail-Corridor-Post-Pandemic-Study.aspx

volumes in the highway network (Figure 2.16).[36] In contrast to transit ridership, however, by mid-2022 the average trend was within 10% of pre-COVID expectation, and continuing to climb.

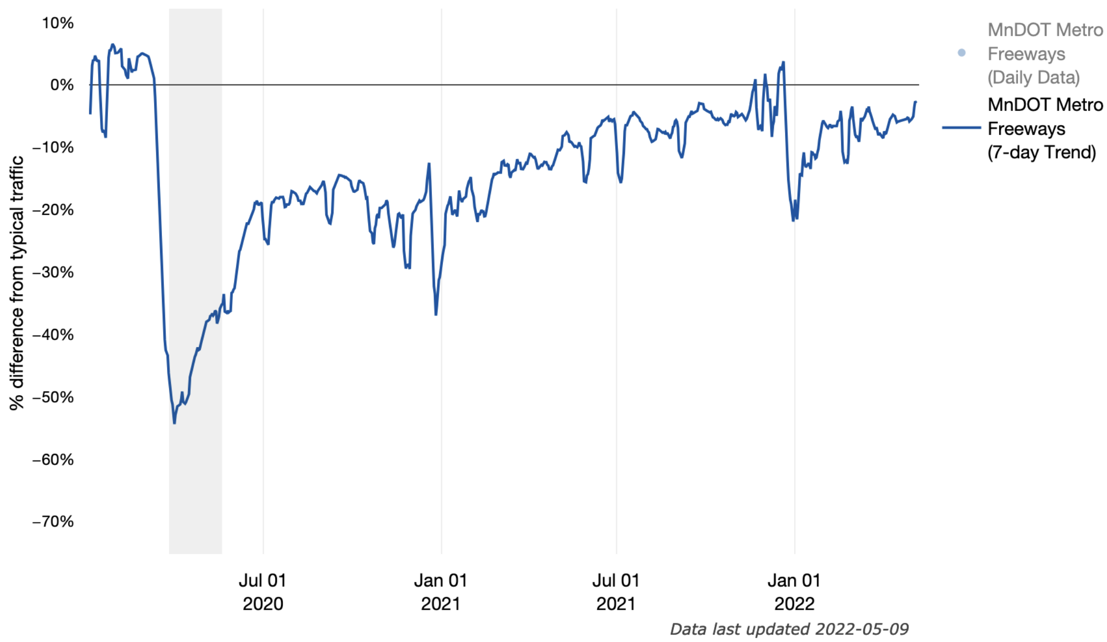

Figure 2.16: Relative recovery of metro area freeway utilization to pre-COVID expectation, 2020-2022

Travel by private auto, mostly alone, remains the dominant transportation mode in the Metropolitan region. Using the census ACS 1-year data for 2022, 74% of area residents traveled to work by auto (car, truck, or van). This is lower than the pre-COVID share which was 86%, but the difference is more than explained by a rise in telework, which in 2022 included fully 21% of regional workers.

Because of this dominance in mode share, understanding trends in availability and cost of private auto travel is helpful for putting transit ridership changes in perspective. This is especially true for Commuter & Express services which pre-COVID served a market overwhelmingly able to use a car for their given transit trip.

2.5.1 Auto availability: car registrations in the Metro region

The COVID pandemic disrupted the consumer market for new and used vehicles, with supply chain and other issues creating shortages nationally, leading to low sales and high prices.[37] Still, ownership of cars

[36] https://metrocouncil.org/Transportation/Performance/System-Measures/Freeway.aspx

[37] https://www.nada.org/nada/press-releases/nada-issues-analysis-2022-auto-sales-and-2023-sales-forecast

as measured by active registrations remained fairly constant in the metro region (Figure 2.17). Registrations are provided by county, showing Hennepin has far and away the most vehicles registered at more than twice any other county; of course, the population of Hennepin county (1.3 million) dwarfs the others as well (runner up Ramsey county has 553,000). Considering roughly 80% of the regional population is of driving age, and not accounting for the myriad of barriers to residents for owning and operating one, there are regionally more than one car per potential driver.

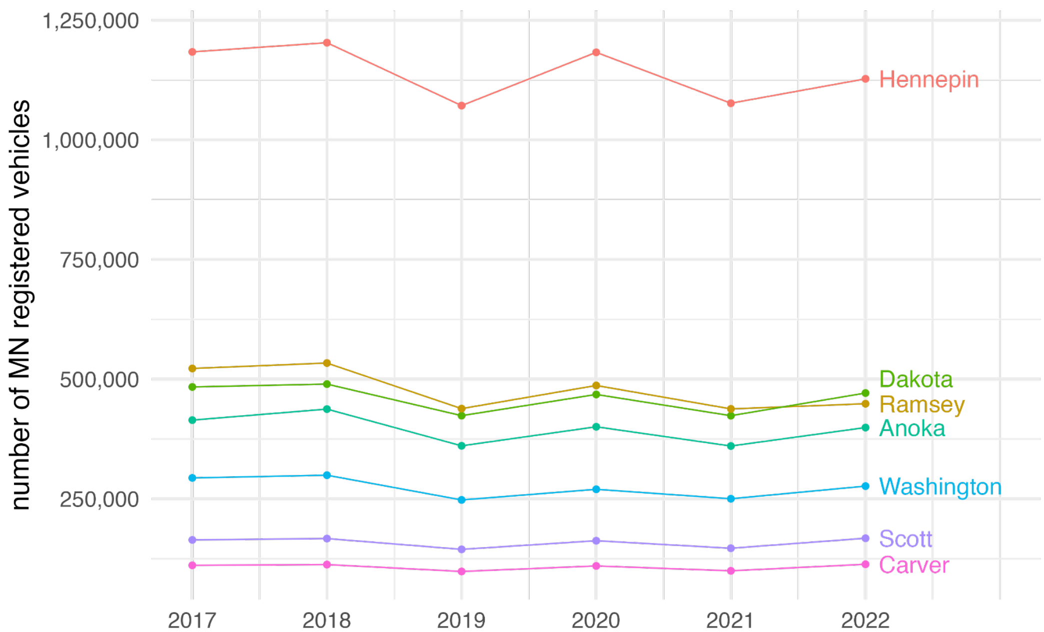

Figure 2.17: Number of autos registered with the state of Minnesota, by metro county, 2017-2022

2.5.2 Cost of auto operation

With high auto availability, what might be the incentive for transit use for those that have a car available and can drive it? The cost of operation might be one such incentive. Direct and indirect operating cost of autos include fuel, maintenance, financing, and depreciation. However, aside from fuel, these costs are built in to the ownership of the auto and rarely considered on a trip-by-trip basis. Other costs which might vary according to the trip include parking (a potential direct cost) and time lost to congestion. Metro Transit's market research indicated that these two topics combined ("avoiding traffic and parking hassles") were consistently the most common reason given for transit use in pre-COVID, for riders who had a car available for the trip. These costs, which motivate transit use, declined noticeably during the COVID era.

2.5.2.1 Traffic congestion is minimal compared to pre-COVID

As access to jobs via transit can be a measure of transit supply, accessibility can also be calculated for auto travel. The Accessibility Observatory uses fine-grained data on observed travel speeds by time of day to produce auto accessibility reports which account for the impact of congestion, by comparing the number of jobs reachable during the AM Peak versus those reachable under free flow conditions. In 2022, congestion had a very minimal impact on accessibility by auto in the metro region, with reductions in jobs reachable on the order of tens of thousands in a regional economy of 1.7 million jobs. These congestion impacts were concentrated in the suburban areas of the region. Altogether the impact on the average regional resident was an 8.4% decrease in accessibility due to congestion. In the last pre-COVID accessibility evaluation, the congestion impact was a 30% decrease, meaning an auto commuter who had experienced pre-COVID congestion would have understood 2022 levels to be a remarkable improvement in accessibility by car.

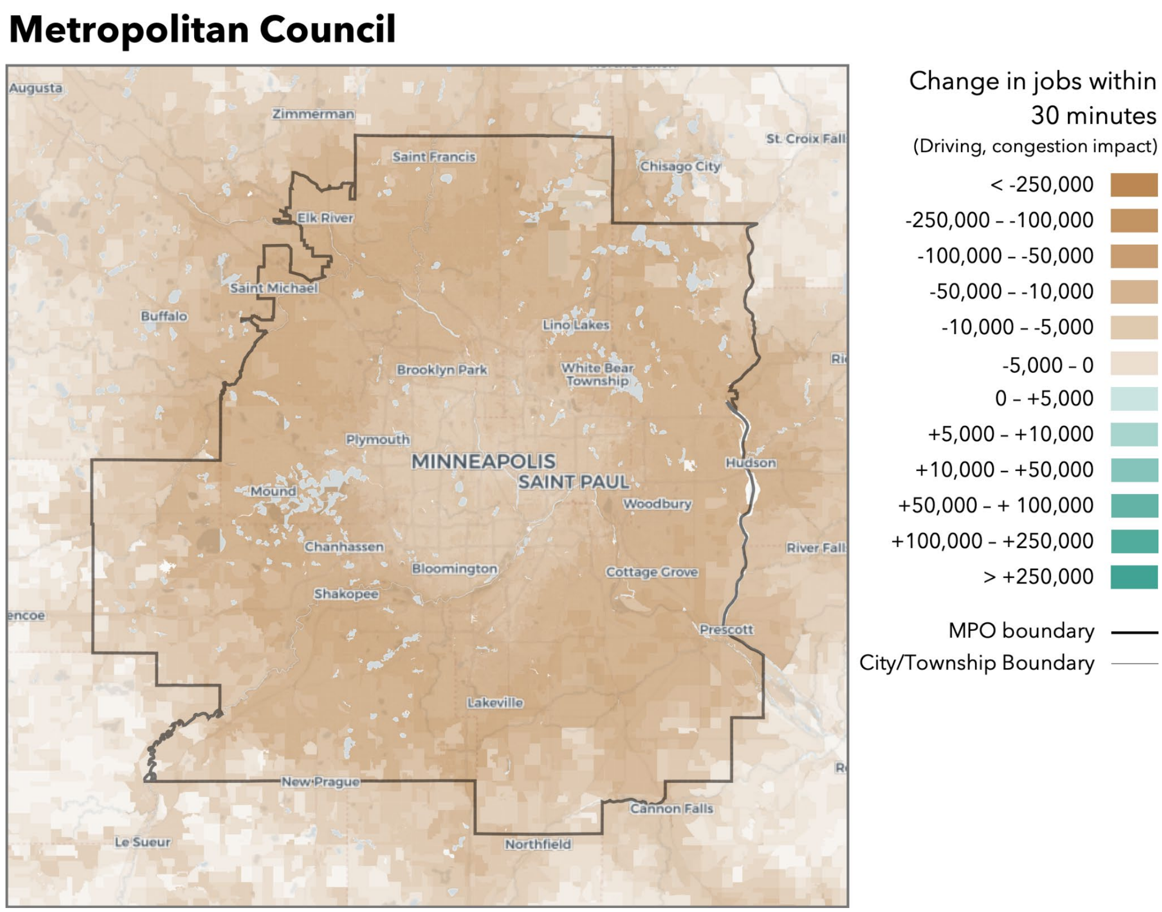

Figure 2.18: Change in access to jobs via private auto due to congestion, 8AM weekday 2022

2.5.2.2 Parking costs in downtown Minneapolis are low

Regionally, parking is almost always free (in the 2021 TBI household survey data for the region, only 1% of observed trips made with a personal vehicle paid for parking). Exceptions include the same types of locations served well by transit: dense concentrations of people, jobs, and opportunities, such as downtowns and universities. Downtown Minneapolis is one such location, with an extensive network of public and private parking facilities. During the pandemic, daily utilization rates plummeted as workers shifted to full or part-time telework. That led the City of Minneapolis, which owns or operates a dozen public parking facilities in the core of downtown, to introduce a new pay-as-you-go parking card to allow for flexible use without a contract.[38] When the card debuted, it could be used to park for a flat rate of $6 daily, which was even cheaper than round trip express bus fare (at $3.25 each way during peak hours). Since raised to $8, it remains an incredible bargain for a commuter with a car available who is not traveling downtown enough to warrant subscribing to either a parking contract or Metropass transit pass.

2.5.2.3 Gasoline prices have increased in the COVID era

In contrast to traffic and parking costs, average retail gasoline price is one component of the cost of auto operation that has been higher during the COVID era than it was before 2020 (Figure 2.19). Just prior to the onset of the pandemic, gas prices were hovering between $2 and $3 per gallon in the metro region, while during the COVID era prices have been higher than $3 and for a time during 2022 were well over $4 on average. Higher gas prices have been consistently found to positively influence transit ridership, and continually low gas prices were identified as a significant contributor to transit ridership loss in the decade before the pandemic (Erhardt et al. 2022). The estimated size of the gas price effect is modest compared to other factors, however, and the COVID gas price increases were accompanied by inflation in many other consumer costs, rather than isolated as a transportation-related spike that might have motivated mode-switching behavior. Whatever the underlying relationship, there was not a noticeable departure from the trend in transit ridership in the region as gas prices spiked in summer 2022 (Figure 2.1), and transit ridership continued to grow as gas prices eased back towards $3 at the end of 2023.

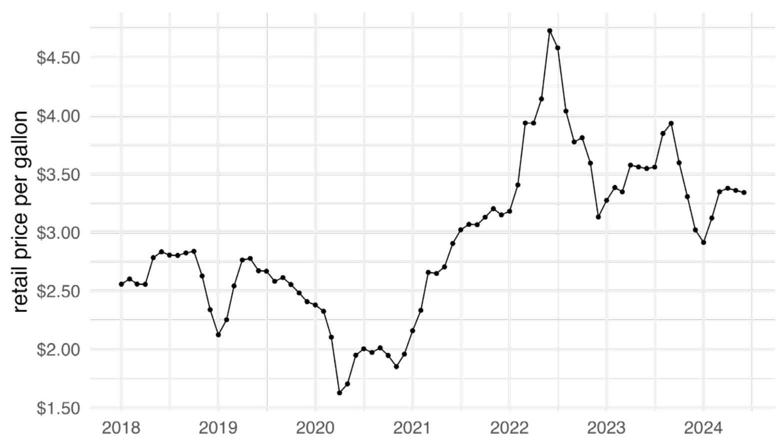

Figure 2.19: Monthly average retail price of gasoline in the metro area, 2018 - 2024

[38] https://mplsparking.com/rpc/

2.5.2.4 Auto use: Uber & Lyft

In addition to driving a vehicle available in the household, trips can be made by auto driven for hire, most commonly arranged through a third-party transportation network company (TNC), like Uber or Lyft. Prior to the COVID pandemic, the disruptive and often initially illegal arrival of such companies into a local transit market were credited with a decline of annual transit ridership of 10% on average, though the impact differed by urban area, and was not straightforward to estimate given the lack of public data on TNC trip making.[17] In 2024 a MN Department of Labor and Industry study commissioned to examine fair pay for TNC drivers was released, which included data shared by the two primary TNCs on their trips provided in 2022 in Minnesota.[39] The TNC trips provided with an origin in metro area counties, by month, are graphed in blue in Figure 2.20. For comparison, the total number of trips made on the Metro Transit METRO network (Blue and Green line LRT; Red and Orange line BRT; A line, C line, and D line BRT) during the same time period is graphed in red. The study did not report the number of passengers per TNC trip, but prior research estimated an average of 1.35 passengers per TNC trip (not counting the driver; Henao and Marshall , 2019), so a multiplication factor is used for relative comparability (dashed blue line). **The conclusion from the data is that TNC use and transit ridership are on an identical scale in the metro region.** Both grew over the course of 2022 from around a million to over 1.25 million rides per month, with fall peaks that reflected travel behavior changes (in transit's case, college and university activity; in the TNC case, higher demand for airport-bound trips, according to the report).

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39 https://www.dli.mn.gov/sites/default/files/pdf/TNC_driver_earnings_analysis_pay_standard_options_report_030824.pdf

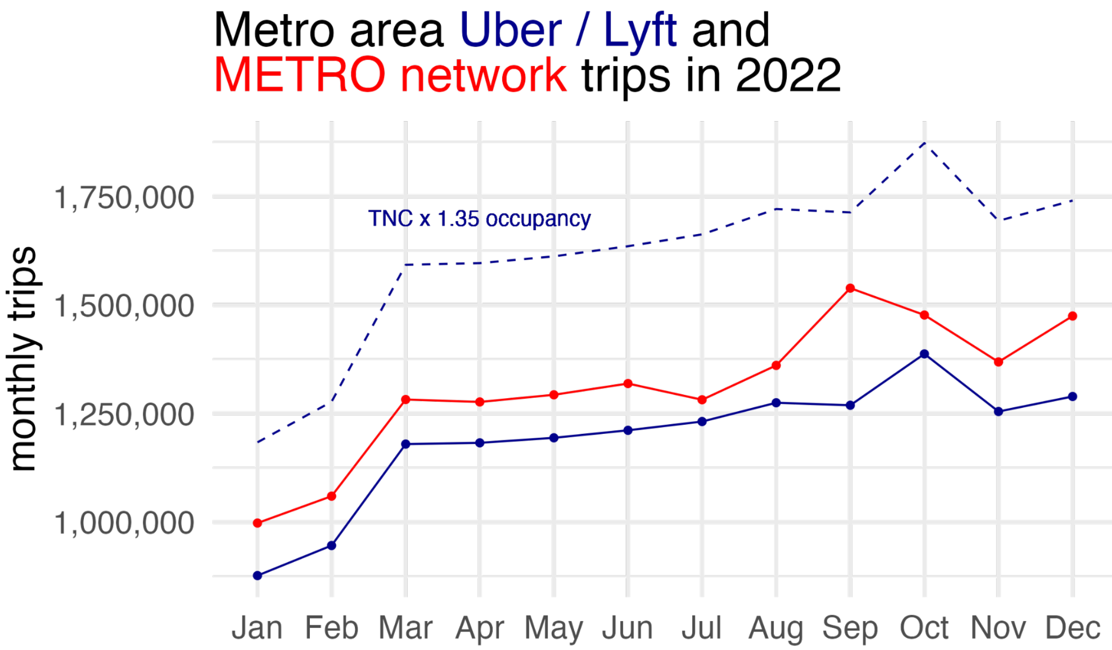

Figure 2.20: Uber & Lyft trips (assumed rides), and METRO network ridership, by month 2022

Thus the core mass transit network and the private TNC network move similar numbers of people through the metro region, albeit in contrast to the efficiency of transit's shared rides and only hundreds of well-compensated drivers, TNCs rely on 10,000 drivers providing their own vehicles, often with leveraged financing, with uncertain return. Transit and TNC trips also have opposite societal impacts with respect to sustainability and congestion, with TNCs worsening both and transit improving both (Diao et al., 2021). Still, the volume of trip making on TNCs represent a potential market opportunity to build transit ridership. For instance, 13% of TNC statewide trips in 2022 were to or from the MSP airport, a destination well served by the METRO Blue Line light rail. The question is whether the demographic, travel behavior, and origin-destination characteristics of riders on each system overlap enough to convince TNC users to ride transit.

2.6 WHO TOOK TRIPS ON TRANSIT DURING THE COVID ERA?

As part of the Travel Behavior Inventory program, in 2022 every route in operation in the region (across all providers) was surveyed in proportion to its typical weekday ridership. In all, over 21,000 responses representing 158,000 weekday transit trips were collected and processed for information about origin and destination, trip purpose, and demographics. This robust sampling effort helps paint a picture of who made trips during the COVID era, and how that differs from the corresponding sample of transit users in pre-COVID taken in 2016.

2.6.1 Very few transit trips are made by those with a car available

During COVID, **82% of transit trips were made by people who did not have the option of driving themselves**. This was a combination of people who did not have a car at home, whether for economic or choice reasons (53%), people who did have a car at their household but did not themselves drive due to lack of knowledge, lack of license, or being underage (16%), and those that did have a car at home and could drive it, but it wasn't available for that particular trip (13%). The remaining 18% who had a car at their disposal for the trip but used transit instead could be considered closest to the definition of "choice" rider at the trip level, in a somewhat problematic but widely used classification in travel behavior.[40] Before the COVID pandemic, riders who had a car available for that trip made over a third (35%) of daily trips. In general, COVID era transit ridership was mostly trip making by those without access to a car.

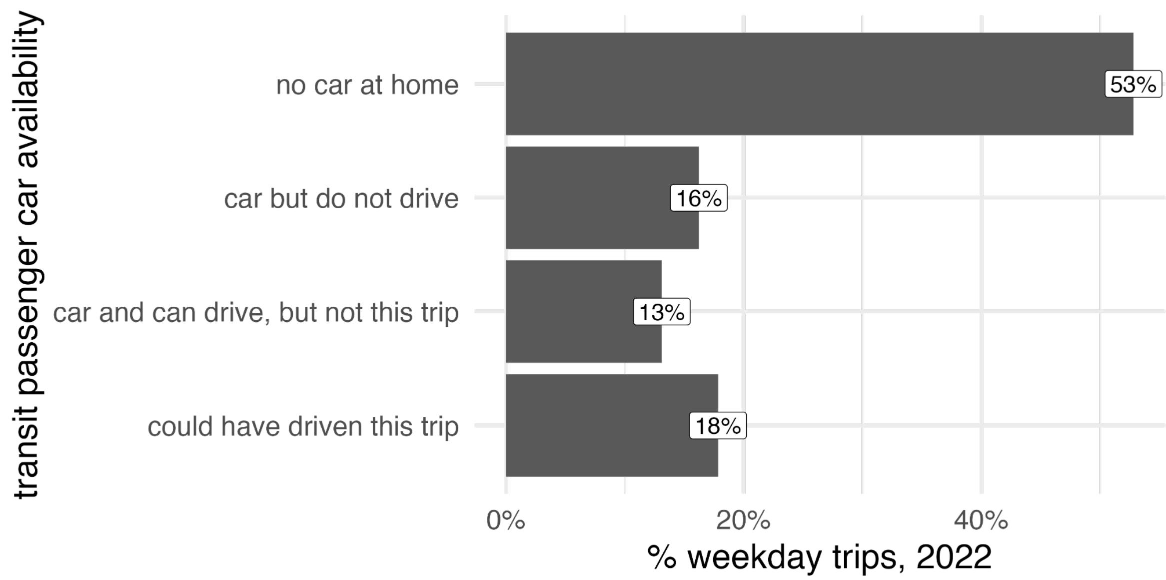

Figure 2.21: Percent of regional weekday transit trips by car availability, 2022

2.6.2 Large majority of transit trips are made by people with below median income

Related to although not completely overlapping with the concept of car availability, during the COVID era the strong majority of trips (69%) were made by people reporting their household income as less than the regional household median income (just less than $100,000 in 2022; Figure 2.22). While 24%

[40] This framing assigns agency only to drivers, but all people make choices about their trip making, even if some choice sets are more limited than others. The person choosing not to travel at all, or to walk, or to wait a day for a ride from a friend, instead of riding transit, is no less worthy of the description of choice rider.

refused to respond with identification of their household income, even assuming those respondents were above median income would only leave around a third of trips being made by higher income residents. In the absence of other information, the refusal to report income could be done by both lower and higher income riders, so it is likely the share of lower than median trip making is overwhelmingly from low income households. This would include, but is by no means limited to, full-time students who have little or no income.

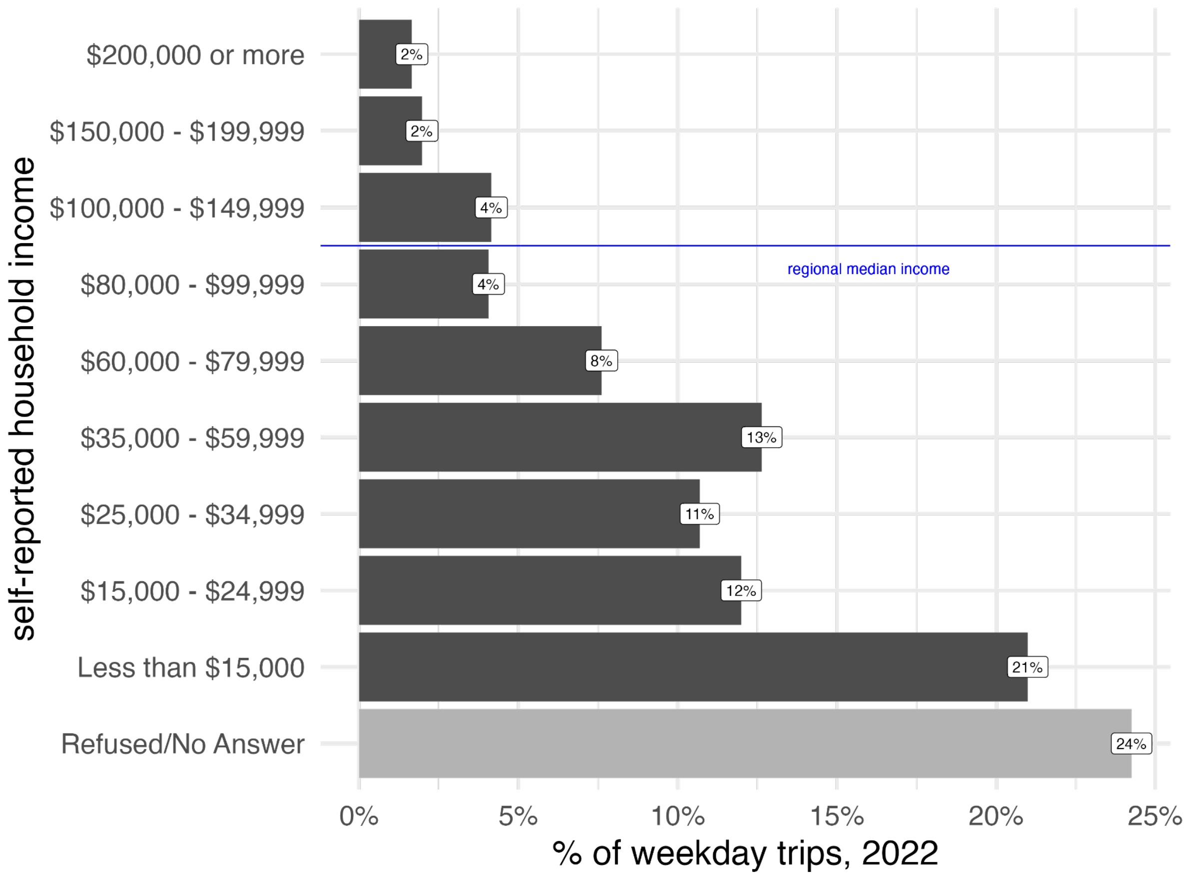

Figure 2.22: Percent of regional weekday transit trips by household income of riders, 2022

2.6.3 Most trips are made by workers, even if not commuting to and from work

From reported trip purpose data (Figure 2.13), the trend during COVID was away from a dominance of the work commute trip as the primary use of transit. However, overwhelmingly transit riders are *workers* who have a job, even if they are not using transit to reach it (Figure 2.23). Specifically, **80% of transit trips in the COVID era were made by people with a full- or part-time job, including caregivers.** Of the remaining trips, 14% were made by non-workers (mostly students), and 6% by retired workers. Of the trips made by college and university students, more were made by students with a job than by students who were non-workers.

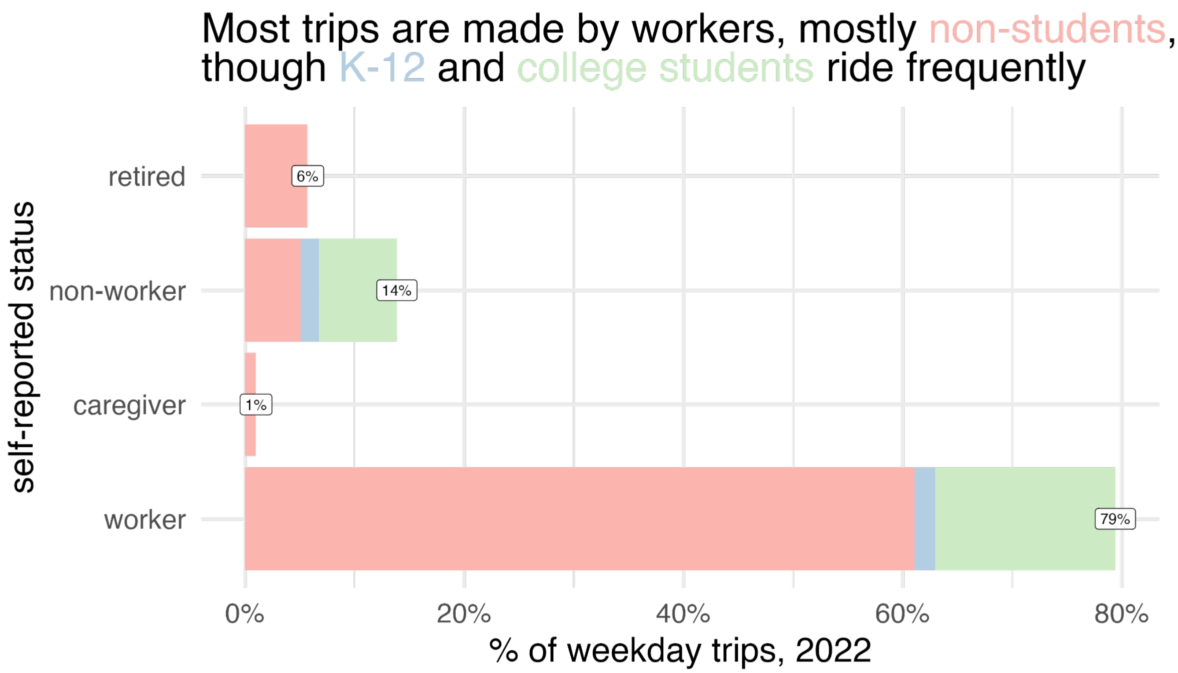

Figure 2.23: Percent of regional weekday transit trips by student and worker status, 2022

2.6.4 Higher number of trips by riders with a disability

In the Metropolitan area, 10.2% of persons report having a disability (that is, a hearing difficulty, a vision difficulty, a cognitive difficulty, an ambulatory difficulty, a self-care difficulty, or an independent living difficulty; 2022 American Community Survey 5-year estimates). Most pertinent to the use of transit are potential barriers to personal mobility like ambulatory difficulty (4.4% of the regional population), vision difficulty (1.4%) or cognitive difficulty (4.6%). The TBI data does not disaggregate disability by type, but the share of trips made by riders who self-identify as having a disability is 13%, statistically higher than the background population. During the COVID era this fraction of trips grew from the pre-COVID statistic of 9.9% of trips, which is statistically indistinguishable from the background population level. This trip making does not include the federally mandated paratransit service, which by definition serves people who cannot regularly use the fixed route service due to a disability. Overall the public transit system provides tens of thousands of trips per day to people identifying as having a disability, including around 21,000 regular fixed route transit trips on a typical weekday.

2.6.5 Higher trip making by BIPOC riders

In terms of race and ethnicity, the Metropolitan region is overwhelmingly white, with 70% of residents identifying as white non-Hispanic in the 2022 5-year ACS census estimate.[41] Transit ridership has consistently included a more diverse group of people than the residents of the region, with pre-COVID 46% of trips made by self-identified Black, Indigenous, and People of Color (BIPOC, including Asian and Hispanic/Latinx). This trend was accentuated during COVID, with a majority (56%) of trips being made on transit by people who identify as BIPOC (Figure 2.24). In part, the trip making by racial and ethnic minority groups reflects residential patterns of the core urban areas of TMA I and II where most trips are made. However, even the city of Minneapolis, which is more diverse than the region overall, has an estimated 60% of residents who identify as white non-Hispanic. Thus there is strong evidence that some groups have a different proportion of transit use than their share of the population. This is true especially for white people, who ride at rates much less than the background population would suggest; and for Black/African American riders who make up 32% of transit trip making during the COVID era, while constituting only 10% of the regional population. The supply of opportunities via transit is a factor in this discrepancy, as accessibility to jobs via transit is much higher for Black residents than the regional average job accessibility. The same is true for American Indian populations, who also make transit trips at a higher rate than the background population (2% of transit trips, less than 0.5% of the regional population). Metro Transit has recognized these trends, and incorporated analysis disaggregated by race and ethnicity into its annual service equity evaluation reports.[42] The distribution of race and ethnicity of riders in some ways supports the idea that public transit itself is a service that supports equity, although analyses of quality and sufficiency of mobility are needed to identify whether the service should be considered truly equitable (Karner et al, 2024).

[41] all regional population statistics in this section from Met Council Community Profiles: https://stats.metc.state.mn.us/profile/

[42] https://www.metrotransit.org/Data/Sites/1/media/equity/2022_service-equity.pdf

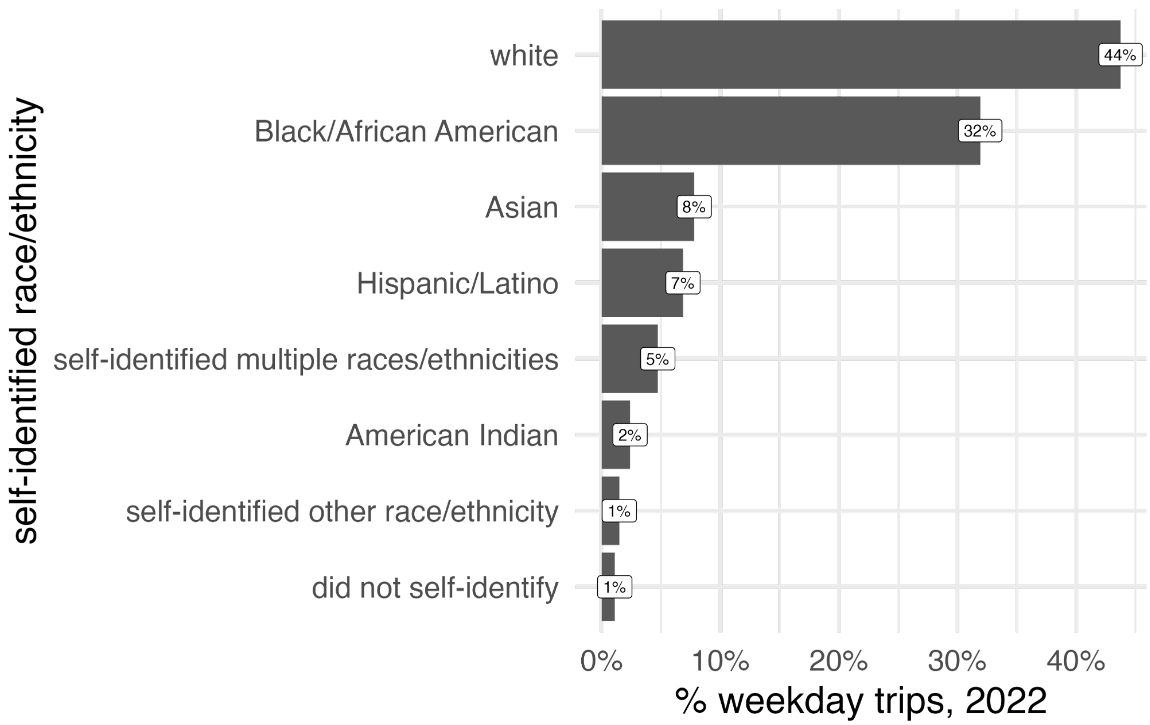

Figure 2.24: Percent of regional weekday transit trips by self-reported race and ethnicity of riders, 2022

2.6.6 Shifts in language spoken at home by riders

As with pre-COVID transit ridership, trip making in the COVID era included a diverse set of cultural backgrounds as indicated by responses to questions about language spoken at home (Figure 2.25). While 82% of trips were by riders who spoke English at home, **7% of trips were by riders who speak Spanish at home**, slightly higher than pre-COVID rates (5% of trips). While riders who speak Somali at home were a constant fraction of 2% of trips both before COVID and in the COVID era, there was a noticeable decline in riders speaking Hmong at home. Hmong language riders were 1% of daily trip making in pre-COVID samples, but only 0.5% of trips in the COVID era, which is fewer than riders speaking Hindi, French, or Mandarin Chinese (now 1% of trip makers). Whether the decline in Hmong speaking trips was due to change in service, change in travel practices, or other reasons unconnected to cultural background, remains an open question.

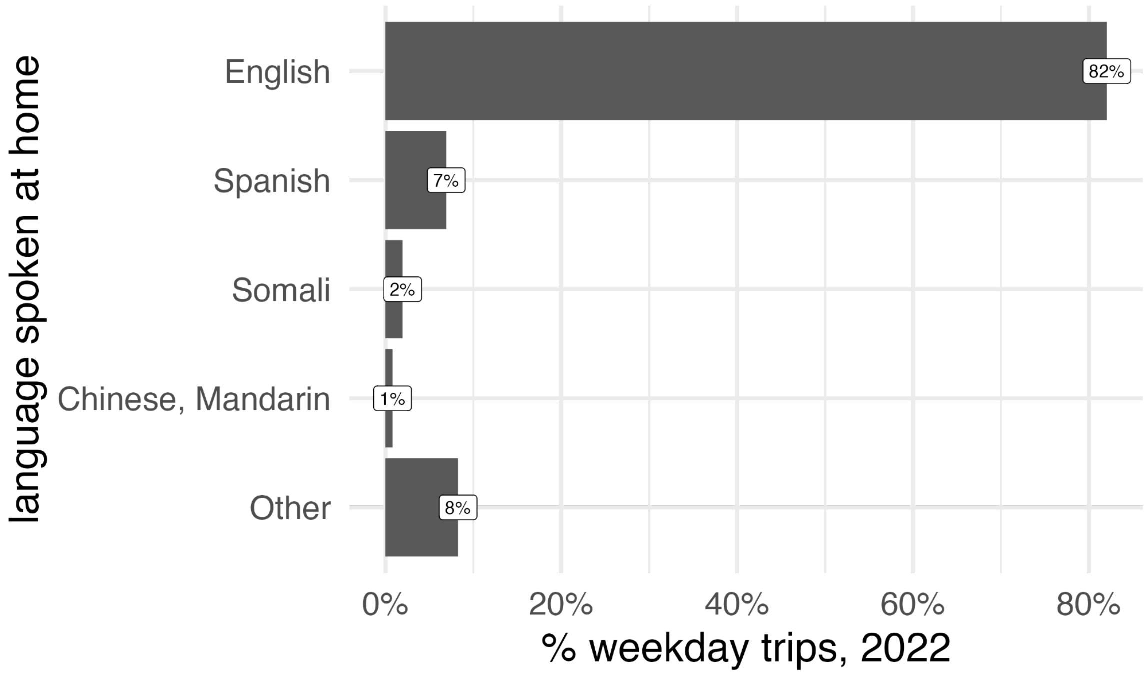

Figure 2.25: Percent of regional weekday transit trips by self-reported language spoken at home, 2022

2.7 FOCUS: WHO RODE COMMUTER & EXPRESS AND NORTHSTAR IN THE COVID ERA?

Prior to COVID, trips on Commuter & Express bus service and the Northstar commuter rail were made mostly by people with higher than median income (55%) who had a car available for the trip they took on transit (95%). This subset of suburban origin, downtown destination commuters was exactly the population which was able to switch to teleworking early in the COVID pandemic, and have still only partially returned to work in person, contributing to the substantial decline in ridership of this service as depicted in Figure 2.9. But who were the remaining riders using Commuter & Express and Northstar?

During COVID, the typical commuter trip would be one made by a woman (52% of trips), of prime working age (77% of trips by riders aged 18-54), identifying as white (57% of trips) with household income around $60,000. Some high income riders remained, as 13% of commuter service trips were taken by riders with household income over $150,000. But as with the regional transit ridership profile in general, the majority of commuter service riders were those with below regional median income (73% of commuter service trips were from households below $100,000 annual income).

Whereas pre-COVID, 95% of commuter service trips were taken by riders with a car available, in the COVID era only 51% of trips were made by a rider with a car available for that trip. Up to 23% of commuter service trips were made by riders with no car in the household at all, showing the significant shift away from the park and ride travel behavior model that the commuter service relied on pre-COVID.

Although the reductions in transit service did reduce access to opportunity on transit around the metro, commuter service riders still originated from across the area. In Figure 2.26 the home origin city of riders who were sampled in the 2022 COVID era TBI on board survey are plotted, limited to the top 20 most commonly reported cities. The largest cities of Minneapolis and St. Paul generate the most commuter & express trips, which is less surprising considering the dominant size of the population combined with the fact that route 94 operating between the two downtowns is classified in the commuter and express category. Other common origin cities for commuter service include representatives from suburbs in all directions from the core urban area. The trip-making on commuter and express services, including Northstar rail, was not high in volume during COVID but was spread throughout the regional transit service area, with on-board respondents from 89 cities and townships recorded on commuter service in 2022.

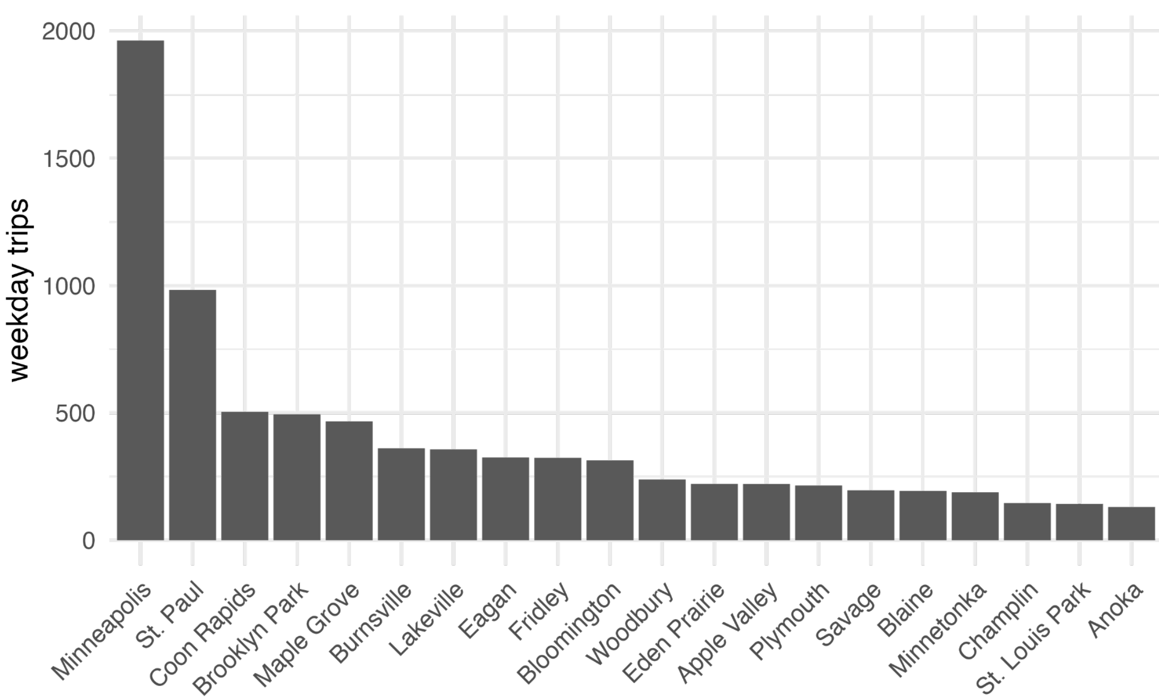

Figure 2.26: Weekly regional transit trips by city of commuter and express bus or Northstar riders, top 20 cities 2022

CHAPTER 3: UNDERSTANDING DEMAND FOR ACTIVE TRANSPORTATION

This chapter of the Post-COVID Pandemic Public Transportation Study presents an analysis of the current state of active transportation, defined as walking and biking to reach destinations, within the Seven County Metropolitan Region. It includes an analysis of the key active transportation use predictors, as well as the current levels of access by active modes within the region. Additionally, this chapter examines the intersection of public transit and active transportation, with special emphasis on emerging active transportation modes like e-bikes and e-micromobility, and provides specific recommendations on how to improve the integration of these modes. The following section includes an examination of latent active transportation demand within the region, and includes potential interventions to aid in converting latent demand into actual use. The chapter concludes by identifying current limitations and unknown variables which may influence planning for active transportation into the future, namely the impact of COVID-19 and the current status of active transportation data within the Metropolitan Region.

3.1 INTRODUCTION

Active modes of travel, like cycling and walking, are critical components of any transportation ecosystem. Travel by these modes can accommodate short and medium distance trips while incorporating physical activity into the daily task of travel, resulting in well documented health benefits (Green et al., 2021), and producing minimal greenhouse gas emissions (Brandt et al., 2021). Active transportation is also a crucial component of public transit, as public transit users are inherently multi-modal, linking together various transportation modes to complete their journey from origin to destination. Specifically, public transit is inextricably linked with walking and rolling, as almost all public transit users are pedestrians at some point in their journey, and **in 2022, 94% of transit trips in the region were accessed via walk or roll**.[43]

While the relationship between walking[44] and public transportation is evident in the Twin Cities region, there is limited integration of transit and other forms of active transportation. This study explored the potential for increased integration of biking, e-micromobility, and public transit, including the barriers which currently inhibit the combination of these modes and potential interventions. Ultimately, integrating these modes ought to be supported, promoted, and funded, as **the flexibility and autonomy of cycling, in combination with public transit's ability to easily cover long distances, can result in a multi-modal combination with higher levels of access than either mode on its own.** Ultimately, high

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[43] Met Council Travel Behavior Inventory Transit on-board survey; authors' calculations

[44] Throughout this report "walking" should be considered to include walking with or without the assistance of a mobility aid; or rolling with a personal mobility device. "Walk or roll" is used occasionally to reinforce this meaning.

quality urban transportation networks must take into account the requirements of active transportation users, and make every effort to support and improve connections between active modes and public transit. Whether alone or in combination, active transportation and public transit can provide access to opportunities at a fraction of the individual and societal cost associated with single occupant vehicle travel.

Where people live, and where they need to travel, plays a pivotal role in their propensity to use active modes like walking and biking. The characteristics of the built environment, land use patterns, and the composition of the local residential population can collectively help determine where active transportation demand is highest. By delving into these factors, this chapter seeks to examine the relationship between geography, demographics, and active transportation demand, offering insights into interventions to encourage and support non-motorized forms of travel and integration with public transportation.

In recent history, trips made by walking, rolling, or biking have made up a relatively small share of total commute trips in the United States. One interpretation of this low mode share is that it equates to low levels of demand. However, the dramatic differences in active transportation rates across cities in the United States indicate that this conclusion may be an oversimplification. Differences in levels of bike ridership and trips made by walking are associated with differences in 'bike scores', levels of accessibility, and characteristics of the built environment. This indicates that there is likely demand for active transportation trips that currently goes unfulfilled due to certain barriers, which may be converted into actual use through targeted interventions.

The COVID-19 pandemic and new and emerging technologies are also changing the active transportation landscape. Across the United States, active transportation use patterns have shifted during the pandemic, resulting in new and returning cyclists, different spatial and temporal patterns of cycling and walking trips, and an increase in active transportation associated with recreation. The rapid adoption of e-bikes and the growth of shared micromobility are factors that are reshaping travel within the Twin Cities region, with major implications for active transportation use and demand. Shared micromobility refers to the provision of bikes, e-bikes, and electric scooters for temporary rental.

3.2 PREDICTORS OF PROPENSITY TO USE ACTIVE TRANSPORTATION

Research has shown that various built environment and socio-demographic characteristics significantly influence the likelihood of individuals choosing active transportation to make a journey. This section delves into these factors, highlighting how they collectively shape active transportation behavior.

3.2.1 The Built Environment

The relationship between the built environment and travel behavior has received significant attention. A commonly applied framework to understand this interaction is what Ewing and Cervero (2010) called the 5 D's:

- Density: Activity density (population, commercial, etc.) per geographic unit

- Diversity: Quantity of different land-uses present in a given area
- Design: Street layout and characteristics, such as sidewalks, lighting, curb cuts
- Destination Accessibility: Ease of reaching a desired location
- Distance to Transit: Distance, using street routes, from origin to nearest transit stop

For active transportation, the relative impact and importance of each of these variables is difficult to determine precisely. The results of changes to any of these elements will inevitably fluctuate between locations, reflecting local nuances that are not captured by this simple framework. However, research into the impact of the built form on travel behavior has resulted in a widely accepted understanding of how these variables relate to active transportation use. Higher levels of active transportation are generally associated with built environments where trip distances are short, there is a greater mixture of land uses and destinations, and active transportation infrastructure is present and accessible (Kent et al., 2023).

For both walking and rolling (Saelens and Handy 2008) and biking (Schoner et al., 2015), the distance of a particular journey is a primary consideration, and is a key determinant of active transportation use. This is intuitive, as the first and most important question that must be addressed when determining if active transportation is viable is whether a desired destination is within a reasonable distance. Because specific trip distances are often unknown, other factors are used as a proxy, such as land-use diversity and density. A high degree of land-use diversity and density results in a mixture of potential origins and destinations in close proximity to one another, and a greater number of residents being within walking or biking distance of destinations. These areas are associated with shorter average trip distances and higher levels of active transportation trips (Quinn et al., 2017).

Beyond the proximity of origin and destination, connectivity and infrastructure also play critical roles in determining the propensity to use active modes. Higher levels of connectivity, defined as the ability to travel efficiently in many directions from an origin, are associated with higher levels of active transportation use. Increased connectivity facilitates easier and more direct travel by bike or foot, reducing travel distances and improving access to destinations. Additionally, the presence of dedicated active transportation infrastructure, such as sufficient sidewalks, bike lanes, and pedestrian crossings, significantly influences individuals' decisions to walk or bike by enhancing safety and convenience, with the presence of this infrastructure being correlated with higher levels of biking and walking trips (Quinn et al., 2017).

3.3 SOCIO-DEMOGRAPHIC CHARACTERISTICS AND ACTIVE TRANSPORTATION

The propensity to use active transportation, such as walking and biking, varies significantly across different socio-demographic groups. Factors such as age, living environment, income, race, education, and marital status have been shown to influence how likely someone is to use active transportation.

3.3.1 Age

Younger individuals show a higher inclination towards active transportation compared to older adults. This trend is robust, supported by numerous studies indicating that younger people are more likely to use walking and biking for both commuting and recreational purposes (Quinn et al. 2017, Grabow et al. 2019). The reasons behind this trend may include younger people's higher physical fitness levels, greater environmental consciousness, and more flexible daily schedules that allow for active transportation modes.

3.3.2 Residential Setting

Residential location also plays a role in active transportation habits. Individuals living in urban areas are more likely to engage in walking and biking compared to those in suburban or rural settings (Grabow et al. 2019). Urban environments typically offer better infrastructure for active transportation, such as pedestrian paths, dedicated bike lanes, and more compact city layouts that make walking and biking more feasible and quicker for daily commutes and utilitarian trips.

3.3.3 Race and Ethnicity

In general, rates of walking have not been found to differ strongly by race or ethnicity. In the national survey data analyzed by Quinn et al. (2017), there were differences in racial demographics with respect to biking, with a significantly lower probability of those self-identifying as African-American, or Hispanic, to use bicycles for transportation. When focused on travel to work, however, there were no meaningful difference between the proportion of white commuters and those of any other race or ethnicity traveling to work by bicycle.

3.3.4 Household Income

Higher household incomes are also positively associated with higher rates of active transportation (Quinn et al. 2017, Grabow et al. 2019). This association might be linked to the ability of higher-income individuals to reside in urban areas that support active transportation or their increased access to resources like high-quality bicycles and related gear. Additionally, higher-income individuals often have greater flexibility in choosing transportation modes that align with their lifestyle preferences.

3.3.5 Educational Attainment

Education level also impacts active transportation usage, with the highest rates observed among the most and least educated individuals (Quinn et al. 2017). Researchers speculate this bimodal distribution suggests different motivations of active transportation use, including consideration of health and environmental benefits, but also economic necessity.

3.3.6 Marital Status and Gender

Active transportation use also varies based on marital status and gender. Single, non-married individuals, particularly males, are more likely to use active transportation (Quinn et al. 2017, Grabow et al. 2019). This pattern could be attributed to fewer family responsibilities, which allows for more flexible and varied transportation options.

3.4 ACCESSIBILITY, OR ACCESS TO OPPORTUNITY

Accessibility, the ease of reaching valued destinations, may also prove to be a significant predictor of propensity to utilize active transportation. The Accessibility Observatory's report, *Access Across America: Biking 2021*[45], estimates access to jobs by biking for the 50 largest metropolitan areas (by population). In the context of this report, accessibility is defined as the total number of jobs and other destinations that can be reached within a given amount of time, from a particular origin, using a particular set of roadways. A widely used technique for understanding the existing levels of comfort and stress for roads within a geographic area is through the concept of 'level of traffic stress' (LTS, Figure 3.1). LTS is an approach driven by the current conditions of roadways, and commonly includes factors such as motor vehicle volumes and speeds, proximity to motor vehicle parking lanes, intersection conditions, the presence of dedicated bicycle infrastructure and the type of bicycle infrastructure. In general, LTS 1 and 2 connote networks of "all ages, all abilities," whereas LTS 3 and LTS 4 involve progressively more vehicular cycling (riding in mixed traffic).

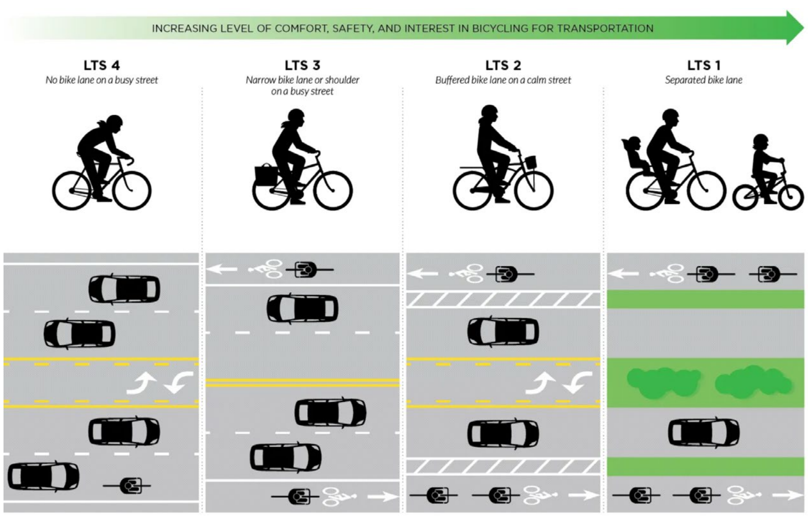

Image Credit: Alta Planning and Design

Figure 3.1: Level of traffic stress and associated cycling infrastructure

Combining the relative accessibility rankings with US Census active transportation commute data (Table 3.1) demonstrates that, at the metropolitan level, higher levels of *access* by bike are associated with higher rates of *commuting* by bike. Of the top 10 most accessible metro areas, the bicycle commute mode share ranges from 0.6% to 1.7%, with an average bicycle commute mode share of 0.9%. The least accessible metro areas, on the other hand, have a bike commute mode share ranging from 0.1% to 0.5%, with an average of 0.2%. Increased accessibility by bike also appears to be associated with

[45] https://www.cts.umn.edu/programs/ao/aaa

increases in commute trips made by walking. Similar to bicycle commute mode share, the metro areas with the highest levels of access by bike have significantly higher rates of walking as a commute mode. While further research is necessary to determine the degree to which accessibility predicts active transportation use, this limited data-set demonstrates that there is likely a positive association between the opportunities provided by a low-stress bike network, and the use of it for job commutes.

Table 3-1: Accessibility and Active Transportation Commute Mode Share in 50 Largest Metro Regions

Metropolitan Area	Low Stress Accessibility Ranking	Bicycle Commute Mode Share	Walk Commute Mode Share	Average Bicycle Commute Mode Share	Average Walk Commute Mode Share
New York	1	0.7%	5.5%	0.9%	3.4%
San Francisco	2	1.5%	4.3%		
Boston	3	0.9%	5.1%		
Portland	4	1.7%	3.1%		
Seattle	5	0.8%	3.6%		
Los Angeles	6	0.6%	2.3%		
Chicago	7	0.6%	2.8%		
Denver	8	0.8%	2.1%		
Washington DC	9	0.7%	2.9%		
Minneapolis	10	0.6%	2.1%		
Las Vegas	41	0.2%	1.3%	0.2%	1.3%
Tampa	42	0.5%	1.3%		
Orlando	43	0.3%	1.1%		
Houston	44	0.3%	1.2%		
Hartford	46	0.2%	2.3%		
Jacksonville	47	0.4%	1.3%		
Riverside	48	0.2%	1.3%		
Birmingham	49	0.1%	1.1%		
Memphis	50	0.1%	0.9%		

At the Census Tract level within the Twin Cities Metropolitan Region there also appears to be a correlation between accessibility and active transportation commute mode share. Figure 3.2 displays the rate of bicycle commute mode share and its association with the level of access to jobs for each Census Tract (displayed here as the weighted total number of jobs accessible by bike within 30 minutes). There is a positive association between job access by bike and bicycle commuting rates within the Metropolitan Region (correlation coefficient of 0.50, $p < 0.001$).

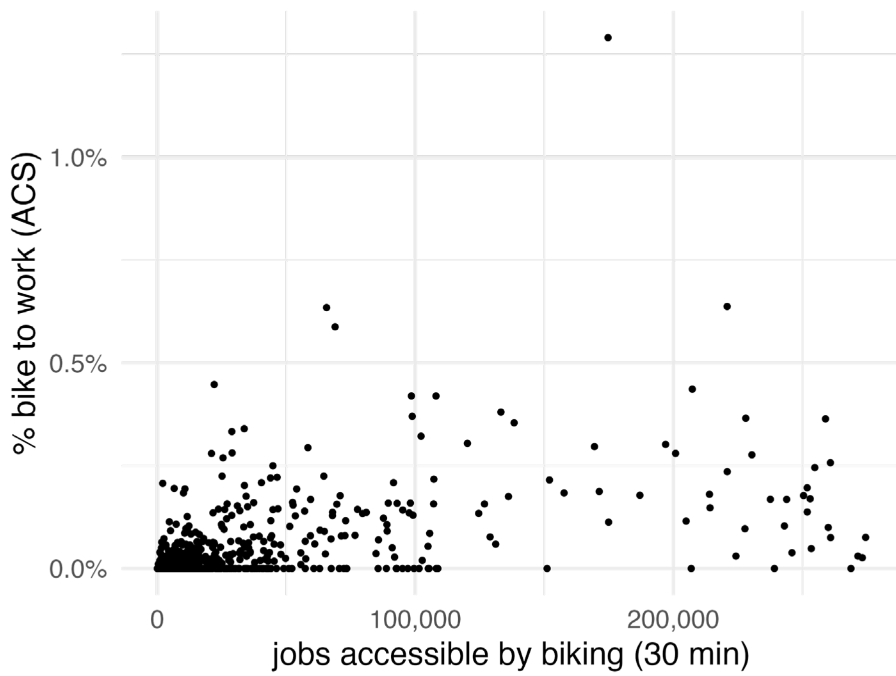

Figure 3.2: Relationship Between LTS2 Weighted 60 Minute Bike Access to Jobs and Percent Bike Commuters

A similar relationship exists between walking accessibility and the percentage of Census Tract residents that commute by walking. Figure 3.3 illustrates the positive relationship between access to jobs by walking and walking commute mode share. This correlation is also significantly positive (correlation coefficient 0.62, $p < 0.001$). Overall, there are not many tracts with high job accessibility within a reasonable walk. For the tracts that do have high access, however, those tracts have among the highest walk to work shares of the region. Note that these overall levels are still an extreme minority of the trips regularly taken to work.

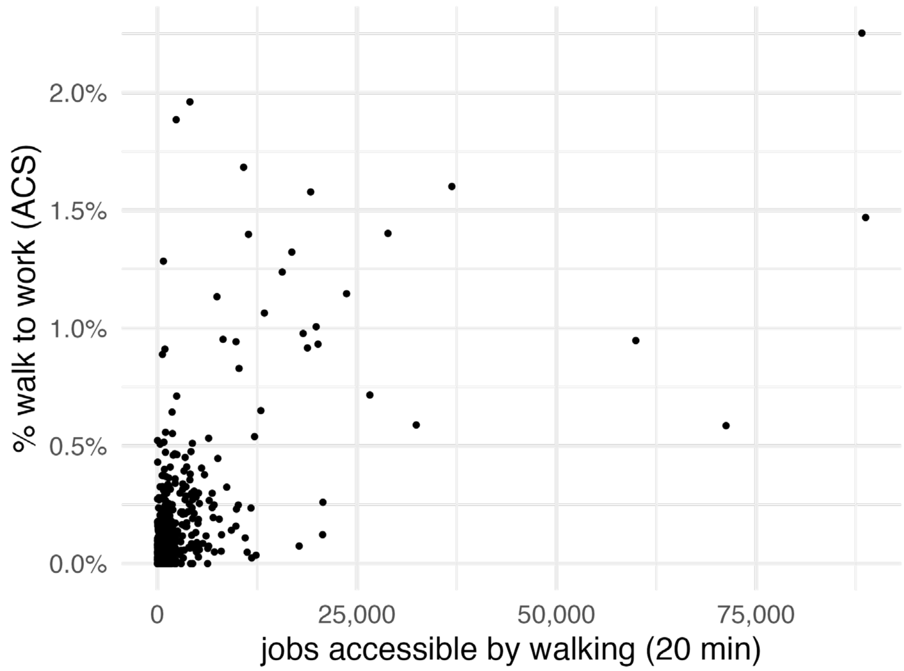

Figure 3.3: Relationship Between Weighted 20 Minute Walk Access to Jobs and Percent Walk Commuters

3.5 ADDITIONAL CONSIDERATIONS

Determining the degree and extent of a causal relationship between active transportation and the built environment has historically been a challenge in research and planning. Residential self-selection is one reason for this difficulty.

A key question is whether changes in the built environment actually induce more people to choose active transportation. Or alternatively, do those who are predisposed towards active transportation move to places in which the built environment supports this travel behavior. Researchers at the University of Minnesota examined this very question for bicyclists in Minneapolis, using the framework of 'magnets' and 'catalysts'. Magnets being built environment variables that support cycling which attract individuals who are already inclined to cycling, and catalysts being elements that may cause behavior change resulting in increased bicycling for those who may not have considered it otherwise. In the case of Minneapolis, evidence indicates that bicycle infrastructure may act as both a magnet and catalyst (Schoner et al. 2015).

In this study, it was found that people who are already cyclists, or interested in cycling, intentionally move to locations that have built environment variables that support bicycling, demonstrating a magnet effect. However, after controlling for residential preference, bike lanes were still found to be a significant predictor of ridership, implying that this infrastructure may also serve as a catalyst (Schoner et al. 2015).

3.6 ACCESS TO OPPORTUNITIES BY ACTIVE TRANSPORTATION

Within the Twin Cities Metropolitan Region there exists stark differences in access to opportunities using active transportation. Residents living in the most urbanized and densely populated areas, namely Minneapolis and Saint Paul, have access to a far greater number of opportunities when traveling by foot or bike compared to more suburban and rural communities. This is mainly driven by the higher concentration of employment and commercial opportunities, as well as the density of low stress road networks.

Despite the relatively higher level of accessibility experienced by residents of more urbanized areas, there still exist barriers limiting access to opportunities. Figure 3.4 displays the street network of downtown Minneapolis, with street segments symbolized by their level of traffic stress designation. This map demonstrates that while a sizable portion of the streets are suitable for cyclists of all ages and abilities, high traffic stress roads and freeways create significant barriers which reduce the supply of opportunities accessible by bike. Existing barriers to cycling other than high traffic stress road segments within the region include highways and freeways, railroad infrastructure, and streams and rivers.

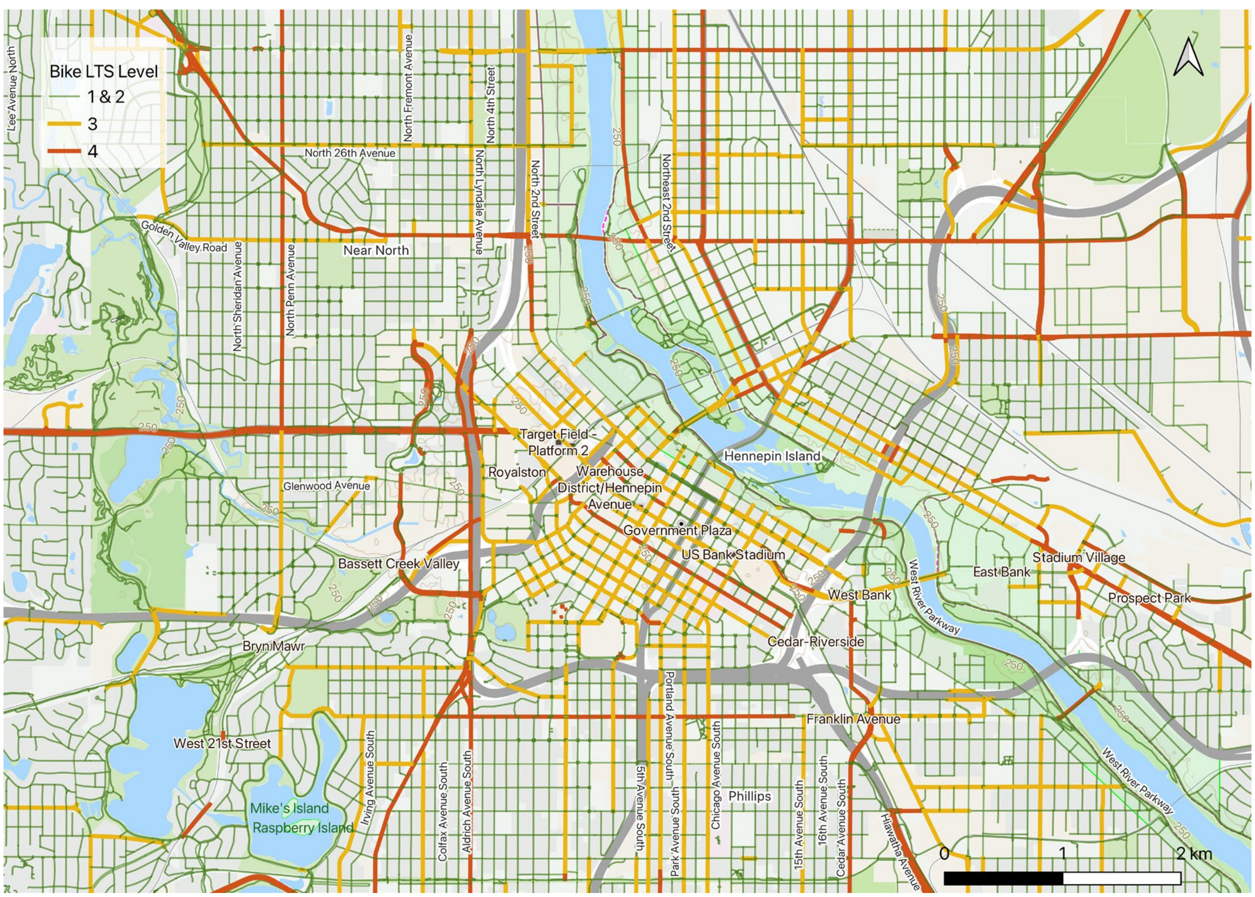

Figure 3.4: Level of Traffic Stress Street Network

These specific barriers and high LTS roads reduce the overall accessibility by bike within the Twin Cities Metro Area. Figure 3.5 symbolizes job accessibility using only low stress streets (LTS 1 and 2). Areas of high job accessibility are limited by the presence of high traffic stress roads and barriers within the Twin Cities Metropolitan Area. Any attempt to improve active transportation accessibility and increase the mode share of biking and walking trips must address these existing barriers.

For both cycling and walking (Figure 3.6), the areas with the highest degree of accessibility are generally in the densest and most urbanized areas of the Twin Cities Metropolitan Region, with lower levels of accessibility by active transportation modes in suburban and rural areas. These results are intuitive, as higher densities of both residential population and commercial establishments generally indicate shorter average travel distances which are associated with increased levels of biking and walking.

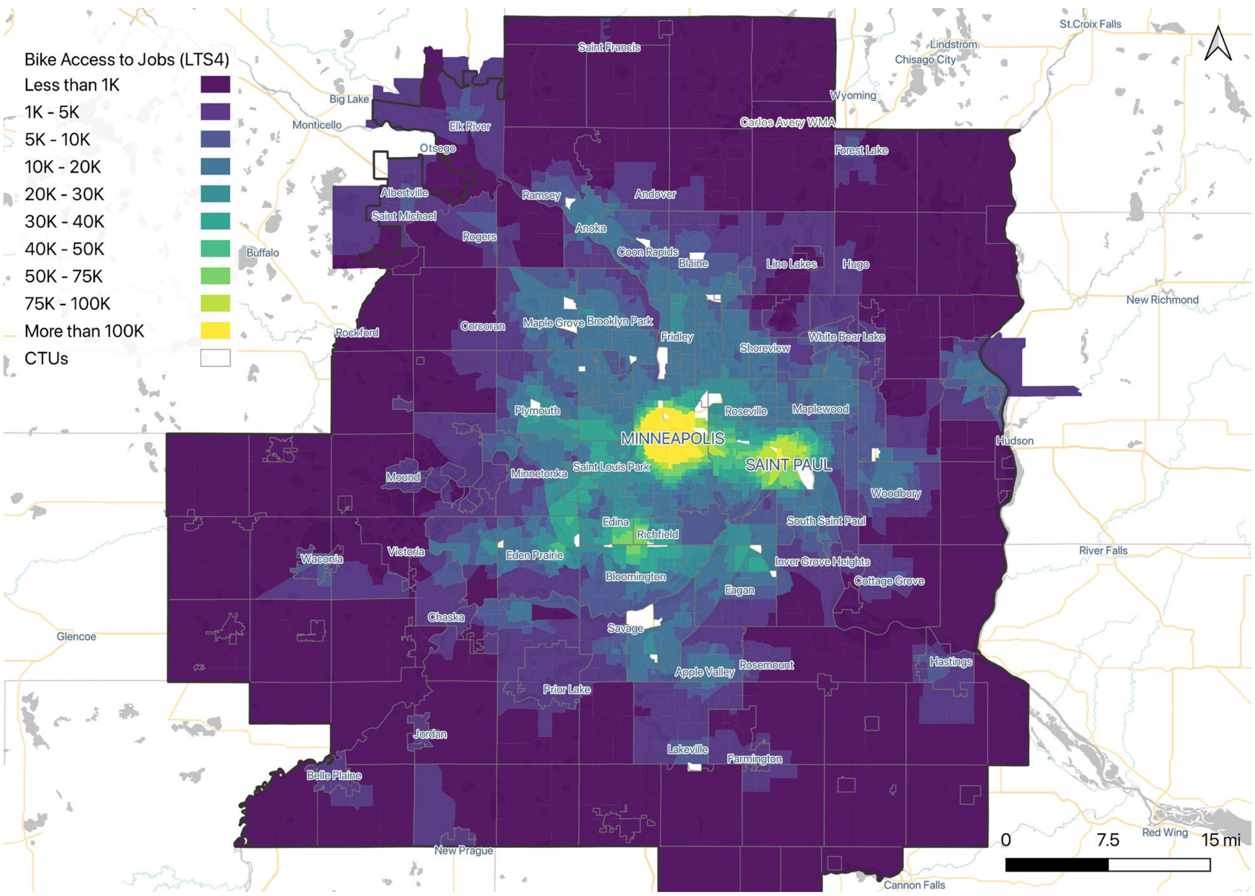

Figure 3.5: Weighted Access to Jobs by Biking on LTS1 and LTS2 network (20 min travel time)

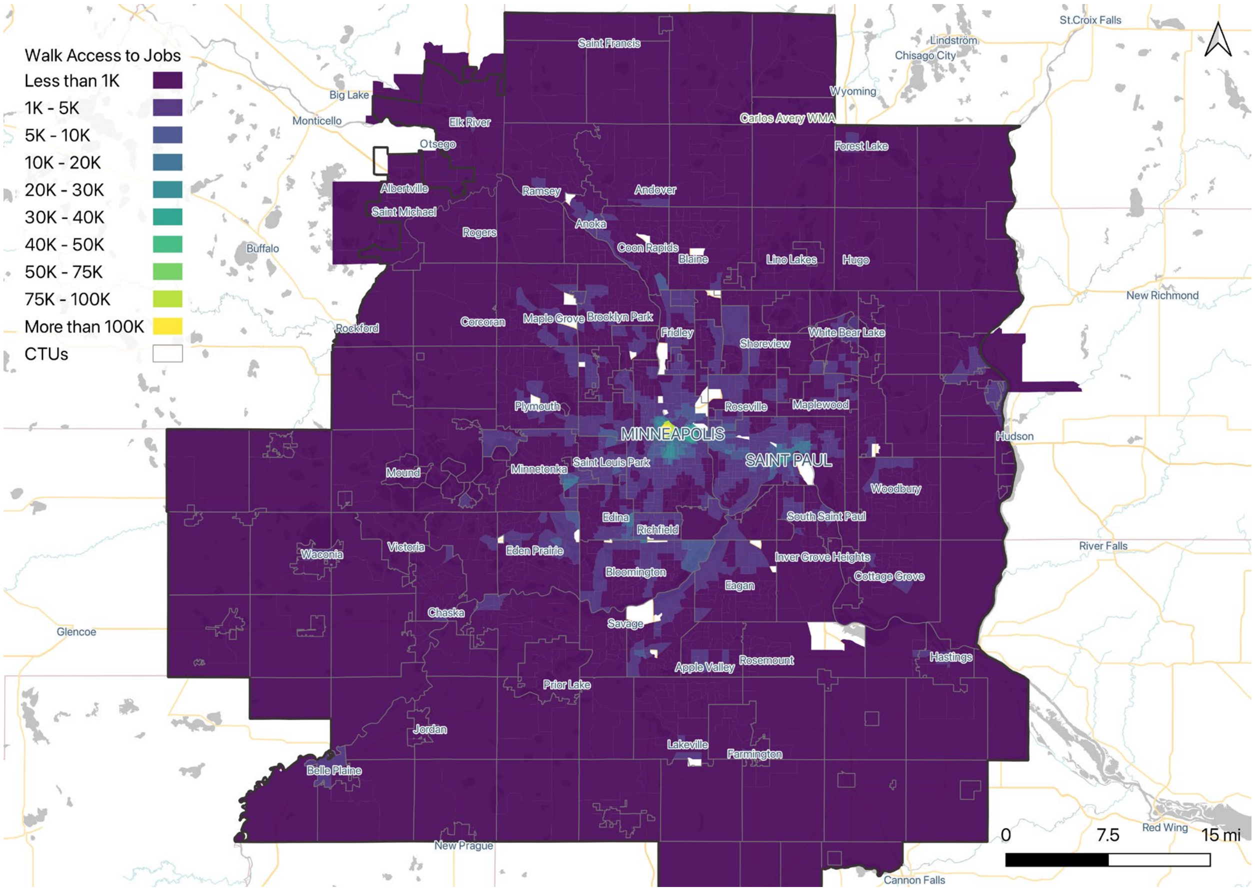

Figure 3.6: Weighted Access to Jobs by Walking (20 min travel time)

A core component of accessibility by bike and level of traffic stress is the presence of dedicated, protected bicycling infrastructure. In 2018 the Met Council published a survey of existing and planned protected bicycle infrastructure within the region, with protected infrastructure being defined as bike lanes or paths that are physically separated from automotive traffic. As of the publication of this inventory there are over 3,000 miles of protected bicycle infrastructure within the Metropolitan Region, with nearly 800 additional miles planned.[46] While there is a significant concentration of protected bicycle infrastructure within the core cities of the Metropolitan Area, it is worth noting that there is significant infrastructure, both existing and planned, in suburban and rural communities. This infrastructure has the potential to be supplemented and adapted so as to provide low stress connections to existing and future public transit infrastructure outside of the Metro Regions core cities.

[46] Regional Bikeways System Inventory

3.7 ACTIVE TRANSPORTATION AND PUBLIC TRANSPORTATION

Public transit is directly linked to active transportation, as the vast majority of public transportation users are pedestrians at some point in their journey. Other active modes, like cycling and shared micromobility, can also support public transit, expanding the catchment area (the geographic area that the transit system attracts passengers from) of the system. This relationship between active and public transportation can be seen in Minnesota, where nearly 95% percent of users accessed public transportation by walking and another 1.2% percent accessed by bike or shared micromobility in 2022 (Table 3.2).[47] Understanding and accommodating this symbiotic relationship is critical when planning for active and public transportation systems and networks.

Table 3-2: How riders access transit stops and stations

How riders accessed transit stop	% weekday trips
Walk, jog, or roll using a mobility device (e.g. wheelchair)	94.4%
Drove alone and parked	2.8%
Was dropped off by someone	1.2%
My bike / e-bike / scooter / skateboard	1.1%
Drove or rode with others and parked	0.2%
Uber, Lyft, Taxi (smartphone ride hailing)	0.2%
Shared bike / e-bike / scooter (e.g. Nice Ride, Bird, Lime)	0.1%
Other	0.0%

Source: 2022 Met Council Travel Behavior Inventory Transit On-Board Survey

[47] Met Council Travel Behavior Inventory Transit on-board survey; authors' calculations

3.7.1 Walking and Public Transportation

In practice, one quarter mile is considered a feasible walking distance to local transit service, with ridership falling precipitously beyond this range (Figure 3.7). The presence of higher frequency transit has been shown to increase this distance to approximately one half mile (Walker, 2024), likely due to the enhanced value offered by rapid transit's faster speeds and shorter average wait times. Importantly, these quarter mile and half mile ranges reference actual walking distance using existing street networks and pedestrian facilities, rather than a simple half mile radius extending from the transit stop, further demonstrating the importance of active transportation infrastructure to public transit ridership. In contemporary transit planning these distances are often a core component of route and station siting, with the goal of bringing as much of the population within reasonable walking distance of transit service as possible, while ideally reducing overlapping catchment areas.

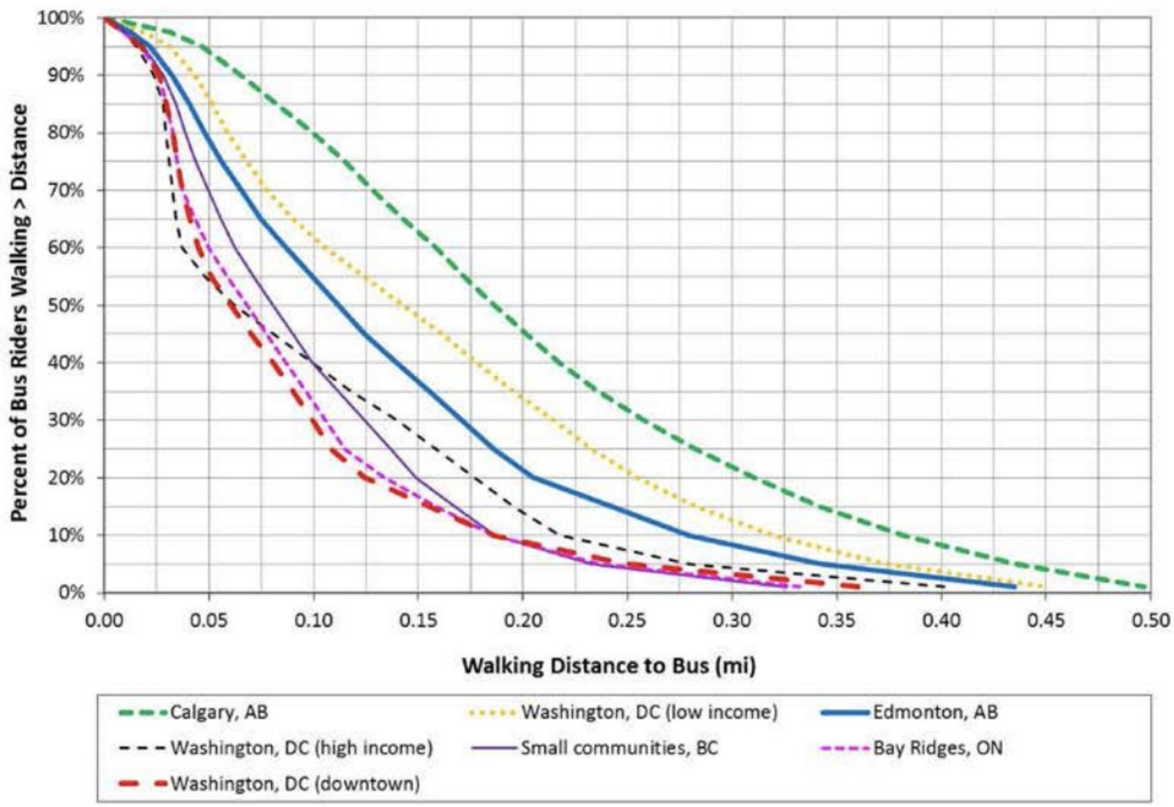

Image Credit: [Transit Capacity and Quality of Service Manual](), Chapter 4

Figure 3.7: Typical walk distance to bus stops

The results of the Metropolitan Council 2022 Transit Onboard Survey demonstrate the prevalence of combining walking and public transportation in the Twin Cities region, with the vast majority of transit users accessing these services by walking. This indicates that the pedestrian environment around transit stops is a crucial element of the public transportation system. Even well-served transit stations (such as the 38th St Station in south Minneapolis) can still require some to navigate highway crossings and high-speed slip lanes, reducing the walk access to the station. As such, improvements to pedestrian facilities connecting to public transportation should be prioritized, with the goal of making the walking experience as safe, pleasant, and direct as possible.

3.7.2 Cycling and Public Transportation

While less common than walking or rolling to transit, the integration of public transportation and cycling holds a great deal of promise. The flexibility and autonomy of cycling, in combination with public transit's ability to easily cover long distances, can result in a multi-modal combination with higher levels of accessibility than either mode on its own. It has been found that people are willing to bike two to five times farther than walking to public transit (Kosmidis and Müller-Eie, 2023). Because cycling enables users to travel farther than pedestrians in the same amount of time, combining cycling and public transit can greatly increase the number of potential transit users who can reasonably access the network.

However, despite the benefits of combining cycling and public transit, the percentage of users who access the transit system using their personal bike in Minnesota is low, at just 1.1% of riders in 2022. Potential reasons for this limited integration include lack of low stress bicycling facilities that directly connect to transit, a lack of adequate bicycle parking at transit stops, logistical challenges associated with changing transportation modes, and travel time budgets (the amount of time a user is willing to allocate to the trip) being exceeded.[48] Another reason for this lack of integration may be the limited options to travel with a bicycle onboard public transit. Cyclists typically prefer to keep their bicycle with them when using public transportation (Bachand-Marleau et al., 2011) which is supported by data from the 2022 TBI Onboard Survey. In 2022, nearly 40% of trips which combined cycling and public transportation occurred on Light Rail lines (Table 3), where cyclists are allowed to bring their bike on-board and there is generally space to do so. Notably, route 3 and the University of Minnesota route 121 are both heavily used by college students. In addition, with average bus speeds around 12 mph it is often as fast or faster to bike than take the bus, so these modes may be competing rather than complementing each other along bus routes. Exceptions include light rail service, suburban rail stations with decent bike networks, and BRT with wider stop spacings.

[48] Why Few People Bike To and From Transit, and How We Can Change That

Table 3-3: Top regional routes where riders access or egress using "My bike / e-bike / scooter / skateboard"

Route	Avg weekday trips	% of all bike-transit trips
Green Line	751	30.71%
Blue Line	191	7.82%
21	155	6.34%
A Line	146	5.98%
3	92	3.77%
C Line	91	3.74%
10	89	3.67%
4	69	2.84%
121	54	2.25%
18	52	2.13%

Source: 2022 Met Council Travel Behavior Inventory Transit On-Board Survey

To improve the integration of cycling and public transportation, four key strategies have been identified which help reduce or eliminate barriers that prevent the combining of these modes. These include **allowing bikes onboard public transit** when possible, **providing and improving bike parking** suitable for e-bikes at transit stops, **connecting low-stress bicycle networks to transit**, and **integrating shared micromobility** at public transit stops (Pucher and Buehler, 2009).

3.7.3 Integrating Public Transit and Active Transportation: Mobility Hubs

The symbiotic relationship between active transportation and public transportation is already understood in the Twin Cities region, as demonstrated by the Metropolitan Council's Mobility Hub Program. Defined by the Metropolitan Council as '*places where people can connect with multiple modes of transportation in a safe, comfortable, and accessible environment*', mobility hubs can serve as a vital point to link active transportation and public transportation. Mobility Hubs in the Twin Cities are often located in close proximity to high frequency public transportation, and recommended elements such as shared micromobility, bicycle parking, and wayfinding all increase the ability of users to link active modes to public transit. Additionally, the Metropolitan Council Mobility Hub Planning and

Implementation Guidebook[49] calls for enhanced pedestrian and bicycle connections to mobility hubs, further demonstrating that the relationship between active transportation and public transit is recognized and being accommodated within the region.

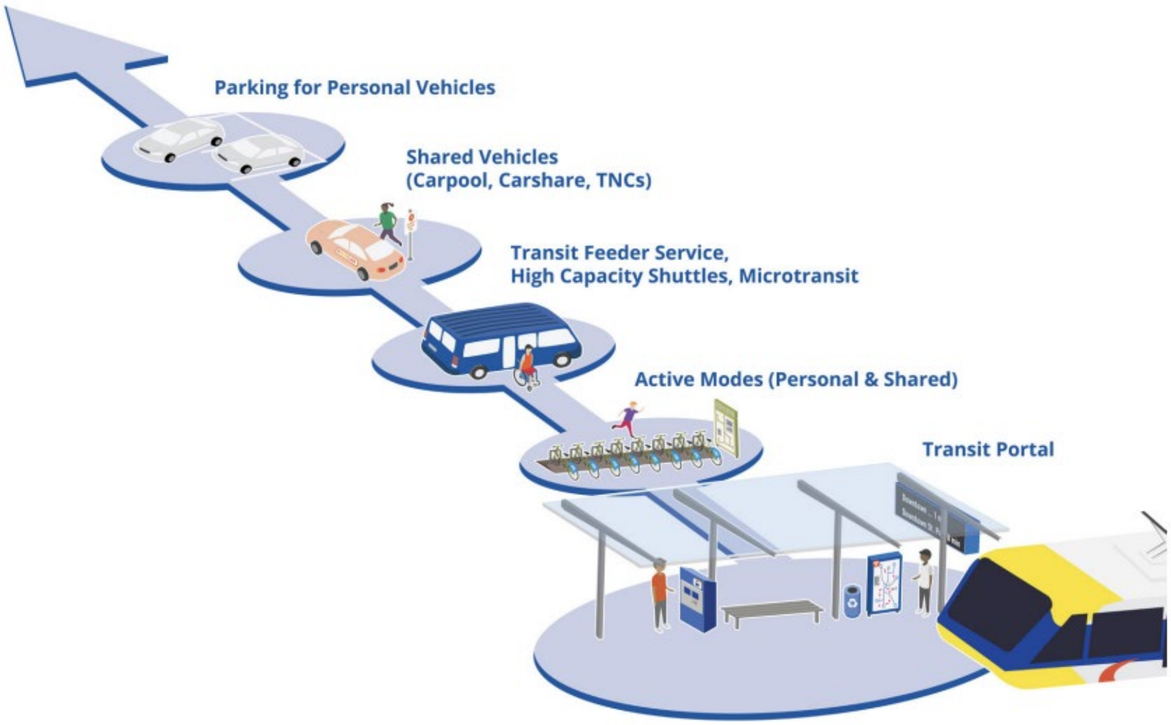

Image Source: Metropolitan Council Mobility Hub Planning and Implementation Guidebook

Figure 3.8: Conceptual access hierarchy for Metropolitan Council Mobility Hubs

[49] Metropolitan Council Mobility Hub Planning and Implementation Guidebook

Table 3-4: Mobility hub components by location: Metropolitan Council Mobility Hubs

Common Elements	Urban Core	Urban District	Urban Neighborhood	Suburban District	Activity	Edge	Mobility Investment
Bike share	*See Service Matching and Decision Tool for Each Mobility Hub Type*						
Scooter share							
Moped share							
Microtransit and on-demand transit							
Car share							
Secure bike parking	✔	✔	✔	✔	✔	✔	✔
Pick-up/Drop-off	✔	✔	◆	◆	✔	◆	◆
Winter mobility options	◆	◆	◆	◆	◆	◆	◆
Real-time travel information & alerts	✔	✔	✔	✔	✔	✔	✔
Public Wi-Fi hubs	✔	✔	◆	◆	✔	◆	✔
Parcel and delivery lockers	✔	✔	◆	✘	◆	◆	✘
EV charging infrastructure	◆	◆	◆	◆	◆	◆	◆
Smart curb and parking technology	✔	✔	◆	◆	✔	✘	✘
Wayfinding	✔	✔	✔	✔	✔	✔	✔
Vendor space	✔	✔	◆	◆	◆	✘	◆
Seating and place amenities	✔	✔	✔	✔	✔	✔	✔
Hub lighting	✔	✔	✔	✔	✔	✔	✔
Public activation	✔	✔	✔	✔	✔	✔	✔
Heated spaces	✔	✔	✔	✔	✔	✔	✔

Key

✔ Recommended ✘ Not Recommended ◆ Optional

Image Source: Metropolitan Council Mobility Hub Planning and Implementation Guidebook

3.7.4 E-bikes and Public Transportation

The emergence of e-bikes and other forms of personal small electric vehicles present additional opportunities and challenges to further integrating active transportation and public transit. These devices have become increasingly common since the onset of the COVID-19 Pandemic (Kent et al., 2023), and their prevalence will likely continue to increase in Minnesota thanks to the state-wide e-bike rebate program initiated in 2024.

E-bikes and other e-powered devices can increase travel speeds, extend distances users can feasibly travel, and reduce exertion on hilly terrain, further expanding access to public transportation. However, additional considerations must be taken into account when attempting to integrate these modes. In Minneapolis residents are increasingly requesting secure bike parking suitable for storing e-bikes[50],

[50] Request For Committee Action: Secure Bike Parking Pilot Program

which are generally more expensive than traditional pedal powered bicycles. This consideration may necessitate the provision of additional long-term, secure bike parking infrastructure at transit stations. The City of Minneapolis is currently moving forward with the implementation of the Secure Bike Parking Pilot Program, which is intended to provide between 15 and 20 new secure bike parking hubs throughout the city, with the potential to expand the program in the future. The connection between active transportation and public transit may be enhanced if these new bike parking facilities are strategically located near transit stops that are accessible by bicycle, so as to facilitate multi-modal transportation that utilizes both public transit and active modes.

3.7.5 Access to Transit by Bike and E-bike in the Metro Area

One way to summarize the utility of bike connections to transit is by quantifying how easy it is to reach the stop or station to board transit service. Using residential Census blocks in the region, we calculated travel times from each block to the nearest stop or station on two different subsets of the regional transit system: stations on the METRO network, and park and ride locations. We also used two different bike networks (LTS 2 or all ages and abilities, and LTS 4). Finally, we used two different bicycle speeds to represent traditional bikes (12 km/h) and a faster e-bike (20 km/h). The results of these eight different combinations are presented in Table 3.5, as the percent of residents who could reach transit from their residential block using the different bike and network types. When using the all-abilities networks (LTS 2), 12% of the Metro Area workforce live within a 10 minute bike ride of METRO network stations, and 8% of the workforce are within 10 minutes of park and ride stops. Two of the key factors which currently limit bicycle access to public transit include high LTS road segments or intersections, which are not suitable for riders of all ages and abilities, and the speed of traveling by traditional bicycle.

Table 3-5: Metro Area Access to transit service by bicycle type and LTS

System	Mode	LTS	Workers	Percent of Workforce
METRO	Bike	2	194,217	12%
	Bike	4	254,810	16%
	E-bike	2	267,237	17%
	E-bike	4	369,295	24%
Park and Ride	Bike	2	121,815	8%
	Bike	4	247,571	16%
	E-bike	2	245,899	16%
	E-bike	4	571,809	37%

One way by which access to transit using active transportation may be improved is by implementing all ages and abilities infrastructure on roads in the immediate vicinity of transit stops. If all streets were suitable for cyclists of all ages and abilities, the percentage of the Metro Area workforce within a 10 minute bike ride of transit stops would increase to 16% for METRO stations and 16% for park and ride locations. Reaching this level of regional access would require significant investment in on- and off-street bicycle infrastructure.

Access to transit by biking may also be improved by increasing the average speed that cyclists travel, which would expand the distance a resident can live from transit and still access it within a 10 minute trip by bike. Such an increase in speed is already being achieved through rapid adoption of e-bikes, which will likely continue to increase in the metro area thanks in part to the Minnesota e-bike rebate program. Assuming e-bikes on current LTS2 roads, the percentage of the Metro Area workforce that is within 10 minutes of transit stops increases to 17% for the METRO network, and 16% for park and ride stops.

These differences demonstrate that 10 minute access to transit is substantially greater for residents who own an e-bike, and this access can be further increased by targeting efforts to reduce LTS on road segments in the vicinity of transit stops. *The combination of these two interventions results in a dramatic increase in accessibility.* If current LTS4 roads were suitable for cyclists of all ages and abilities, and e-bikes were available to residents, 24% of the metro area workforce would be within a 10 minute bike ride of a METRO stop, and 37% of the workforce would be within 10 minutes of a park and ride stop. Figure 3.9 demonstrates this analysis, displaying the current access to transit METRO stops using traditional bicycles on LTS2 roads compared to access using e-bikes on all LTS roads.

METRO Transit Network: 10 Minute Bicycle and E-Bike Access

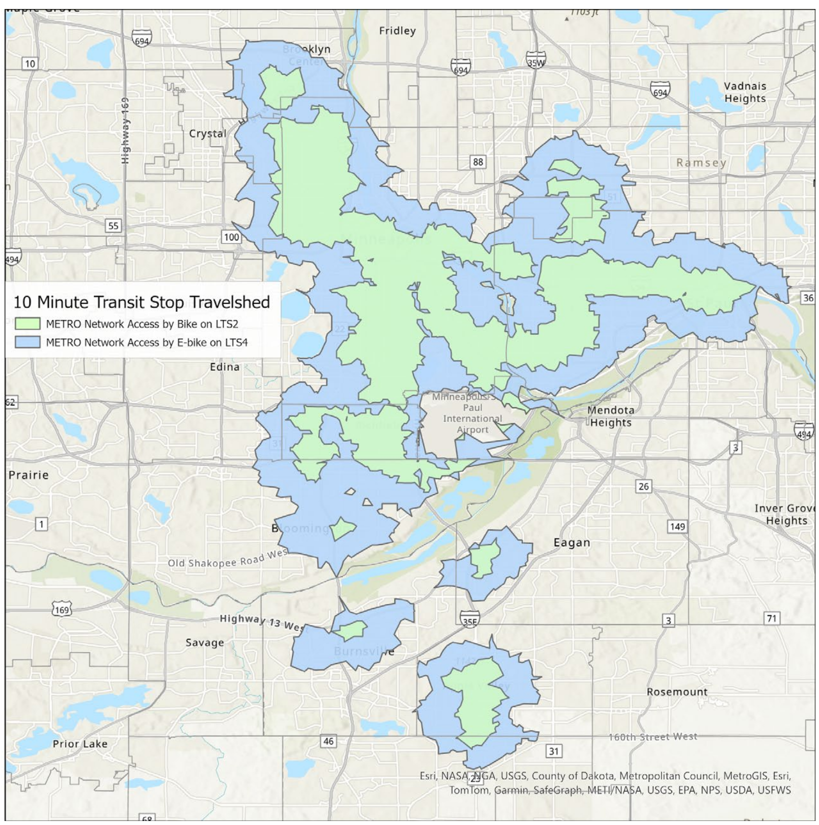

Figure 3.9: Ten minute access to METRO network by bike using LTS 2 and e-bike using LTS 4

3.7.6 Active Transportation and Public Transit in the Suburban Environment

The low density built environment typical of suburban locations inherently limits the ability to access public transportation by walking for many suburban residents, both through increased walk distances and through barriers to safe and comfortable walk or roll trips. In 2022, 40% of riders of Commuter & Express bus service were pedestrians at both ends of their transit trips, while 58% used a car for at least one end of the trip; only 1% of Commuter & Express riders used a bicycle for either end of their trip.[51] However, the continued emergence of e-bikes and other personal e-micromobility devices presents an opportunity for residents of these communities to access public transit using active transportation from distances that would not have been feasible using non-motorized modes in the past.

A particularly important element of public transportation in suburban communities in Minnesota are commuter services connecting these areas to employment centers. These commuter-oriented transit stops often take the form of park and ride facilities which allow users to drive to the transit stop and shift to public transit for the remainder of their journey. It has been found that the average driving distance to access park and ride stops is under five miles, or less than 10 minutes driving (Stieffenhofer et al. 2016). While this distance exceeds what would be considered a reasonable trip made by walking, it can be perfectly suited for other active modes like biking and e-biking.

Connecting park and ride facilities to low-stress active transportation infrastructure is a key step in maximizing the potential of the relationship between public transit and active transportation in suburban settings. Additionally, the provision of additional secure, long-term bicycle parking suitable for e-bikes at commuter transit stops is a necessary step in accommodating integration of active modes and public transit.

3.7.6.1 Burnsville Case Study: Access to Transit by Bike and E-bike

Examining the METRO Orange Line transit station in Burnsville provides an example of how the adoption of e-bikes, in tandem with reducing LTS on roads adjacent to transit stops, can dramatically improve access to public transit using active transportation in suburban environments. Using the calculations made for the region above, currently just 696 workers are within a 10 minute bike ride of this station using LTS2 roads and paths, but this figure increases to 3,191 if high traffic stress roads (LTS3 and LTS4) surrounding the station were to become accessible to all cyclists. Substituting e-bikes for traditional bikes further expands access to transit using active transportation, with 7,590 workers in the Burnsville area being within a 10 minute e-bike ride of the METRO Orange Line, assuming all road segments are low stress–meaning 10-fold more people could easily reach the terminus of this high frequency transit

[51] Met Council Travel Behavior Inventory Transit on-board survey; authors' calculations

stop within a reasonable travel time. Figure 3.10 maps this difference in access to the Orange Line in Burnsville.

Burnsville Case Study: 10 Minute Bicycle and E-Bike Access

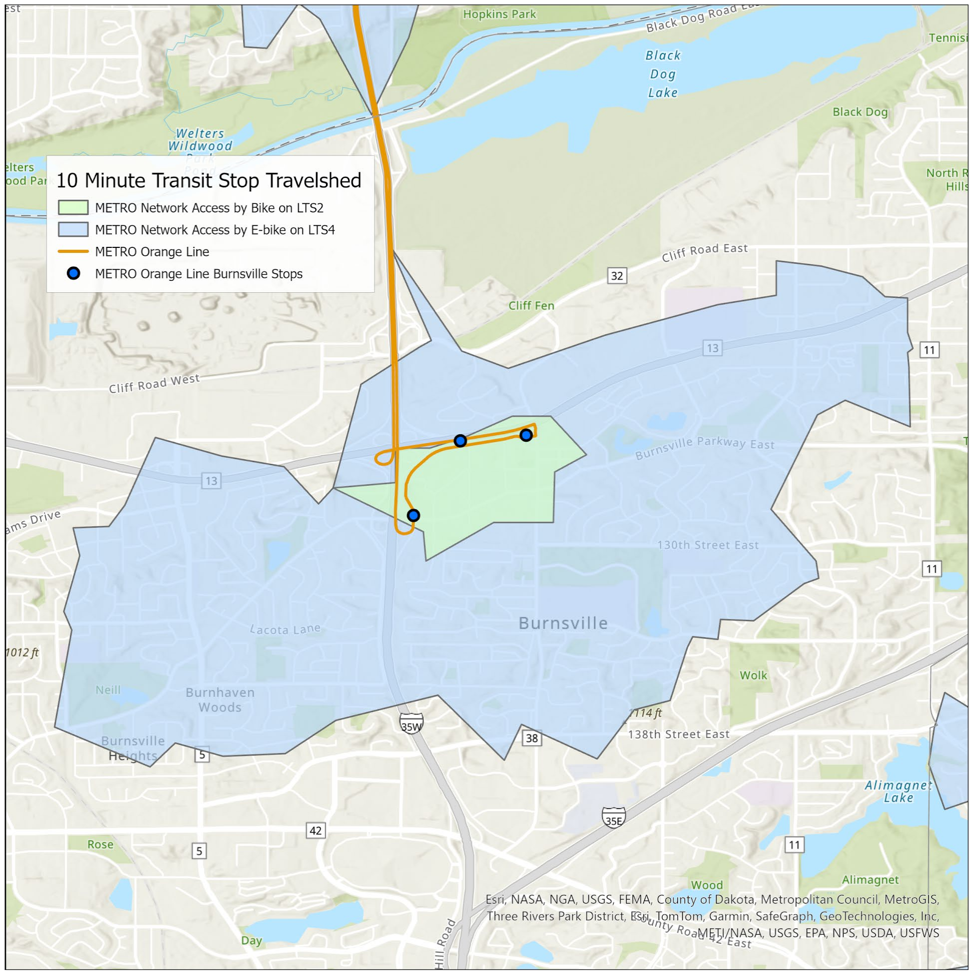

Figure 3.10: Ten minute access to METRO Orange Line station by bike using LTS 2 and e-bike using LTS 4

3.7.7 Shared micromobility and Transit

In addition to personal bicycles and e-bikes, shared micromobility holds a great deal of potential as a complement to public transportation. Shared micromobility can create a catchment area similar to that of bicycles and e-bikes, while eliminating many of the barriers which currently prevent higher levels of integration between cycling and transit. Because shared micromobility riders do not own these devices, the security of parking infrastructure is a minimal issue for users. If a robust micromobility system is present, the need to bring a device onboard transit is also eliminated, as users can generally find a shared device when they disembark transit, which can be used to complete their journey.

While shared micromobility is being used as a replacement for some public transit trips (in 2022 approximately 8% of shared micromobility trips were replacing public transit trips in North America) a far greater share of users report using micromobility to connect to transit. In 2022, 64% of shared micromobility riders reported using these devices to connect to transit, with 18% claiming they do so weekly. In total, approximately 23% of all shared micromobility trips connected riders with transit[52] in North America in 2022.

Across North America, transit agencies are recognizing the symbiotic relationship between these two modes. Many agencies are directly involved in the planning of shared micromobility stations, and some even provide direct funding to these systems. Data sharing between shared micromobility entities and transit agencies is also becoming more common, and is increasingly being used to integrate these modes through in-app trip planning and mobility as a service (MaaS) applications which allow users to bundle and pay for transit and shared micromobility in a single transaction (Kosmidis and Müller-Eie, 2023). This integration is seemingly something that users want, and are willing to pay for. One study found that riders would pay approximately 22% more for a monthly transit pass, and 25% more for a single transit ticket, that includes shared micromobility use.[53]

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[52] NABSA Shared MicroMobility State of the Industry Report

[53] Putting Micromobility at the Center of Urban Mobility

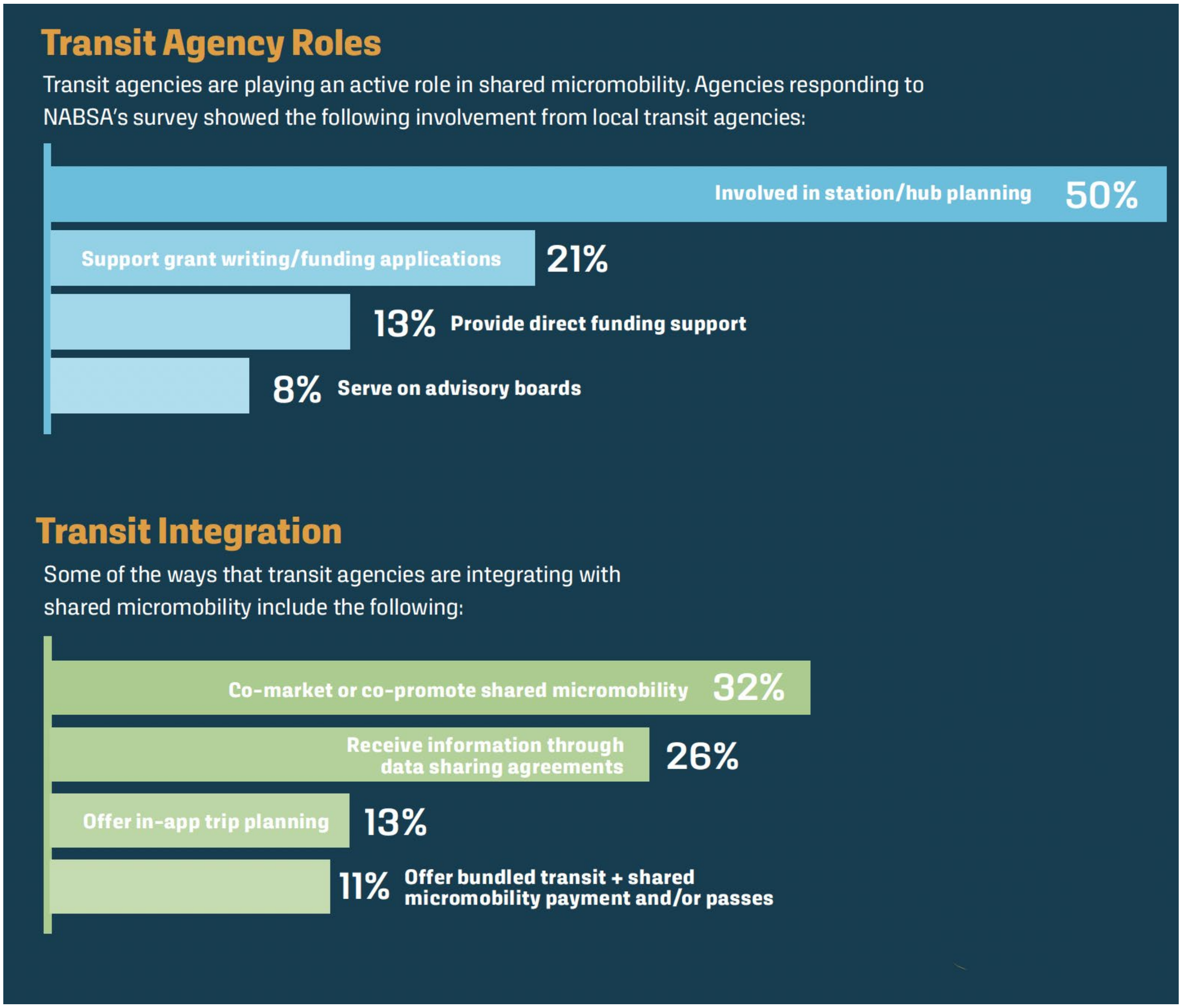

Image Credit: NABSA 4th Annual Shared Micromobility State of the Industry Report

Figure 3.11: Transit agency roles and transit integration with shared micromobility

Although shared micromobility holds great promise as a supplement to transit, and is potentially more effective than combining personal bicycles and public transportation, the integration of these modes is minimal in the Twin Cities region. According to the Metropolitan Council 2022 Transit Onboard Survey, just 0.1% of transit users accessed public transportation using shared micromobility. To increase the integration of these modes, several steps are recommended:

- Continue accommodating the relationship between micromobility and public transit through the Metropolitan Council's Mobility Hub program including micromobility parking areas and wayfinding.
- Improve active transportation infrastructure adjacent to public transit stations so as to increase the accessibility of transit using micromobility devices.
- Pursue in-app integration of modes, allowing users to plan and pay for trips which include both transit and shared micromobility.

3.8 ACTIVE TRANSPORTATION DEMAND

Even if comprehensive data on active transportation use were available, these figures would not adequately represent demand. This is because data on active transportation use does not take into account trips that individuals would like to make using active modes, but are unable or unwilling to due to certain factors.

Latent or unrealized demand for active transportation represents trips a resident would have taken by active mode if it weren't for certain factors. To better understand latent demand, and ideally convert it into actual use, an understanding of common barriers is necessary.

3.8.1 Demand, Latent Demand and Walking

Over 90% of American adults believe that walking as a form of transportation is reasonable (Watson et al. 2015). However, in the Twin Cities Region, just 2% of residents commute by walking.[54] While trip distance is likely a major factor in this low rate of use, a lack of safety, real or perceived, may also be a reason for this lack of representation. In a 2011 nationwide walking survey by America Walks[55] over half of respondents indicated that distracted drivers (talking on cell phones or using other devices) and speeding motor vehicles are safety issues that they encounter as pedestrians. Other safety concerns noted by respondents included poor walking infrastructure and lighting as additional safety issues. Addressing these safety concerns through policy and design solutions is a critical component of converting latent demand for walking into actual walking trips.

Latent demand for walking trips can also be observed through the demand for housing in walkable areas, which tend to have higher rates of walking trips for both transportation and recreation (Watson et al. 2015). Components that are generally believed to make a neighborhood walkable include a high supply of destinations in walking distance, a pleasant walking environment, and the presence of high quality infrastructure. A 2023 survey by the National Association of Realtors[56] demonstrated that the walkability of a neighborhood is a key factor when determining where to purchase a home, with elements like sidewalks, places to take walks, and being within walking distance of destinations being very important factors. According to this survey, respondents are seemingly willing to pay for access to these walkable areas, with 60% of respondents indicating that they would be willing to pay more for housing in a walkable neighborhood, with this percentage increasing to 90% for Gen-Z and Millennials. These findings indicate that an increase of the supply of walkable neighborhoods, as well as the

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[54] Metropolitan Council Community Profiles

[55] National Walking Survey

[56] National Association of Realtors Report

provision of additional housing in areas that are already walkable, may help to convert latent demand into actual walking trips.

3.8.2 Demand, Latent Demand and Cycling

In bicycle planning individuals are often categorized into four groups based upon their comfort and interest in cycling as a mode of transportation (Dill and McNeil, 2016). The groups (and the estimated percentage of the population that falls into each category in large metro areas) are:

- No way, no how—not interested in cycling; alternatively, suitable for most children. (Approximately 37% of population)
- Interested but concerned—unwilling to bike next to fast traffic or in traffic on busy roads; strong preference for separated facilities. (Approximately 51% of population)
- Enthused and confident—willing to tolerate busy traffic conditions if there is designated space for bicycles. (Approximately 5% of population)
- Strong and fearless—willing to bike regardless of traffic conditions. (Approximately 7% of population)

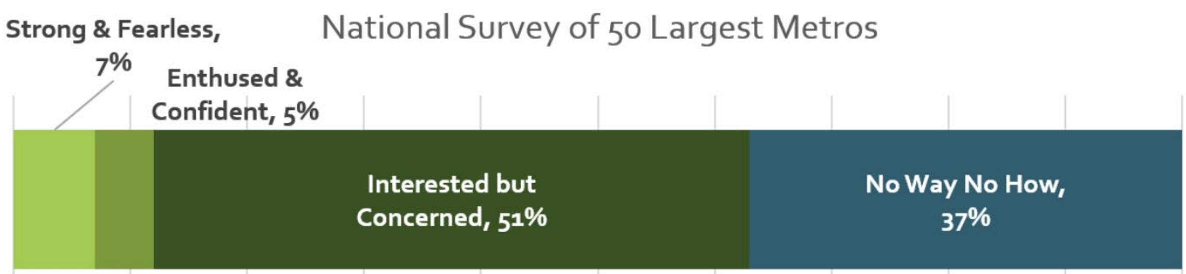


Image Credit: Jennifer Dill, PH.D., Portland State University, Alta Planning and Design

Figure 3.12: Cyclist typology by percentage of national population

For the purposes of converting latent demand into actual use, the 'Interested but Concerned' category is of the utmost importance, as this is the group with the highest potential to increase total cycling rates. By some estimations, upwards of half of major metropolitan area populations fall within this category, and these individuals generally ride less often, and are less likely to cycle as a form of transportation compared to 'Strong and Fearless' and 'Enthused and Confident' group members. However, compared to all other cyclist types, those that are interested but concerned have indicated the highest desire to travel by bike more often than they do currently. The size of this group, combined with their relatively high interest in cycling more often, indicates that any effort to increase total cycling mode share should prioritize accommodating this cohort and addressing barriers which currently inhibit them from cycling (Dill and McNeil, 2016).

Key barriers that prevent individuals within the Interested but Concerned category from cycling, or cycling more frequently, include a lack of access to a bicycle, safety concerns, and the lack of adequate bicycle infrastructure. Additionally, the length of trips and the need for personal vehicles for various reasons are often cited as barriers to cycling more. Addressing these barriers can also help to increase cycling rates of other cyclist groups, as many of these same considerations also prevent the Enthused and Confident and Strong and Fearless groups from cycling more often (Dill and McNeil 2016).

One potential avenue for addressing many of the current barriers that prevent the Interested but Concerned cohort from cycling more is through the implementation of an All Ages and Abilities planning approach. The All Ages and Abilities framework is a comprehensive approach designed to make cycling accessible and safe for everyone in the community, regardless of age, ability, or experience level. This concept has been increasingly adopted by cities and organizations across the United States to help ensure that bicycle networks accommodate a broad spectrum of the population, including children, the elderly, and differently-abled individuals.

According to the National Association of City Transportation Officials' (NACTO) Designing for All Ages and Abilities guidebook, core components of AAA include an emphasis on safety, comfort, and equity. Figure 3.13 from this same guidebook provides guidance on proper bicycle infrastructure given the conditions of the roadway in question.

Contextual Guidance for Selecting All Ages & Abilities Bikeways

Roadway Context				All Ages & Abilities Bicycle Facility
Target Motor Vehicle Speed*	Target Max. Motor Vehicle Volume (ADT)	Motor Vehicle Lanes	Key Operational Considerations	
Any		*Any*	*Any of the following:* high curbside activity, frequent buses, motor vehicle congestion, or turning conflicts‡	**Protected Bicycle Lane**
< 10 mph	Less relevant	No centerline, or single lane one-way	Pedestrians share the roadway	**Shared Street**
≤ 20 mph	≤ 1,000 – 2,000		< 50 motor vehicles per hour in the peak direction at peak hour	**Bicycle Boulevard**
≤ 25 mph	≤ 500 – 1,500			
	≤ 1,500 – 3,000	Single lane each direction, or single lane one-way	Low curbside activity, or low congestion pressure	**Conventional or Buffered Bicycle Lane, or Protected Bicycle Lane**
	≤ 3,000 – 6,000			**Buffered or Protected Bicycle Lane**
	Greater than 6,000			**Protected Bicycle Lane**
	Any	Multiple lanes per direction		
Greater than 26 mph†	≤ 6,000	Single lane each direction	Low curbside activity, or low congestion pressure	**Protected Bicycle Lane, or Reduce Speed**
		Multiple lanes per direction		**Protected Bicycle Lane, or Reduce to Single Lane & Reduce Speed**
	Greater than 6,000	*Any*	*Any*	**Protected Bicycle Lane, or Bicycle Path**
High-speed limited access roadways, natural corridors, or geographic edge conditions with limited conflicts		*Any*	High pedestrian volume	**Bike Path with Separate Walkway or Protected Bicycle Lane**
			Low pedestrian volume	**Shared-Use Path or Protected Bicycle Lane**

Image Credit: NACTO - Designing for All Ages and Abilities

Figure 3.13: Contextual guidance for selecting all ages & abilities bikeways

For all cyclists, two of the greatest sources of stress and potential danger are motor-vehicle traffic volume and speed. When vehicular speeds are below 25 miles per hour and traffic volumes are below

2,000 vehicles per day, most riders are comfortable riding in a shared roadway with vehicular traffic. However, when speed and volume exceed these thresholds, AAA guidelines call for physically separated infrastructure. This intervention helps to reduce the number of 'passing events', when a motor vehicle overtakes a cyclist on the road, that occur when there is no separated bicycle infrastructure accessible.

The infrastructure recommended by the AAA framework is intended to increase the comfort and reduce the stress of riding a bike. Through the implementation of an AAA framework which results in an extensive LTS1 and LTS2 network, latent demand for cycling may be converted into actual trips by addressing many of the barriers currently preventing the Interested but Concerned cohort from riding, or riding more often.

3.8.3 E-bikes

E-bikes are already proving to be an effective tool in turning latent demand into actual active transportation use, with e-bike ownership being associated with higher levels of cycling for both new cyclists and those who previously used traditional pedal powered bikes (MacArthur et al., 2018). Primary reasons for purchasing an e-bike are often related to barriers that deter individuals from riding a standard bicycle, such as the ability to make longer trips, and an increased perception of safety (Dill and McNeil, 2016). The numerous benefits associated with e-bikes, and their proven ability to increase cycling rates, indicate that they should be viewed as a critical tool in increasing cycling mode share.

E-bike rebate initiatives have proven to be incredibly popular and help to address the barrier of a lack of access to a bicycle, which currently inhibits active transportation use. In Denver, Colorado, an e-bike rebate program was introduced in 2022, and since that point over 15,000 applications have been submitted and over 8,000 residents have become e-bike owners through the program.[57] Denver's approach has been especially effective in providing e-bike access to low-income residents, with 67% of funding being directed to income-qualified applicants in the first year.[58] In Minnesota, a similar initiative is underway, which provides financial assistance for the purchase of a qualified e-bike starting July 1st, 2024.[59]

E-bikes can also help to mitigate the barrier of trip length, which currently prevents the adoption and more frequent use of cycling as a mode of transportation. The electric assist feature of e-bikes allows for faster travel over longer distances without the physical strain associated with traditional bicycles. This ability to ride longer distances has been identified as a key reason for the purchase of an e-bike

[57] Denver's e-bike rebate program will look different in 2024. Here's how and when vouchers will be available

[58] Denver's 2022 Ebike Incentive Program Results and Recommendations

[59] Electric-Assisted Bicycle (e-Bike) Rebate

(MacArthur et al., 2018), and the average trip distance and duration by e-bike users is significantly greater than that of traditional bike users (Castro et al., 2019). Additionally, e-bikes can expand the range of trip types that are feasible using active transportation. Owners of e-bikes report riding for different purposes, to different destinations, or taking different routes compared to what they would have on a standard bicycle (MacArthur et al., 2018).

Another benefit of e-bikes, which directly relates to a common barrier to cycling, is an increased perception of safety. E-bike users tend to feel safer riding an e-bike than a standard bicycle, and this difference is even more pronounced for new cyclists. This effect is multi-faceted, but includes the ability to take longer routes to avoid high stress streets, as well as the benefit that electric propulsion provides in accelerating away from potential conflict and keeping pace with traffic so as to reduce speed differentials and passing events.

Additional benefits offered by e-bikes over traditional pedal-powered bicycles include faster travel speeds, assistance in riding on hilly terrain, and reduced physical exertion. These various benefits have led to the adoption of e-bikes by individuals who previously might not have considered cycling as a viable mode of transportation, often turning these users into weekly riders (MacArthur et al., 2018). Data from Denver's e-bike rebate program demonstrate the utility of e-bikes in attracting new cyclists, where 29% of recipients of rebates were new bike riders.[58] Increased levels of cycling for those who previously rode traditional pedal powered bikes has also been observed after the purchase of an e-bike (MacArthur et al., 2018).

E-bikes can also play a crucial role in reducing single occupant vehicle trips and total vehicle miles traveled. Surveys of e-bike users have found that the majority of utilitarian trips made with an electric bicycle are replacing motor vehicle trips, and replacing car trips has been identified as a key motivator for the purchase of e-bikes. While exercise and recreational purposes are the most commonly reported use, the second and third most common trip purposes are commute trips and to run personal errands. In Denver, where recipients of the city's e-bike rebate program were surveyed on their e-bike use, it was found that respondents rode 26 miles per week on average, replacing 3.4 round-trip car trips. The program also found that 71% of participants reported using their gas vehicles less often.

3.9 ACTIVE TRANSPORTATION DATA LIMITATIONS

A key dissimilarity between travel behavior research into active transportation and public transportation is the difference in the quantity and quality of data available, with data on active transportation generally being far less comprehensive. Active transportation data is collected using a variety of methods, each with strengths and limitations. Continuous and temporary automated counters, as well as in-person manual counts, can provide accurate data on active transportation use at a specific geographic location and point in time, which can then be extrapolated to predict use throughout the entire transportation system. However, these methods fail to collect information on trip origins, destinations, purpose, and user demographics. Travel behavior surveys, another common tool for collecting active transportation data, can fill many of these data gaps. A limitation to this method is that it is reliant upon proper sampling techniques and survey question design, with many believing that widely used surveys on travel behavior often undercount active transportation trips. Third party location based service (LBS) data analytics companies have also emerged in recent years, which use cell phone data to produce estimates of active transportation use and patterns. While companies which track or buy personal GPS mobile app data can produce a synthetic picture of active transportation use within an area, there remain concerns regarding the validity of the information, and the techniques utilized to source this data.

Beyond the collection of data, a primary obstacle preventing a more comprehensive understanding of active transportation use and demand at the regional level is the lack of data integration across entities throughout the Twin Cities region. Numerous groups, at multiple geographic scales, engage in some form of active transportation data collection. These include pedestrian and cycling counting initiatives within large cities like St. Paul and Minneapolis, at the county level, through the Minnesota Department of Natural Resources, and within the Minnesota Department of Transportation. However, as it currently stands there is no single entity that has an official mandate or funding for the establishment of data collection standards, or collecting, aggregating, and analyzing these various data sources within the Metropolitan Council's jurisdiction. Without an official framework in place, understanding active transportation use and demand at the regional level will remain difficult.

3.10 ACTIVE TRANSPORTATION AND COVID-19

The COVID-19 pandemic has had profound effects on transportation behaviors and patterns. As the virus spread and stay-at-home orders were implemented, public transit usage decreased, while active transportation modes, such as walking and biking, experienced a surge in popularity.

3.10.1 Increase in Active Transportation

Active transportation trips across the United States generally increased during the pandemic. This rise can be partially attributed to the socially distanced nature of activities like walking and biking, which allowed individuals to travel and maintain physical activity while adhering to public health guidelines. Notably, cycling saw a 16% increase nationwide, with a more pronounced growth on weekends (29%) compared to weekdays (10%; Beuhler and Pucher, 2021).

Findings suggest that much of the increase in active transportation use was due to a growth in recreational trips, rather than commuting or utilitarian trips. This assertion is supported by active transportation data collected from Rails-To-Trails paths (recreational mixed-use paths along decommissioned rail-lines) which witnessed a 48% increase in usage, indicating a preference for off-road and recreational cycling environments. In other locations, there were notable increases in off-road cycling, while ridership in downtown areas and near universities declined.[60]

[60] https://www.peopleforbikes.org/news/how-bicycling-changed-during-a-pandemic

In addition to changes in trip purpose, temporal shifts in cycling usage during the years following the onset of the COVID-19 Pandemic have also been observed. Active transportation trips during the afternoon and early evening grew significantly during this time period, while trips made in the morning increased to a lesser extent, or even declined.[60] These results mirror patterns in other modes like transit ridership and auto traffic. In addition to increases in active transportation for recreational purposes, the shifting patterns may also reflect the increase in flexible work schedules associated with the COVID-19 Pandemic era.

3.10.2 First-Time and Returning Cyclists

The COVID-19 Pandemic also resulted in many American adults returning to cycling after an extended hiatus, or even cycling for the first time. Approximately 4% of the population rode a bicycle for the first time in a year or more, and 6% engaged in a new form of cycling.[60] This influx of new cyclists contributed to the overall increase in active transportation use, but a key question is whether these behaviors adopted during COVID-19 will continue as the pandemic subsides. An additional question that remains is whether new and returning recreational cyclists, who began cycling for recreational purposes, will begin cycling for utilitarian purposes in the future as the pandemic subsides. A survey conducted by People For Bikes sought to address this question, and found that the majority of new cyclists expect to ride at least once per week moving forward, with a significant portion indicating that they plan to cycle for commute and general transportation purposes.[60]

3.10.3 Personal Motivators for Increased Cycling

Multiple surveys of new, COVID-era cyclists have been conducted since 2020 in an attempt to better understand the factors that have contributed to the increase in cycling. Key personal motivators include elements related to stress relief and mental health, physical exercise, socialization, relaxation, and spending more time outdoors. These factors also support the conclusion that much of the increase in cycling during and immediately after 2020 was for recreational purposes. Differences in personal motivators were also found between new cyclists and existing cyclists, with elements like socialization and relaxation being far more important for new riders.[60]

3.10.4 Spike in Bicycle Sales

The increased interest in cycling was also reflected by a surge in bicycle and bicycle equipment sales. Total revenue for all cycling equipment categories combined saw a 65% increase in 2021 compared to

2019. E-bike revenues, in particular, skyrocketed by 240%, reflecting a growing interest in this emerging form of active transportation[61].

3.10.5 Infrastructure Improvements

Cities worldwide responded to the growth in active transportation by altering and expanding infrastructure to support active modes. In the United States, over 200 cities altered roadways to accommodate increased outdoor activity, with over 100 cities expanding their bicycle infrastructure network. Similar initiatives were also taken overseas, with approximately 106 European cities building a total of 1,209 km of provisional pop-up bike lanes in 2020. These cities reported an average increase in cycling ranging from 11% to 48% (Buehler and Pucher, 2021).

3.10.6 Active Transportation in Minnesota During COVID-19

In Minnesota, data captured by bike and pedestrian counters reflect many of the same trends that have been observed nationally. Between 2017 and 2019, total cycling and walking trips generally declined. However, 2020 saw a reversal of this trend, with active transportation trips surpassing 2017 figures in many locations. Changes in active transportation varied by location and type of bikeway or walkway, with recreational sites and trails experiencing a significant uptick in usage, and cycling and walking on roadways and commute trips made by cycling generally declining (Lindsey et al., 2022). This pattern suggests that, like much of the country, the overall increase in active transportation rates was largely driven by recreational trips.

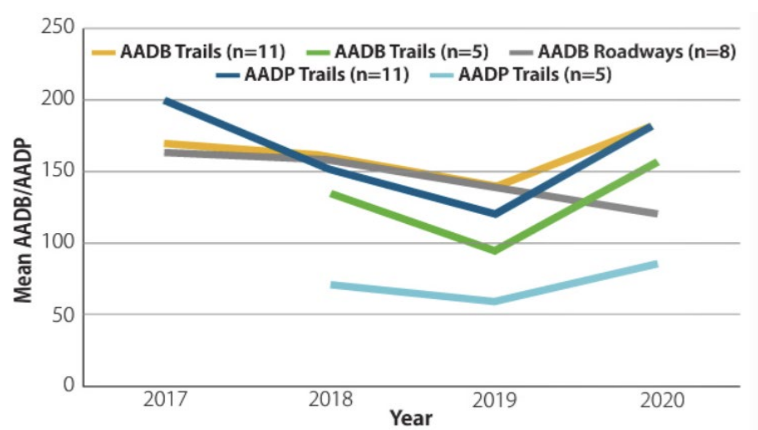


Image Credit: Lindsey et al., 2022

Figure 3.14: Bicycle Mean Annual Average Daily Traffic in Minnesota by mode and facility type

[61] The Cycling Market Pedals Ahead in 2021

3.11 CONCLUSIONS

This analysis reveals significant opportunities for enhancing the use of active transportation modes within the Twin Cities Metropolitan Region. The current levels of active transportation use likely underrepresent the actual demand, suggesting that targeted interventions to improve comfort, safety, and access could significantly increase the mode share of active transportation. The built environment, characterized by high-density areas with diverse land uses and well-designed infrastructure, plays a crucial role in determining active transportation use. Therefore, urban planning efforts intended to increase active transportation mode share should focus on developing environments that support and encourage walking and biking.

Integration with public transit is a critical factor in expanding accessibility and promoting multi-modal travel. Enhancing the connectivity between active transportation modes and public transit can significantly improve access, particularly in suburban areas where distances to transit stops are greater. The emergence of e-bikes and shared micromobility devices offer promising solutions to bridge these gaps, providing flexible and efficient options to connect to public transit. These modes have the potential to convert latent demand into actual use as well as to attract new riders and enhance overall accessibility.

However, current data limitations hinder a comprehensive understanding of active transportation patterns and the effectiveness of interventions. The lack of integrated and comprehensive data across various entities within the region poses challenges for planning and policy-making. Addressing these data gaps is essential for informed decision-making and for evaluating the impact of active transportation initiatives. Overall, these findings included within this chapter underscore the need for targeted policy interventions, improved infrastructure, and enhanced integration with public transit to fully realize the potential of active transportation in contributing to a healthier, more sustainable, and accessible urban environment in the Twin Cities Metropolitan Area.

CHAPTER 4: FINANCIAL IMPACTS OF THE COVID-19 PANDEMIC ON TRANSIT

4.1 FINANCIAL IMPACTS OF THE COVID-19 PANDEMIC ON TRANSIT SYSTEMS ACROSS THE U.S.

Research on the financial impacts of the COVID-19 pandemic on transit systems highlights the simultaneous decrease in funding for transit operations and the surge of operating expenses. Transit revenues declined during the initial months of the pandemic mainly due to the stay-at-home orders, put in place to prevent the spread of the virus. Operating expenses increased as transit agencies incurred staffing costs and adopted virus containment measures. In response to the rapidly escalating budget pressures, the Federal government provided temporary relief.

As the pandemic wanes, many transit agencies expect operating funding shortfalls. Federal relief funds are depleting and operating expenses continue to rise. Meanwhile, revenues started to recover slowly at an uneven pace across various sources. Passenger fare revenues remain depressed, below pre-pandemic levels, while state and local revenues have rebounded to pre-pandemic levels. Transit agencies with higher ridership and farebox recovery ratios before the pandemic, and those with rail operations, are anticipating major financial deficits.

4.1.1 A decline in transit funding during the pandemic and a slow and uneven recovery post-pandemic

Transit services are funded through a variety of revenue sources across the U.S. The most common sources come from passenger fares, state and local revenues from sales taxes, revenues from motor fuel taxes,[62] and other state-dedicated revenues such as revenues from tolls and vehicle fees.

Revenues from Passenger Fares: During the pandemic, fare revenue decreased due to a ridership decline and the temporary suspension of fare collection. First, due to the stay-at-home orders, ridership across the U.S. declined from about 750 million passengers in February 2020 to 155 million in April 2020 (APTA, 2024a). Although ridership has been recovering to an average of 498 million passengers in 2022 and 583 million in 2023, it has not reached pre-pandemic levels.

[62] The motor fuel tax is the largest source of dedicated funding for transit at the federal level. At the state level, several states use proceeds from motor fuel taxes for transit purposes. Thirty states across the U.S., including Minnesota, restrict the use of motor fuel tax for transit purposes, either by statutes or state constitution (Kenny, 2023).

Second, many transit agencies temporarily suspended fare collection as a response to curb the spread of the virus (Dickens et al., 2020),[63] particularly affecting higher-fare rail services, and lasted between three to nine months. According to the first nationwide survey conducted by Siddiq et al., (2023), 65 percent of the respondent transit agencies suspended fare collection and 18 percent stopped fare enforcement for at least some period during 2020. A second survey, conducted in 2021-22, reported that 66 percent of respondent agencies went back to collecting fares, 14 percent went fare-free permanently, 5 percent reduced fares from pre-pandemic levels, and 7 percent increased fares. In addition, most of the respondents who returned to pre-pandemic fare collection also reported having a lower farebox recovery ratio and annual ridership, relative to those who changed their pre-pandemic fare collection.

Overall, fare revenue has partially recovered but remains significantly lower compared to its pre-pandemic levels. **In particular, fare revenue has not increased proportionately with ridership**. In 2022, transit agencies across the U.S. reported fare revenues and ridership at 55.6 and 62.4 percent of pre-pandemic levels, respectively (APTA, 2024b; Davis, 2023). Estimates suggest that nationwide ridership will recover to approximately 85 percent of pre-pandemic levels by 2026 (S&P Global Ratings, 2024), with top transit cities experiencing full recovery (USDOT, 2022).

<u>Revenues from Sales Taxes</u>: Sales tax revenues, which rely on consumer spending, decreased during the initial months of the pandemic (second quarter of 2020) and recovered thereafter (Dean et al., 2023; King et al., 2021, 2023). Such recovery is related to a shift in the consumption structure away from services and toward goods, particularly through e-commerce. This shift is a consequence of the stay-at-home restrictions that negatively affected service provision. The shift of consumption into goods increased sales tax revenue because goods are more likely to be in the sales tax base.

Revenues from sales taxes have recovered rapidly but recent studies show that they are more volatile and have shifted from larger to smaller jurisdictions. Analyzing data from California counties, King et al., (2021, 2023) found that the primary effects of the COVID-19 pandemic on local option sales tax (LOST) receipts were a decrease in the amount collected in the short-term and an increase in their volatility and unpredictability in the medium term. In addition, they found that California counties with higher disposable income experienced more volatility in LOST revenues than lower-income counties. Additionally, higher unemployment rates were associated with lower LOST revenues. In addition, Dean et al., (2023) and Agrawal & Shybalkina (2023) found that the **e-commerce boost shifted the point of sale and thus the related sales tax revenues from urban jurisdictions to suburban and rural jurisdictions**.

[63] The COVID-19 virus demonstrated a higher level of contagiousness, primarily due to its rapid transmission through respiratory droplets and aerosols and lack of pre-existing immunity in populations. The temporary suspension of fare collection aimed to limit direct interactions between passengers and operators, contributing to a collective effort to mitigate the risk of infection.

Revenues from motor fuel taxes: Fuel tax revenue plummeted across the U.S. because of the stay-at-home orders and reduced commuting from remote working arrangements. Fuel tax revenues declined on average 7.4 percent between the first quarter of 2020 and 2021 with larger declines in the Far West, Mideast, and New England regions (declines ranging from 10.5 and 15.9 percent; Dadayan, 2021).

Revenues from the motor fuel tax recovered in 2021 (FHWA, 2022a). However, the long-term adequacy of this revenue source is threatened by improvements in vehicle fuel efficiency, inflation, and the increasing adoption of non-fuel-powered vehicles. In particular, in the U.S., total vehicle miles traveled increased by 2.75 percent, while total fuel sales increased by only 0.15 percent between 2021 and 2022 (Regan, 2023).

Toll revenues: Toll revenues declined drastically because of the stay-at-home orders. Traffic and revenue for U.S. toll roads decreased by 50 to 90 percent in April and May 2020 (Cherry et al., 2023). Toll road activity as well as revenues from it, however, had mostly recovered by 2021 in part due to the spur in commercial traffic tied to increased demands for goods (Forsgren & Stafford, 2022).

Revenues from vehicle fees: These include revenues from vehicle registrations and vehicle sale fees. Revenues from vehicle registrations declined in some states during the pandemic due to extensions in the registration filling period. These revenues have not recovered to pre-pandemic levels in all states, even though the number of vehicles registered across the U.S. increased in 2022 surpassed its 2019 levels (FHWA, 2022b; Jenkins, 2023; NCDOT, 2020).

Revenues from vehicle sales tax remained relatively constant during the pandemic. While vehicle sales decreased across the U.S. by 14.9 percent, revenues from vehicle sales taxes did not decrease as much due to higher prices coming from automobile shortages, high consumer demand, and inflation (Dupor, 2022; Metropolitan Council, 2022). Vehicle sales have recovered but are still down from pre-pandemic levels - monthly average vehicle sales were 17.49 million in 2019 and 16.03 million in 2023 (FRED, Federal Reserve Bank of St. Louis, 2024). Beyond the current state of vehicles sales, there are long-term concerns regarding the revenue generated by vehicle sales taxes, as shared mobility and an overall lower dependence on cars reduce vehicle demand.

4.1.2 Increasing operating costs that continue after the pandemic

The COVID-19 pandemic led to increased operating costs for transit agencies as they implemented measures to limit outbreaks while continuing to provide essential transit services, especially for first responders and other essential personnel unable to work from home.

Pandemic-related expenses: Costs escalated in 2020 due to the need to limit the spread of the virus. Transit agencies across the U.S. had to implement heightened cleaning and disinfecting protocols, undertake measures to shield vehicle operators from passengers, and retrofit vehicles for improved air filtration. The Transit Center estimated COVID-19-related cost increases to be in the range of $3.9 to $4.6 billion (Transit Center, 2020), which amounted to approximately 8 to 10 percent of the total national transit expenses in 2020 (FTA, 2020).

Overall, there has been limited research about the trend of these expenses in the transit industry after the pandemic. Although the COVID-19 pandemic was downgraded and no longer considered a global emergency in 2023, the virus remains active. Research focusing on other transportation industries, particularly air transport, highlights the importance of maintaining cleaning and hygiene measures in the industry to increase the passengers' confidence in making travel decisions and emphasizes the need for transportation agencies to remain vigilant as viruses (including COVID) remain active (Florido-Benítez, 2023).

Labor expenses: **Two main factors affected labor expenses during the pandemic in different directions**. First, expenses increased as transit agencies incurred overtime payments for workers substituting for other staff who were quarantined during the pandemic. For instance, paid absences increased by 10.4 percent between 2019 and 2020 (from $2.6 to $2.9 billion, respectively) across U.S. transit agencies (FTA, 2020). Second, expenses decreased as, following the decline in ridership, transit agencies reduced service frequency, adjusted weekday/weekend and peak/off-peak services, and suspended, consolidated, or eliminated routes, which resulted in a decrease in operations staff (Siddiq et al). According to an APTA survey in July 2020, 36 percent of the 121 surveyed agencies had already conducted or planned furloughs (Dickens, 2020). Between 2019 and 2020, salaries paid decreased by 4.8 percent, from $16.4 to $15.7 billion (FTA, 2020).

The overall effect of these forces was that total salaries and fringe benefits remained at about $31 billion between 2019 and 2021. However, this took place as the vehicle-revenue-miles-operated declined from 5.12 to 4.03 billions of miles as well as the number of employees decreased from 448 thousand to 415 thousand (with an annual decline of about 5 percent in vehicle operations and maintenance staff) (Dickens & Bonina, 2023).

Finally, **transit agencies across the U.S. have encountered difficulties in recruiting and retaining personnel since 2022**, which impacts budgets[64] (Dickens, 2022; Siddiq et al., 2023). In February 2022, an APTA survey found that more than 92 percent of respondent agencies had difficulty hiring new employees and 66 percent had difficulty retaining employees (Dickens, 2022). Reasons for the shortage include an aging workforce with agencies experiencing high retirement rates; concerns about work schedules, compensation, safety, and other conditions; and intense competition for workers across all industries (Foursquare ITP & EBP, 2023). To address this shortage, transit agencies have considered various strategies that increase labor expenses, including expanding recruitment capacity, improving training and onboarding, increasing workers' compensation, providing better work schedules, improving worker safety, and building agency culture.

[64] The workforce shortage also contributed to further service modifications, resulting in cut services, delays, and missing trips (Dickens, 2022).

Financial Shortfalls and Federal Emergency Relief Funds

Changes in revenues and expenditures for transit agencies during the COVID-19 pandemic resulted in a funding shortfall for 2020 and subsequent years for the U.S. as a whole. For 2020 the shortfall was estimated to be between $26 and $40 billion (Transit Center, 2020). For 2021, 2022, and 2023 it was estimated to be $25.2, $15.1, and $13 billion, respectively (EBP US Inc, 2021). To mitigate the impact of the pandemic, the U.S. Federal Government approved economic stimulus packages that, among others, supported transit systems across the country. Transit support came through the Coronavirus Aid, Relief, and Economic Security (CARES) Act; the Coronavirus Response and Relief Supplemental Appropriations (CRRSAA) Act; and the American Rescue Plan (ARP) Act. These Acts allocated $25 billion for urban and rural transit operations in March 2020, $14 billion in December 2020, and $31 billion in March 2021, respectively.

For many transit agencies, federal aid replaced lost revenue from fares and local and state funding. **Federal funding for operating expenses went from representing about 8 percent of total costs in 2019 to 26 percent in 2020, 37 percent in 2021, and 39 percent in 2022** (FTA, 2022). In this way, federal funding played a crucial role in supporting transit operations, offsetting the economic challenges brought about by the pandemic, and facilitating the continued provision of essential transportation services across the U.S.

Transit agencies had obligated more than 99 percent of these emergency relief funds in 2023 (Dickens, 2023) but the way these have been exhausted by transit agencies varies across years. According to Siddiq et al., (2023), 25 percent of responding agencies expected to fully expend the funds by FY2022, 40 percent anticipated doing so in FY2023, and one-fifth of agencies planned for the federal relief funding to extend beyond FY2023. As federal relief funding expires, the uncertainty surrounding the financial stability of transit agencies post-federal relief grows.

4.1.3 What comes next in public transit finance?

According to survey data, between half and two-thirds of transit agencies predict an operating budget shortfall in the near future (Dalbey, 2023; Dickens, 2023; Siddiq et al., 2023). This follows from the increase in operating costs, the exhaustion of relief funds, and the slow recovery in fare revenues that have not returned to pre-pandemic levels. Based on an APTA survey, 70 percent of large agencies with operating budgets greater than $200 million indicated they will experience a deficit of 10 to 30 percent of their operating budget in the next five fiscal years (Dickens, 2023). Transit systems anticipating major deficits tend to be larger (270 million annual passengers pre-pandemic) and had a higher farebox recovery ratio (24 percent, on average, pre-pandemic) (Siddiq et al., 2023). In addition, half of the transit agencies with rail operations anticipated financial shortfalls, while agencies operating only buses and/or paratransit anticipated smaller shortfalls.

Survey results also suggest that transit agencies facing a fiscal cliff are more likely to seek increased funding (state, local, and new dedicated tax revenues) and reduce costs, as opposed to reducing workforce and increasing fares. States seeking additional funding for transit projects may increase tax rates or implement new revenue-generating strategies. For instance, Maryland increased vehicle registration rates to fund road and transit projects (Roads & Bridges, 2024). Other states, like Vermont, are considering flexing more federal highway funds toward transit projects (Richardson, 2022). Between 2013 and 2020, states flexed less than 4 percent of their federal highway funds[65] for transit projects. Only Nevada, Washington, Arizona, New York, Vermont, Oregon, Maryland, California, and New Jersey flexed more than 4 percent of their funds for transit.

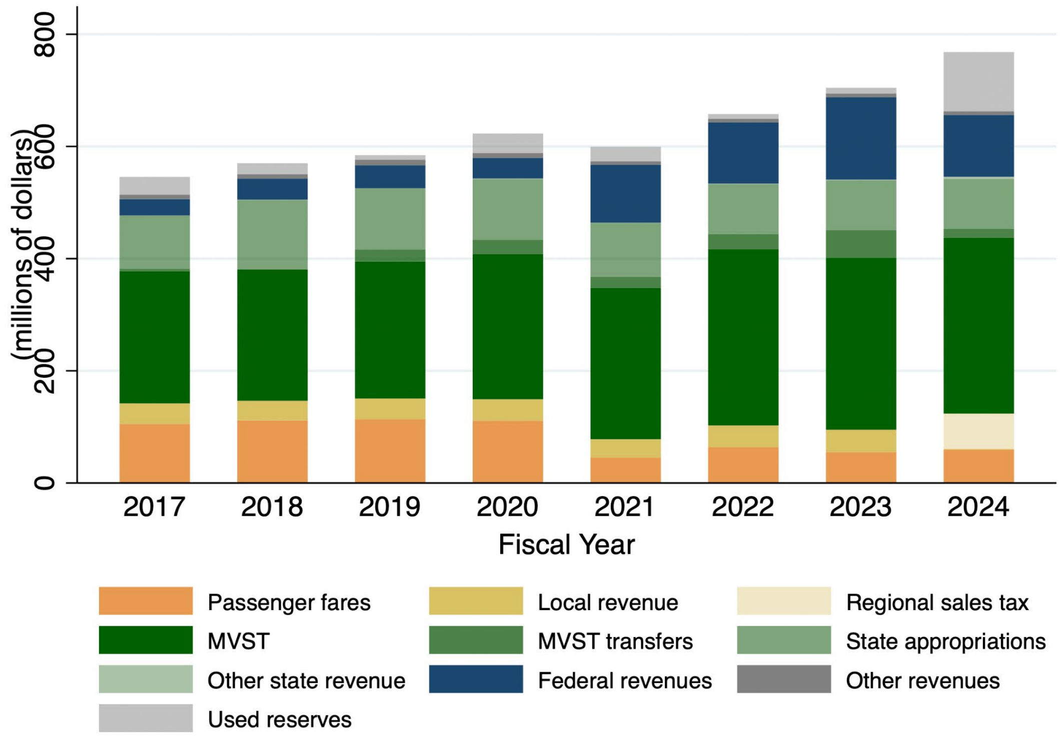
4.2 FINANCIAL IMPACTS OF COVID-19 ON THE TWIN CITIES METRO AREA TRANSIT SYSTEM

4.2.1 Impacts of COVID-19 on Funding Composition

Revenues for transit services provided by the Metropolitan Council, including Metropolitan Transportation Services (MTS) and Metro Transit come from state, federal, and local sources as well as from own-source revenues generated by the transit agency (Figure 4.1). For the period between fiscal years (FY) 2017 and 2024, state revenues, such as revenues from the Motor Vehicle Sales Tax (MVST), state appropriations, and other state revenues, accounted for approximately 63.5 percent of the total revenues. Federal revenues accounted for 11.7 percent; own-source revenues, such as passenger fares, accounted for 13.6 percent; and local revenues, accounted for 5.3 percent.

Revenues for transit services from MTS and Metro Transit increased on average at an annual average rate of 5.1 percent between FY2017 and FY2024. This overall figure includes the effect of a 3.8 percent decrease in revenues experienced during the COVID-19 pandemic (FY2021). The growth of revenue post-pandemic has been slightly higher than in pre-pandemic years (8.6% for FY22-24 vs 4.5% for FY17-20) but has barely kept up with inflation that also increased in the same period. **The Metropolitan Council has been able to cover its transit operating expenses in all years despite the pandemic. The use of reserves has been key for this.** Used reserves covered 5 percent of total transit expenses between FY2020 and FY2021 and 13.8 percent in FY2024.

[65] Congestion Mitigation and Air Quality (CMAQ) and the Surface Transportation Block Grant (STBG) are the two highway funding programs most commonly flexed to transit. Other programs that can fund transit include the National Highway Performance Program (the largest highway formula program) and the Carbon Reduction Program (Richardson, 2022).



Source: *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure 4.1 Expenditures for Metropolitan Transportation Services and Metro Transit by revenue source

The COVID-19 pandemic triggered significant changes in the funding composition for public transit. First, there is a higher reliance on MVST revenues, which are the largest source of funding for transit operations. Second, passenger fare revenues plummeted but this was compensated by an increase in federal funding. Third, regional revenues replaced local revenues.

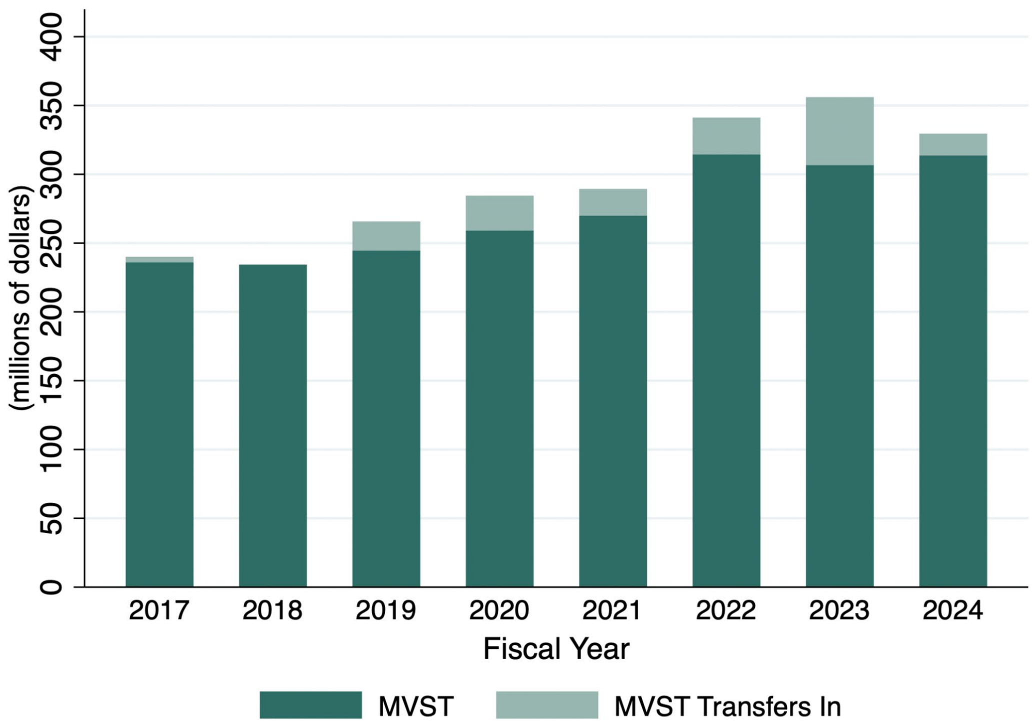
4.2.1.1 Higher Reliance on Revenues from the Motor Vehicle Sales Tax

Metropolitan Transportation Services and Metro Transit operations rely heavily on state revenues, particularly on those from the Motor Vehicle Sales Tax (MVST). The MVST is the single-largest source for transit operations in the Metro Area.[66] Revenues from this source went from accounting for 43.5 percent of total transit revenues pre-pandemic to 50.2 percent (this includes MVST revenues for the

[66] Of the total MVST's proceeds, 40 percent is allocated to transit for the Twin Cities metropolitan area (36%) and for Greater Minnesota (4%) (Minn. Const. art. XIV, § 13).

year as well as MVST revenues carried over - transferred from reserves [referred as 'MVST transfers' in in the budget and figures]). State appropriations are also important, representing an average of 16.8 percent of total revenue in the period between FY2017 and FY2024. However, these decreased during the pandemic (by 11 percent) and have remained constant in the aftermath.

Unlike other revenues during the pandemic, revenues from the MVST increased modestly in FY2021 (1.7%) and then strongly in FY2022 (17.9%) (Figure 4.2), which also increased the reliance on this source for transit operations as other revenue sources decreased. Revenue levels were not impacted as much by the pandemic because of the high prices brought by automobile shortages and high consumer demand. However, vehicle sales while growing, are growing at a lower rate. Revenues are expected to continue growing going forward, as starting on July 1, 2023, the MVST rate increased from 6.5 to 6.875 percent (Minn. Stat. § 297B.02, 297B.13, DVS, 2024).



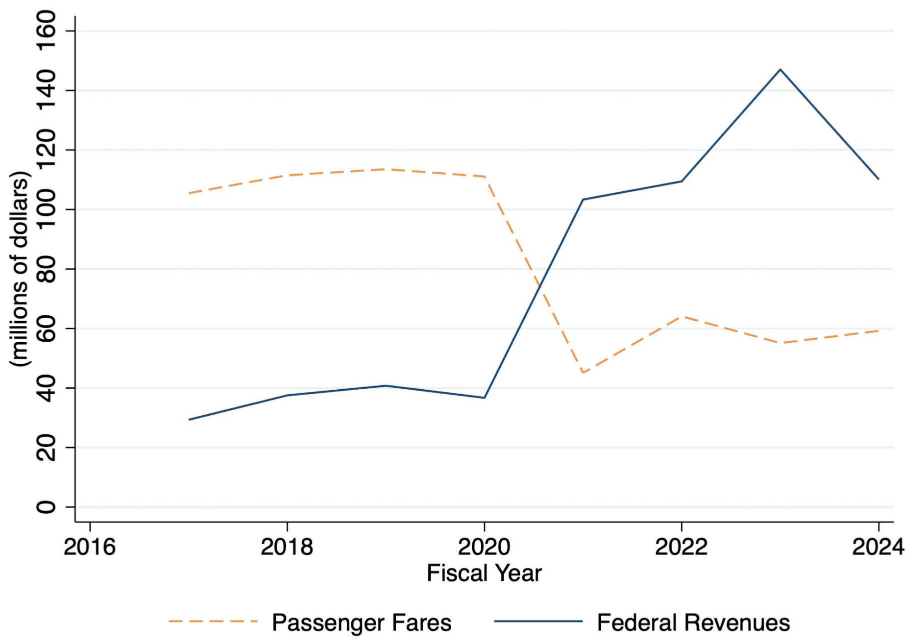
Notes: *MVST corresponds to 95 percent of the resources expected for the period, except for FY2021 when 100 percent of the resources were budgeted. 'MVST Transfers in' are MVST revenues carried over (transferred from reserves).* ***Source:*** *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure 4.2 Revenues from the Motor Vehicle Sales Tax (MVST) for Metropolitan Transportation Services and Metro Transit

Although revenues from the MVST are expected to continue growing in the short term, there are concerns about their long-term growth owing to expected shifts toward lower vehicle ownership as shared mobility and other trends become more salient. This is significant given the MVST importance for funding operational transit costs increases.

4.2.1.2 Decline in Passenger Fare Revenues and Increased Federal Funding

Passenger fare revenues decreased during the COVID-19 pandemic, but this was offset by an increase in federal funding (Figure 4.3). **Revenues from passenger fares declined by almost 60 percent in FY2021 in part due to the decline in ridership and the temporary suspension of fare collection for almost five months** (between late March and the end of July 2020). Although there has been some recovery, fare revenues are still far from pre-pandemic levels: FY2024 revenues were at 53 percent of FY2020 revenues. Passenger fares went from accounting for 19.9 percent of total transit revenues before the pandemic, to only 9.7 percent thereafter.



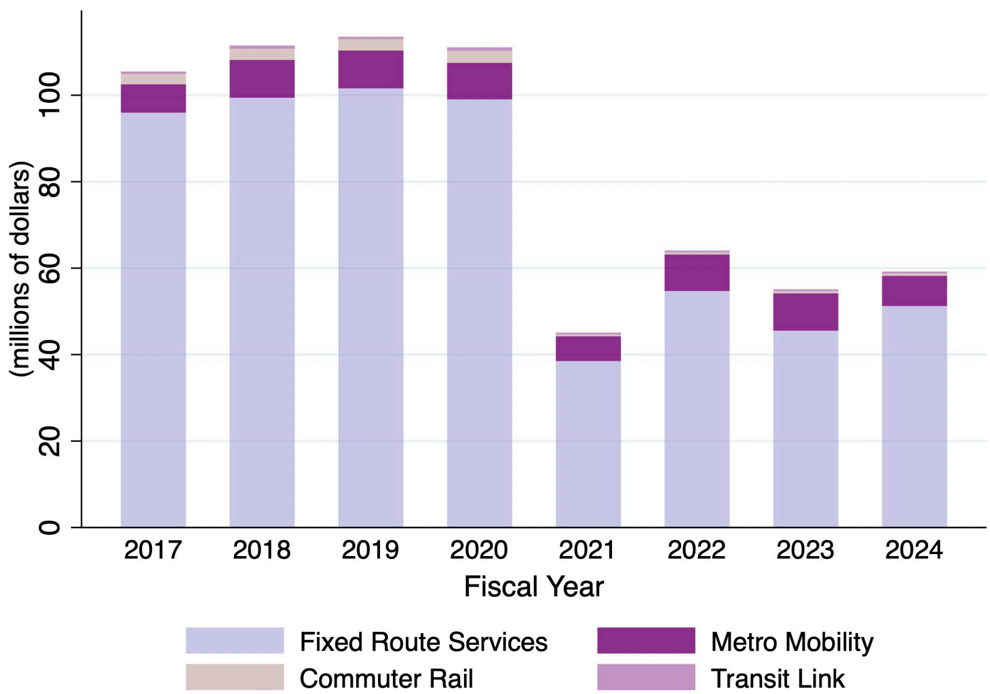
Source: *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure 4.3 Revenues from passenger fares and federal revenues for Metropolitan Transportation Services and Metro Transit

Conversely, federal revenues more than doubled in FY2021 due to the stimulus packages approved by the Federal government. Federal revenues went from accounting for 6.6 percent of total revenues before the pandemic to 18.2 percent thereafter. The Metropolitan Council received a total of $725.8 million in COVID-related funds since 2021, including $226.5 million from the CARES Act funding, $185.9 million in CRRSSA Act funding, and $313.4 million in ARP funding (Metropolitan Council, 2022). Most of the funding has already been spent to help balance operating budgets. The Metropolitan Council will finish spending these resources in 2025, with $68 million programmed in the 2024 budget and $23 million in the 2025 budget (Metropolitan Council, 2023a).

4.2.1.3 Fare Revenues Across Transit Services

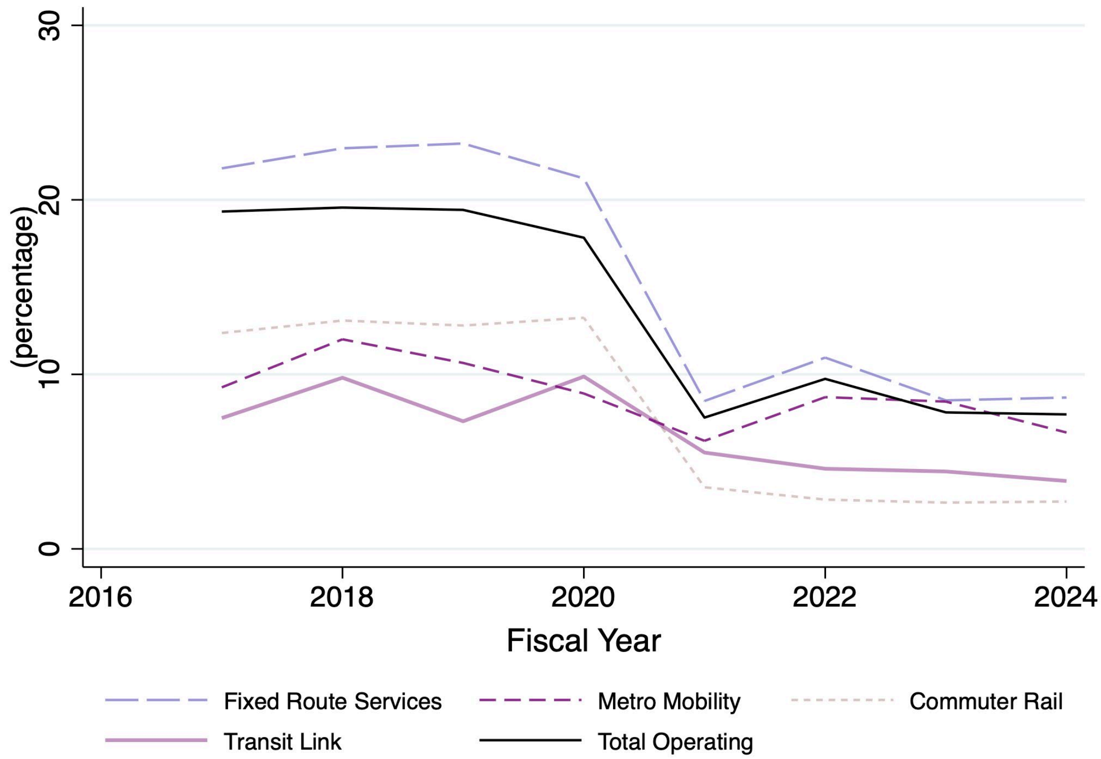
Passenger fare revenues for MTS and Metro Transit mostly come from fixed route services: bus, light rail, and contracted fixed route services. Fixed route services provided around 87 percent of total passenger fare revenues between FY17 and FY24 (Figure 4.4). Passenger fare revenues from these services decreased in FY2021 by 61.1 percent. While there has been some recovery, the revenue fares from these services in FY2024 are at about 50 percent of their FY2019 level. Conversely, **passenger fare revenues from commuter rail experienced the highest decline and slowest recovery across all transit modes**. Commuter rail fares (that account for 3 percent of total fare revenue) declined by 85.4 percent in FY2021, and in FY2024 are only at 20 percent of their FY2019 level.



Note: *Fixed route services aggregates bus services, light rail, and contracted fixed route.* ***Source:*** *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure 4.4 Revenues from passenger fares by transit services provided by Metropolitan Transportation Services and Metro Transit

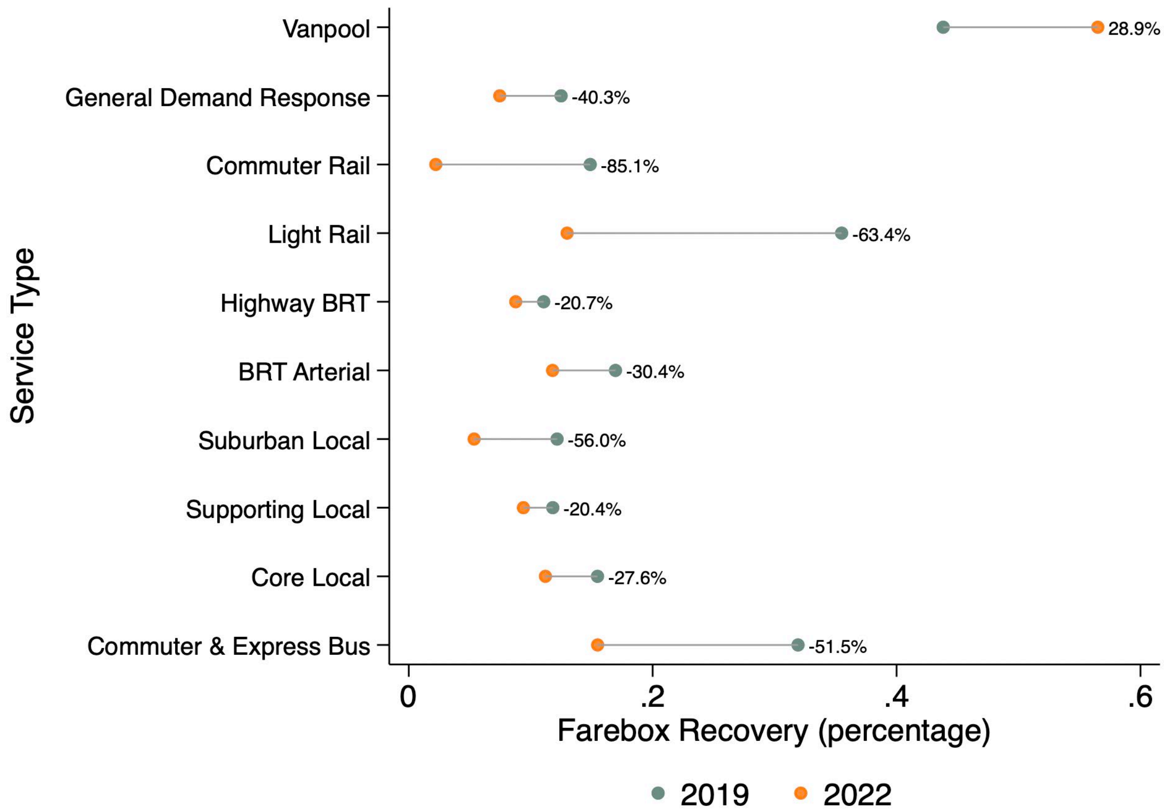
With the decline in passenger fare revenues resulting from the pandemic, the ability of this funding source to cover operation expenses fell (Figure 4.5). **Passenger fare revenues covered about 20 percent of the Metropolitan Council total transit operating expenses before the pandemic, but only about 8 percent in its aftermath**. By transit service type, commuter rail was the transit service experiencing the highest decline in farebox recovery and became the transit service that covers the smallest portion of its operating expenses across all modes. Between FY2019 and FY2023, the farebox recovery for commuter rail decreased by 10 percentage points (from 12.8 to 2.7 percent). Passenger fare revenues from fixed route services (bus, light rail, and contracted fixed route services) covered a large portion of their operating expenses before the pandemic and while the farebox recovery declined with the pandemic, these services continue covering the largest portion of operating expenses across all services (about 8.5 percent in FY2023).



Note: *Fixed route services aggregates bus services, light rail, and contracted fixed route.* ***Source:*** *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure 4.5 Farebox recovery by transit services provided by Metropolitan Transportation Services and Metro Transit

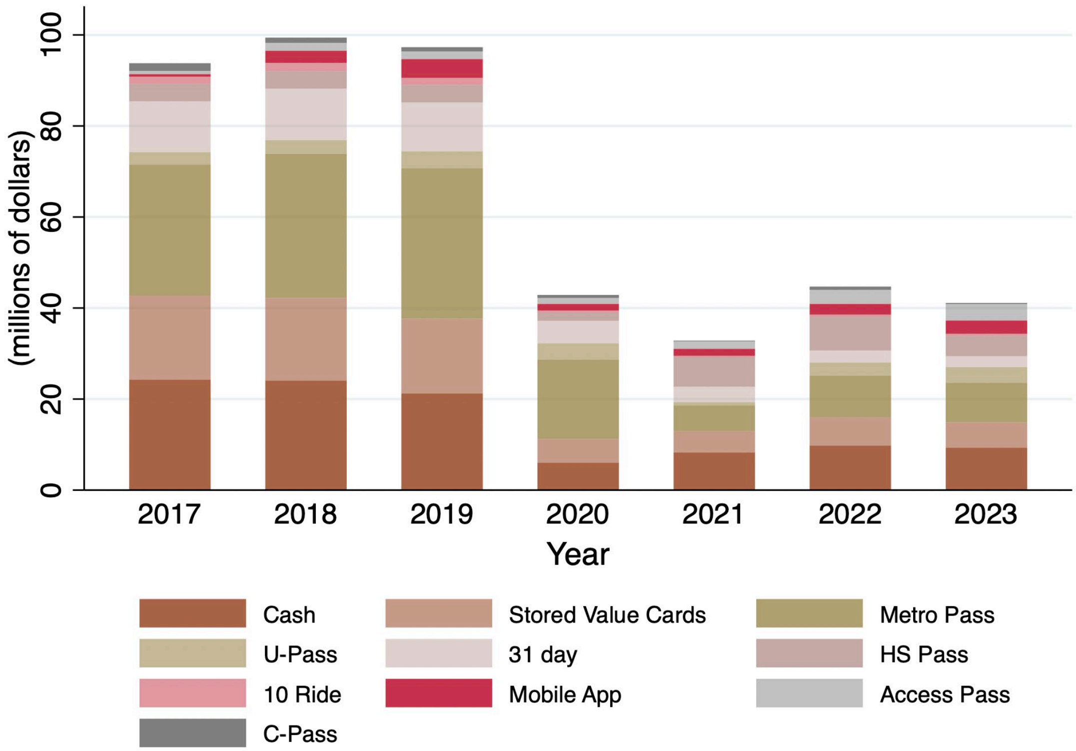
Declines in the farebox recovery rates were also experienced in most transit services in the metro region (see Figure 4.6 and Appendix B). Overall, services that are highly supportive of work commutes --such as commuter rail and commuter & express bus services-- were the most impacted by the COVID-19 pandemic. Regionally, between 2019 and 2022, suburban local, and commuter & express bus services experienced the second highest declines in the farebox recovery rates (around a 52 percent); while highway bus rapid transit (BRT) and supporting local services experienced the lowest declines (around a 20 percent). Among all transit services in the region, vanpool, the service with the highest farebox recovery rate, experienced an increase in its ability to cover operating expenses with fare revenues.



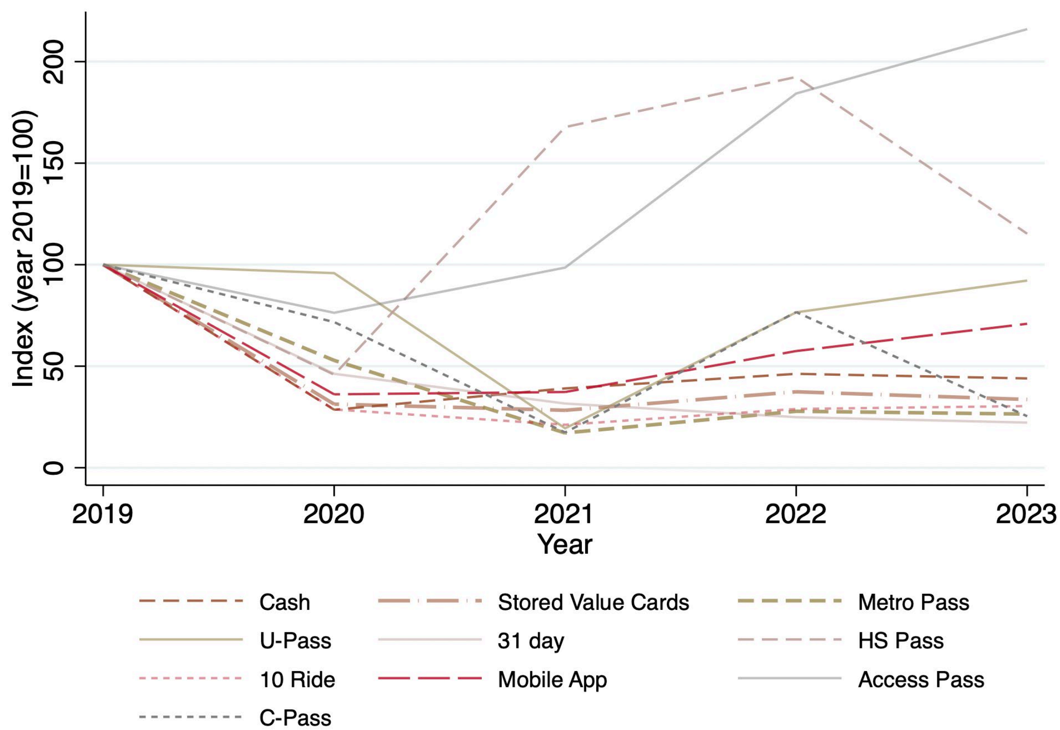
Note: *Data for all transit providers in the metro region including Metro Transit, Metropolitan Transportation Services, Minnesota Valley Transit Authority (MVTA), Maple Grove Transit, Plymouth, and SouthWest Transit. Vanpool data for 2020 is displayed as 2019 data in the graph. BRT: Bus Rapid Transit.* ***Source:*** *Metropolitan Council Performance Data, 2019-2022.*

Figure 4.6 Regional farebox recovery by transit service

Revenues from all Metro Transit's fare products decreased to different extents with the COVID-19 pandemic (Figure 4.7) and have slowly increased. Similarly to previous results, fare products oriented toward work commutes were the most impacted by the COVID-19 pandemic. Metro Pass, for example, is an employer-based transit pass from Metro Transit tied to office commuters. **Pre-COVID, Metro Pass was the main contributor to passenger fare revenues, contributing an average of 35 percent of fare revenues**. As a result of the pandemic, Metro Pass revenues decreased annually by 47.1 percent in 2020 and 67.6 percent in 2021. By 2023, revenues were at 26.4 percent of their 2019 level and accounted for only 21.2 percent of fare revenues. As Metro Pass is an employer-connected program, these trends are likely due to the rise in remote and hybrid work arrangements that have persisted after the pandemic.



Panel A: Revenues from Passenger Fares by Fare Product



Panel B: Revenues from Passenger Fares as a share of 2019 levels by Fare Product

Source: *Monthly revenue booked by fare product, Metro Transit, Jan 2017 to Dec 2023.*

Figure 4.7 Metro Transit's Passenger fare revenues by fare product

Metro Pass, together with Cash, Stored Value Card, and 10 Ride form a group of fare products whose revenues experienced a significant decline and slow recovery. Revenues from these fare products in 2021 were, on average, down to 27 percent of their 2019 level. By 2023, revenues had only recovered to 34 percent of their 2019 level. Cash, Stored Value Card, and 10 Ride are for riders who are either not connected to a pass-enabled employer or cannot afford a large outlay for a pass and pay ride-by-ride.

The U-Pass and Mobile App fare products experienced a moderate to high decline in revenues but are near full recovery. U-Pass revenues in 2023 are at 90 percent of their 2019 level after being in 2021 at a 19 percent of their 2019 level. Such an increase was mainly driven by the passage of the Universal Transit Pass (UTP) at the University of Minnesota in Fall 2022 (Metropolitan Council, 2024). Similarly, revenues from the Mobile app in 2021 were at 37 percent of their 2019 level, but by 2023 these were 71 percent of their 2019 level.

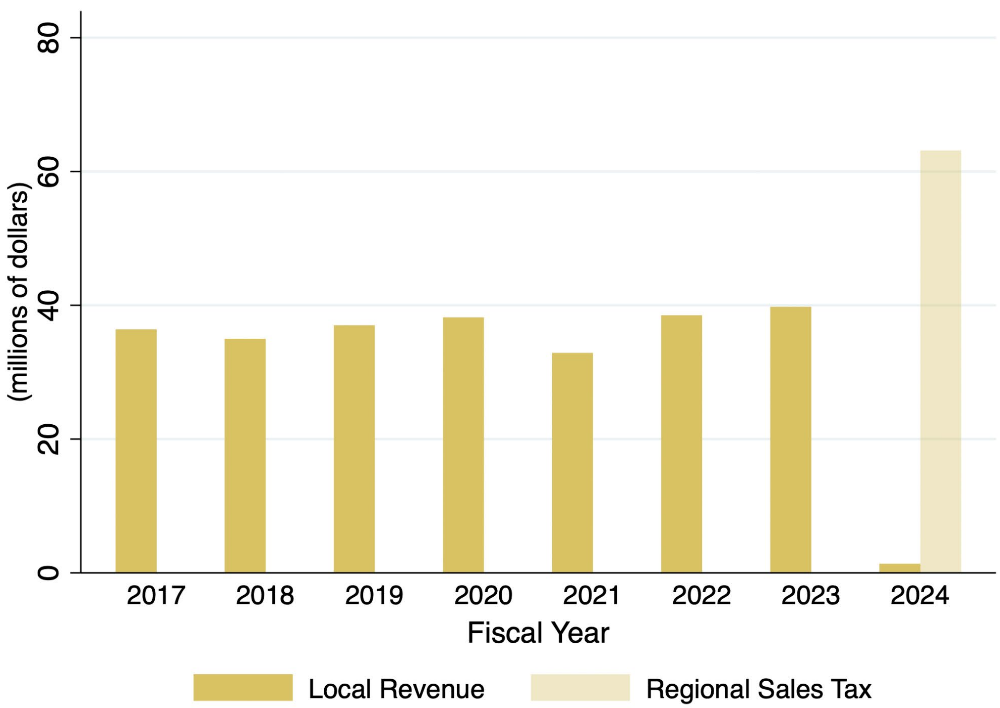
Finally, revenues from High School Pass and Access Pass fully recovered to pre-pandemic levels in 2021 and almost doubled in 2022. However, by 2023, revenues from the High School Pass (HS Pass) were 15 percent higher compared to their 2019 level and accounted for almost 20 percent of total fare revenues (up from 3.9 percent pre-pandemic), while revenues from the Access Pass more than double the 2019 levels.

4.2.1.4 Regional sales tax revenues replaced local revenues

After the COVID-19 pandemic, local revenues were replaced by regional revenues as county transportation sales taxes were replaced by the Metro Area Transportation Sales and Use Tax for Metropolitan Council transit services. This change maintains the tax base—sales and uses—but affects the rate, the authorized entity, and the use of proceeds.

Prior to the pandemic, local revenues for transit were derived from county transportation sales taxes. Counties were authorized to impose a tax of up to 0.5 percent on all retail sales and uses occurring within the county and use proceeds for capital or operating costs of transit projects and related facilities and capital costs of transportation projects (Minn. Stat. § 297A.993, 2022). Post-pandemic, the use of these revenues to fund Council transit operations was replaced with revenues from the Metro Area Transportation Sales and Use tax, which has been effective in Minnesota since October 2023 (Minn. Stat. § 297A.9915, 2023). The tax is administered by the Department of Revenue (MnDOR), its rate is 0.75 percent (three-quarters cent), and its funding is allocated to the Metropolitan Council (83%) and the region's counties (17%).[67] The Metropolitan Council's share will primarily fund transit operations, maintenance, and capital projects, with 5 percent of the proceeds dedicated to active transportation (Metropolitan Council, 2023b).

Local revenues have been very stable and recovered rapidly after the pandemic before being replaced by the regional sales tax (Figure 4.8). Revenues from county transportation sales taxes increased on average 2 percent per year before the pandemic. They decreased by 13.9 percent in FY2021 but fully recovered by the following fiscal year. Most revenues were replaced by the regional sales tax in FY2024, but there is still a small portion that comes from Sherburne County and MnDOT to support commuter rail operations.[68]



Source: *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure 4.8 Revenues from localities and regional sales tax for Metropolitan Transportation Services and Metro Transit

[67] Metropolitan counties are Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington. The funding allocated to these counties is distributed 50 percent based population and 50 percent based on needs; and must be used for active transportation and corridor studies (41.5%), for rehabilitation of transportation systems (41.5%), and for transit/complete streets/greenhouse gas mitigation (17%) (MnDOT, 2024).

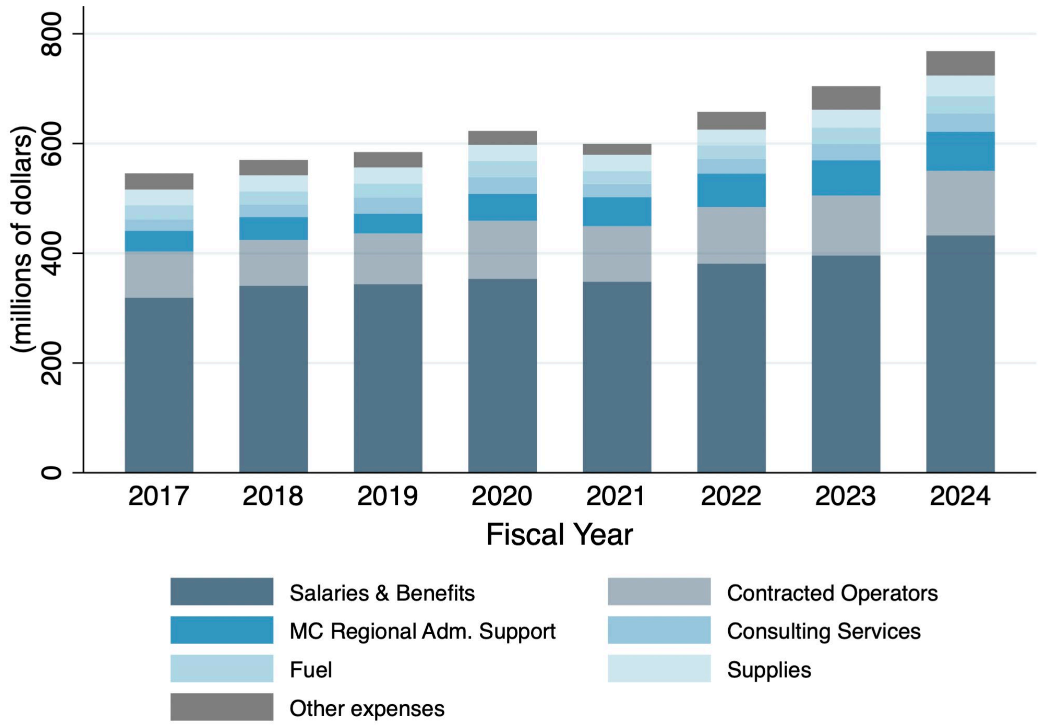
[68] The Sherburne County Board of Commissioners adopted Resolution 090418-AD-1857 in September 2018 implementing a special half-cent (0.5%) county-wide sales tax to fund transportation. A portion of the revenues is applied to the NorthStar and Link operations and maintenance (Sherburne Public Works, 2018).

The regional sales tax provided an important amount of funding for FY 2024 and is expected to do so in the coming years. The regional sales tax provided $63 million in FY2024 to fund transit operations (light rail, bus, and commuter rail - see Appendix A).[69] The MnDOR estimates a total of $433 million in revenues in 2024, $473 million in 2025, and $487 million in 2026 (Metropolitan Council, 2023b). Additionally, these revenues are expected to (1) cover the budget gap caused by the depletion of federal relief funding and the slow recovery of passenger fare revenues, (2) replace local revenues for guideway and busway services as directed by law, and (3) cover long term capital maintenance. Prior to the pandemic the Council's transit operating budget faced a structural deficit that had been temporarily filled through a series of one-time state appropriations across many biennial budgets. In addition to replacing lost fare revenue, federal relief funds addressed this deficit on a temporary basis until new sales tax revenues resolved the deficit. As they are tied to sales and economic activity, the sales tax revenues provide a sustainable revenue stream for transit operations, but being procyclical makes it crucial to build up reserves in order to plan for capital maintenance expenditures and endure fluctuations tied to economic activity.

4.2.2 Impacts of COVID-19 on Expenses

The majority of transit operating expenses for Metropolitan Transportation Services and Metro Transit are salaries and benefits, which account for an average of 60 percent of total expenses between FY2017 and FY2024 (Figure 4.9). Other large expenses are contracted operators for MTS services, accounting for 15.8 percent of total expenses; and Metropolitan Council regional administration support,[70] accounting for 8.12 percent. Other expenses such as consulting and contractual services, fuel, and supplies each represent around 4.5 percent of total expenses.

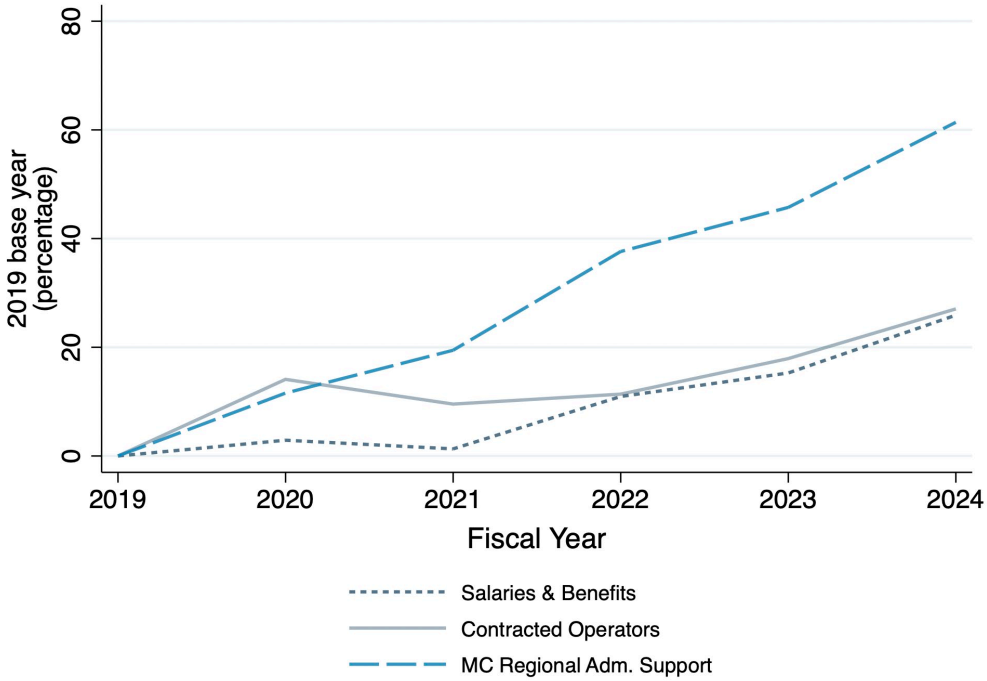
[69] The regional sales tax for FY2024 provided a total of $425 million. Of this amount, 80 percent was directed to reserves, 15 percent used to fund the transit operation, and 5 percent as pass-through.
[70] According to information provided by Metropolitan Council Staff, these expenses include Human Resource and financial staff as well as information systems.



Notes: *Other expenses include chemicals, rent and utilities, printing, travel, insurance, modal and A-87 cost allocations, transfers to other funds, and others.* ***Source:*** *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure 4.9 Expenses for transit services by type for Metropolitan Transportation Services and Metro Transit

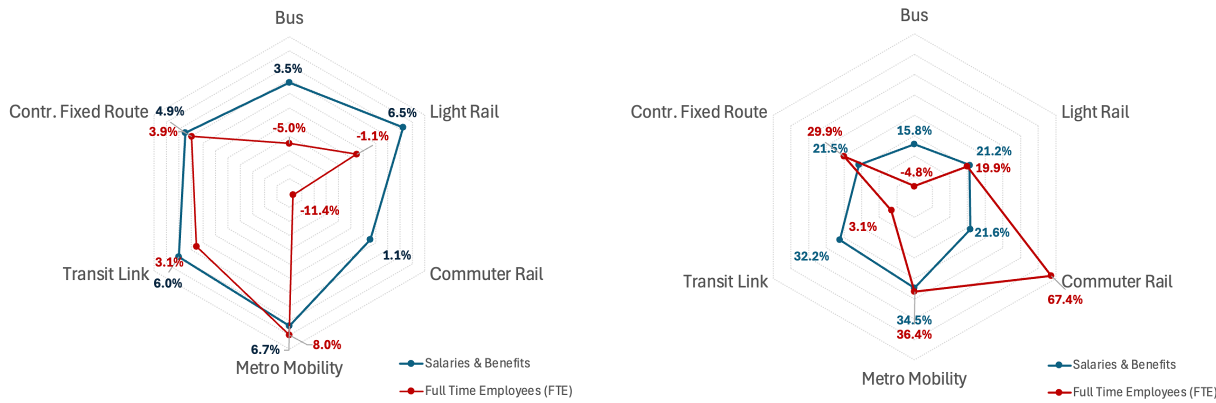
The COVID-19 pandemic also put pressure on expenses, particularly those related to vehicle operation and regional administration support. These expenses together account for about 80 percent of total MTS and Metro Transit operating expenses and have increased compared to FY2019 levels (Figure 4.10). While salaries and benefits and contracted operator expenses increased slightly, at an annual average rate of about 5 percent; regional administration support expenses increased at a higher rate, at an annual average rate of 10 percent. The observed increase in these expenses is due to increased employee hours coupled with higher salaries.



Notes: *Growth of transit expenses compared to 2019 levels of expense.* ***Source:*** *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure 4.10 Major transit operating expenses for Metropolitan Transportation Services and Metro Transit as a share of 2019 levels

During the pandemic, the number of full-time employees (FTE) operating Metro Transit services decreased across all services, while associated salaries and benefits slightly increased (Figure 4.11. – Panel A). These trends are consistent with reduced operation as a response to reduced transit demand and additional costs incurred, for instance paying workers substituting for other staff who were quarantined. Conversely, but also consistent with type of services offered by MTS, their FTE remained relatively constant. Post-pandemic, FTE and their associated salaries and benefits have increased in tandem for most transit services (Figure 4.11. – Panel B). Two noteworthy changes are the decrease in FTE associated with bus services due to a decrease in training, marketing, and operations staff, and the increase in FTE associated to commuter rail due to additional administrative and maintenance staff.



Panel A: Change between 2019-2020 **Panel B: Change between 2019-2023**

Notes: *Growth of transit expenses compared to 2019 levels of expense.* ***Source:*** *Staff Complement in FTE's (Appendix H), Metropolitan Council (Actual: 2017-2022; Adopted: 2023; Amended 2024).*

Figure 4.11 Changes in Salaries & Benefits and Full Time Employees for Metro Transit

Regional administration support expenses have increased significantly since FY2021 (see Table 4-1). Between FY2021 and FY2022, the increase was mainly driven by higher salaries & benefits. By FY2023, the average regional administration support expense per FTE was 25.7 percent higher compared to pre-pandemic levels. Between FY2023 and FY2024, the increase was driven by additional staff brought onboard to support transit operations, primarily in the divisions of information systems, human resources, and procurement and contracts; and for regional administration.[71]

Table 4-1 Regional administration support by the numbers

	2017	2018	2019	2020	2021	2022	2023	2024
Regional Administration Support Expense (in thousands)	$38,276	$41,972	$44,272	$49,394	$52,885	$60,928	$64,519	$71,456
Change (%)		9.7%	5.5%	11.6%	7.1%	15.2%	5.9%	10.8%
Regional Administration FTE	319	330	327	347	344	350	379	407
Change (%)		3.5%	-0.9%	6.0%	-0.8%	1.7%	8.3%	7.4%
Average Expense per FTE (in thousands)	$ 120	$ 127	$ 135	$ 142	$ 154	$ 174	$ 170	$ 176
Change (%)		6.0%	6.5%	5.2%	7.9%	13.2%	-2.2%	3.1%

Source: *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024). Staff Complement in FTE's (Appendix H), Metropolitan Council (Actual: 2017-2022; Adopted: 2023; Amended 2024).*

[71] Between 2019 and 2023, the FTE for the divisions of information systems, human resources, and procurement and contracts increased by 22, 10, and 8, respectively. In addition, the number of regional administrators doubled in the same period.

CHAPTER 5: TRANSIT BEYOND THE COVID-19 PANDEMIC

5.1 INTRODUCTION

The Legislative direction to study post-COVID pandemic public transportation included a requirement to "provide analysis and projections" on changes in transit to include "long-term impacts." To address this requirement we conduct analysis through *scenarios.* Rather than predictions or forecasts, scenarios allow exploration of potential future conditions while examining the influence of particular policy and operational decisions on likely outcomes. In other words, scenarios can build upon the findings in the previous chapter of this report to anticipate how the regional transit system, and commuter-oriented transit service in particular, will look in the post-pandemic future.

5.2 SERVICE SCENARIOS

5.2.1 Coverage service versus Productivity service

Transit planners often discuss the purpose of routes or segments of the transit network as either *coverage* or *productivity* (sometimes called *ridership service* since it is meant to generate positive demand feedback). These roles lie on a spectrum, and routes can serve different roles on different parts of their service area. But productivity transit service is clearly designed to build on known demand, generate new usage from high propensity transit areas, and serve passengers efficiently with a high return on investment in both ridership and fare recovery. Coverage transit service is designed to make sure that people in a given part of the service area are able to make essential trips, whether or not they have a car available for those trips. The return on ridership is expected to be low, and the financial subsidy is expected to be high for these services. But, as their purpose is not to generate significant ridership but provide options for all residents, these services can be judged as effective even when scoring low on traditional transit performance measures of ridership return or farebox recovery.

The Met Council undertook a study to examine regional consensus on service allocation, in part between coverage and productivity service.[72] The results suggested coverage service guidelines and measures other than ridership efficiency. Different transit providers may also have different mixes of emphasis between productivity and coverage services, depending on their context in the region. In the scenarios evaluated by the service allocation study, decisions were scored based on additions to the regional transit resource pool. However, especially due to workforce shortages, questions about the mix of coverage versus productivity service come down to allocation of finite resources to meet equally valid but sometimes mutually exclusive end goals.

[72] Transit Service Allocation Study (2021)
https://metrocouncil.org/Transportation/System/Transit/Studies/Transit-Service-Allocation-Study.aspx

5.3 RIDERSHIP SCENARIOS

5.3.1 Transit provider influence on ridership

"Ridership" is an emergent phenomenon resulting from a match between a desire to travel, and a supply of a transit trip. We emphasize a key distinction to be made with respect to dynamics underlying ridership overall. That is, a distinction between factors completely or partially under control of regional transit providers, and those factors outside the realm of transit provider control. For instance, the number of people in the region needing to travel to a downtown each weekday is a function of many thousands of individual business and organizational decisions about telework. This is a strong determinant of demand for travel, that is outside of the control of agencies (with the small exception of the transit providers' own workforce). How frequently and reliably transit can bring people from regional origins of high demand to the downtowns, is much more under transit agency control.

In this report we demonstrate that both before, and during, the COVID era, the level of **Accessibility to jobs on transit from a given neighborhood partially explains the ridership from residents in that place.** Accessibility reflects aspects of transit service under agency control, most importantly frequency, span, and speed of travel of the service. However, land use decisions about where people and jobs are located can be as influential, or even more influential, on the accessibility of given transit service. Accessibility sums the potential for reaching opportunities on transit, and actions providers can take to increase accessibility, will result in increased ridership.

5.3.2 Ridership trend analysis and forecasting

The impact of the COVID pandemic on the travel behavior and transit ridership of the region can be described as a shock. This is revealed by a glance at a transit ridership time series, where regular, seasonal cycles of ridership prior to the pandemic abruptly crashed to a new level in March and April 2020. Theoretically, systems where the underlying dynamics do not change following such shocks can be resilient and recover quickly to their prior level. Alternatively, systems may enter a new state, where different dynamics govern a new set of outcomes. This new state can be very stable, and not necessarily have any tendency to revert back to the dynamics at play before the perturbation.[73]

From the evidence of the first three years after the COVID pandemic began, transit ridership has in fact entered a new state, with new underlying behavioral dynamics, demographics, and market factors. The question for understanding long-term impacts is **under what circumstances will transit ridership tend**

[73] there is a rich body of ecological and evolutionary theory around perturbations, alternative stable states, and how to diagnose and even predict transitions from time series data on ecosystems

back toward its prior level? And, are these circumstances likely in the near or long-term future? We explore three scenarios using a time series of transit ridership data as a framework.

5.3.2.1 Metro Transit ridership timeseries

Owing to data availability and being the largest single regional transit provider, with a full mix of service types and their associated underlying dynamics, we use as a data framework the monthly total ridership across regular route service provided by the Metropolitan Council, including Metro Transit and MTS contract routes from 2019-2024.[74] Prior to the pandemic, there was a strong seasonal pattern of ridership evident in the timeseries, where total trips would peak in fall, drop over the winter months, peak at a smaller level in the early spring, and then decline predictably in the summer. This peakiness was a result of ridership from college and university students, high school students, and indirectly the behavior patterns of parents of school-age children who typically had coordinated time off from work (and their commutes) to align with the school schedules (the uniquely Minnesota "MEA break" week in October predictably resulted in a drop in daily weekday ridership of commuter routes).

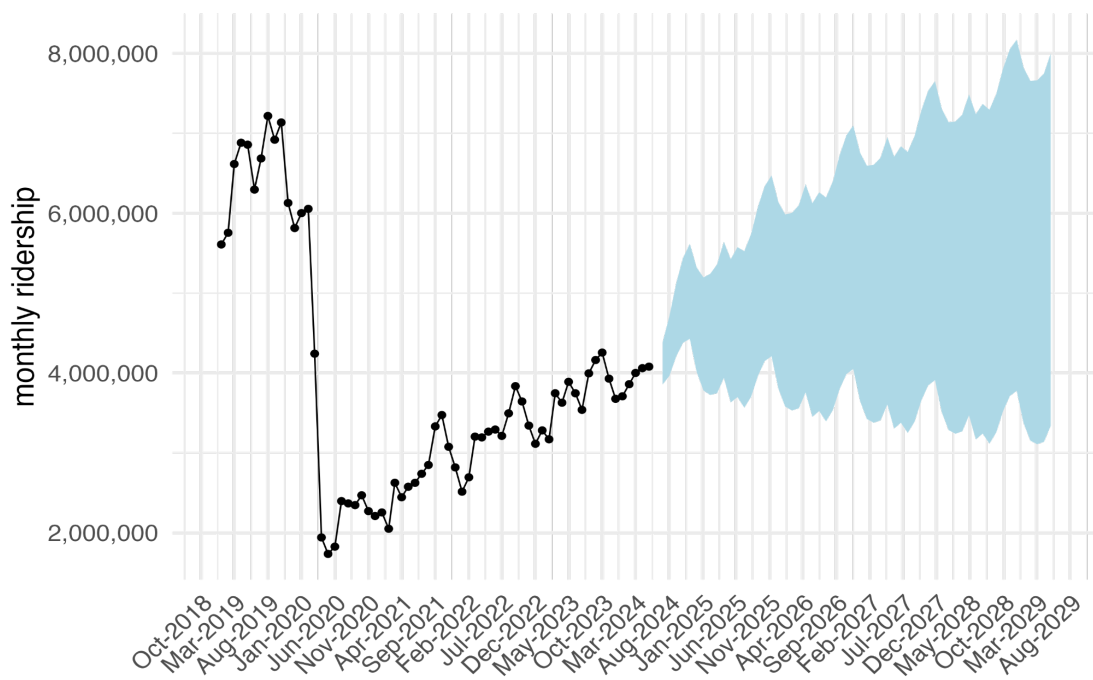


Figure 5.1: Forecast scenario region of the Metro Transit ridership timeseries

[74] https://www.metrotransit.org/performance; file used in the analysis includes data through May 2024.

After the pandemic, evidence of this seasonal pattern returned, with significant fall peaks in 2021, 2022, and 2023, as well as mid-winter and summer dips even as the overall trend level appeared to be one of steady growth (FIgure 5.1). To capture these known seasonal patterns while also revealing the underlying longer term pattern, we used a statistical procedure known as Seasonal Trend Loess Decomposition with smoothing, or STL (Hyndman and Athanasopoulos 2021). One of the values of analyzing the time series this way is that the structure of the seasonality can be incorporated into the forecast of the time series. However, because the forecast is based only on a trend (rather than mechanistic detail) it also comes with substantial uncertainty (blue area Figure 5.1, representing one standard deviation of the forecast from the observed time series). We use three possible trends within the uncertainty range to work backwards to understand the scenarios that might realistically produce them (Figure 5.2).

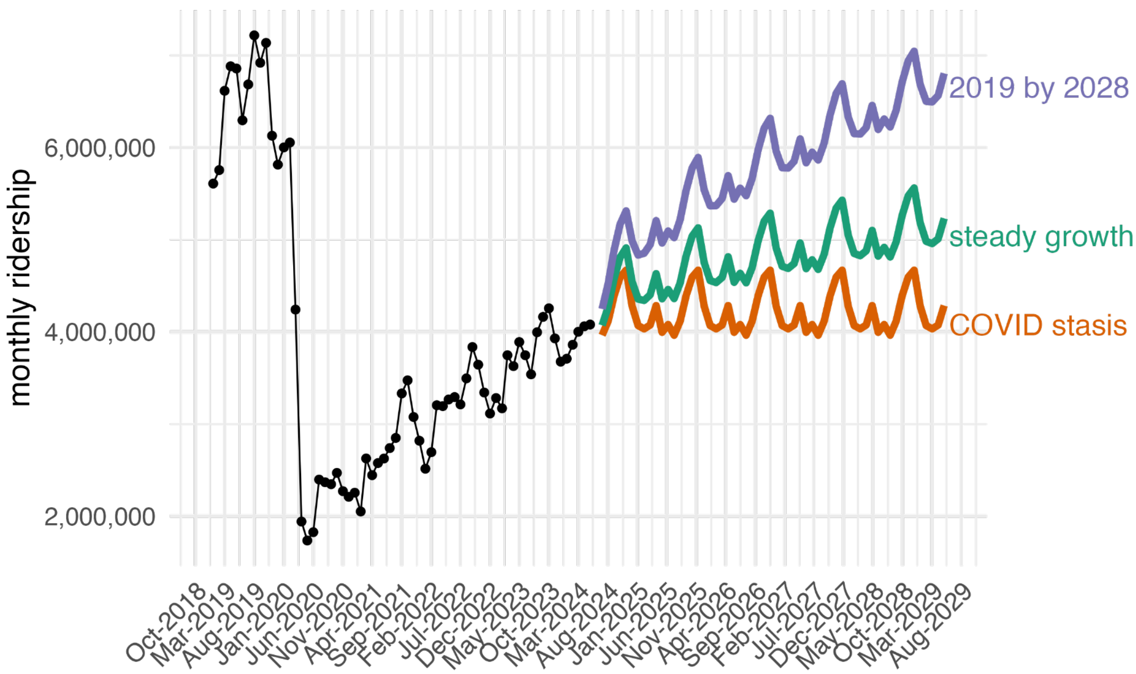


Figure 5.2: Sketch ridership trajectories under three different future scenarios

5.3.2.2 Scenario 1: COVID stasis

In the first scenario, the dynamics of transit ridership have been firmly established by the first three years of the pandemic, and the 2024 level of ridership is approximately the level that will be expected long term. This scenario would result in modest growth over the four years of the forecast window, ultimately around 10% higher fall peaks by 2028.

What dynamics would underlie this scenario? It would be associated with stability in the demographic and market profile of present day ridership: trips made by people more likely to be lower income, not have a car available for the trip, and generally using transit to support every day activities including but beyond travel to work. Additionally, the lack of growth would reflect a lack of new service, no improved frequency of busy routes, or other changes that would significantly boost transit accessibility, in turn producing higher ridership. The stasis indicates a very stable transit system, operating at a much lower level of patronage than in pre-COVID times, but nevertheless serving an important function for a subset of regional residents.

5.3.2.3 Scenario 2: steady growth

In the second scenario, ridership continues to grow at a steady pace from its current level, adding 4 - 5% annually until reaching an annual total of around 60 million trips in 2028. This scenario would represent about a 75% return to the pre-COVID ridership level.

What dynamics would underlie this scenario? Given that annual growth in transit trips has been on the order of 15-18% annually 2021-2023, growth rates of 5% seem achievable with current day fundamentals of markets and service. However, the rapid growth from the nadir of 2020 involves large markets returning to daily travel from being purely remote (especially universities and high schools). Now that these trips are included in the trend, that year over year increase becomes less likely to repeat. Instead, as travelers find service useful for some trips, they may make others, taking transit more often and building ridership organically through incorporating into their daily routine.

This scenario would also require additional investment and adjustment in service by transit providers. Increasing transit accessibility by 10% in the Transit Market Areas of the urban core which respond most strongly would according to our research produce a sustainable 4% increase in ridership in the areas experiencing that change, all other things equal. Improved frequency and planned upgrades from local routes to arterial BRT, if implemented in TMA 1 and 2, would be contribute to ridership growth system-wide.

In this scenario, positive feedback loops between service increases and ridership lead to sustainable growth. However, the stability of this growth results in a level that is far below the pre-COVID ridership level. Large submarkets of the pre-COVID ridership, especially downtown office commuters, would remain much smaller in this scenario, reflecting stability in the telework, traffic, and parking environments important for determining the propensity of this submarket to ride transit.

5.3.2.4 Scenario 3: 2019 by 2028

In the third scenario, the large growth rates in 2021-2023 are carried forward through 2028, when ridership levels approach the expected values in the last full pre-COVID year, 2019. Specifically, this scenario would be the result of 10-12% growth annually, reaching an annual total of 78 million rides in 2028, which would represent a 98% recovery to 2019 levels.

What dynamics would underlie this scenario? Most significantly, this scenario would involve the return or addition of significantly missing trip purposes or travel markets to transit ridership. While ridership builds on itself as existing riders take new trips, the higher growth rates of this scenario require continuous additions of new riders to the time series. Return to in-person, four or five day a week schedules at major downtown employers, addition of new college or university all-you-can-ride passes, University of Minnesota staff who now have an unlimited ride benefit taking advantage in large numbers, and so on–these additions would have to be occurring regularly across the next few years.

In this scenario, most of these changes are external to the transit providers, though there would need to be strong action by providers to respond. As each “missing” market that rode transit in 2019 returns, transit service must be adjusted to meet the needs of the trips reliably and with enough capacity to add the resulting multiplying trips. To make transit more useful and build on trips with new trips, accessibility would be increased through accelerated implementation of the METRO network, upgrades to frequency of local and commuter express service, and addition or restoration of routes not currently in operation. On average, an increase in transit accessibility of close to 25% in the core TMA I and II would be expected to generate 10% ridership increases in the impacted areas. That level of accessibility change probably would require not only capital investment by transit providers but also significant shifts in land use patterns in how residences and businesses locate to complement existing transit supply. Again, the accessibility changes driving ridership in this scenario would only partially be under the control of transit providers.

Returning to the causality discussion in chapter 2, however, the provision of the service described in the previous paragraph is not enough to produce ridership growth in the absence of the demand from robust markets and trip purposes. And in the main, that means widespread, external economic motivators for switching from driving trips to transit trips. There are potential candidates for motivators which would result in huge markets of trips being added to transit ridership: exponential gas price spikes or gas shortages, widespread parking cost increases or parking removal, infrastructure failure on key roadway links resulting in persistent widespread congestion, TNCs ceasing to do business in the region, and so on. While all of these mechanisms are at least plausible, and some have occurred in recent memory, they are all characterized by instability. The implication for this scenario might be that a return to near 2019 levels of ridership might quickly be followed by a fall to 2023 levels if the mechanisms driving rapid growth over the next four years are not sustainable or permanent.

5.3.2.5 Which scenario?

The long-term future is uncertain, but there are clues as to the trajectory of the transit system as time passes. By fall 2025 the monthly total ridership will help distinguish which, if any, of these scenarios seems most likely. Are levels about what they were in fall 2024, with little change in underlying market dynamics? That might indicate COVID stasis. Are fall 2025 rides peaking above 5 million? Perhaps the sustainable growth path is likely. And if ridership is nearing 6 million in a single month by fall 2025, the timeseries will probably not have to be consulted to know that the boom growth was continuing - evidence would be widespread that transit trips were being taken more and more often by more people.

5.3.3 Commuter-oriented bus and Northstar commuter rail scenario

The very word *commuter* originates from regular travelers who could exchange ("commute") individual trip tickets into a cheaper pass, especially on rail service. Thus the nature of regular office travel is inseparable from public transportation in general, and commuter rail in particular. Undoubtably the largest single shift from pre-COVID to the COVID era has been the increase in high-income telework with the accompanying reduction in trips made to downtown office job centers. The Metro region is no exception, with rates of telework three times as high as before the pandemic, and rates of 20% or more workers participating in telework at least some days. These changes have had lasting impacts on transit nationwide, again including in the region, in two main ways: (1) direct effects through a reduction in ridership, and (2) indirect effects through changes to financial structures via reduced fare revenue (see below).

The sudden onset of a worldwide pandemic aside, daily travel patterns tend to be very "sticky" and hard to dislodge from routine. Having changed routine to incorporate additional flexibility of working from home, adjusting travel outside of peak hours, and eliminating the time and expense of daily travel to work, it is hard to imagine the incentives, outside near-universal employer mandates, that will generate a mass return to four- or five-day commuting to high income office jobs. Thus, **we consider the scenario that peak commute travel to and from downtown office jobs will remain at current levels for the foreseeable future.**

A number of important points arise from this scenario. First, service which is purpose-built to carry white collar workers to downtown job centers, should be considered coverage service, designed to provide an option for some who need it regularly or occasionally. There should not be any expectation of an efficient ridership return on investment in these services, certainly not any approaching the high levels of farebox recovery and low levels of subsidy observed pre-COVID.

Second, and related to the first point, changes to commuter-oriented service which bring it more in line with the travel behavior in this scenario may make service less efficient. To provide for travel options outside of the peaks, bi-directional service all day, and other service alternatives means increasing the access to opportunity to transit via park and ride and other commuter-oriented locations, at the expense of a lower return on ridership per in-service hour. This could still result in overall raw transit trip increases, provided the service is building on existing demand to grow ridership. But in general, a choice will arise between reducing or eliminating service or altering expectations of ridership productivity for what was previously a very efficient service type.

Different flavors of this scenario have already been considered in-depth by the Met Council in the Northstar Rail Corridor Study completed in 2023.[75] The study highlighted options including extending the rail service to St. Cloud, or on the other hand replacing the commuter rail service with commuter-oriented express bus. The complexities of the federal financing of the original project and public and private rail operators (Amtrak, BNSF) do not make decisions about Northstar straightforward. But, it is uniquely unsuited for current transit markets given its designed purpose of serving downtown Minneapolis (and University of Minnesota) commuters. It certainly still works well for the 90% of current Northstar riders that are using it for just this purpose, and for event service to downtown Minneapolis. But the overall market has shrunk tremendously due to telework, and due to the fact that just about everyone who previously used Northstar had a car available for the trip they took on transit instead (95% of trips made in 2016). Under the current level of commute behavior scenario, and with its current service design, Northstar is an expensive coverage service with little prospect of returning to previous levels of ridership or productivity.

5.3.4 Future accessibility on transit

Over the long term, additional planned expansions and upgrades of the regional transit network should lead to increased transit ridership as the system is made more useful, to more people in the region. The map in Figure 5.3 shows the expected change in regional transit access to jobs according to the modeled locations of residents and jobs in the region, assuming the future transit projects in the funded scenario of the Transportation Policy Plan are built as expected. These include planned arterial BRT routes (B, E, F, G, and H lines); light rail extensions (Green Line and Blue Line); and highway BRT routes (Gold line). **The planned additions to the METRO network will add meaningful additional access to opportunity across the core service area.**

[75] https://metrocouncil.org/Transportation/System/Transit/Studies/Northstar-Rail-Corridor-Post-Pandemic-Study.aspx

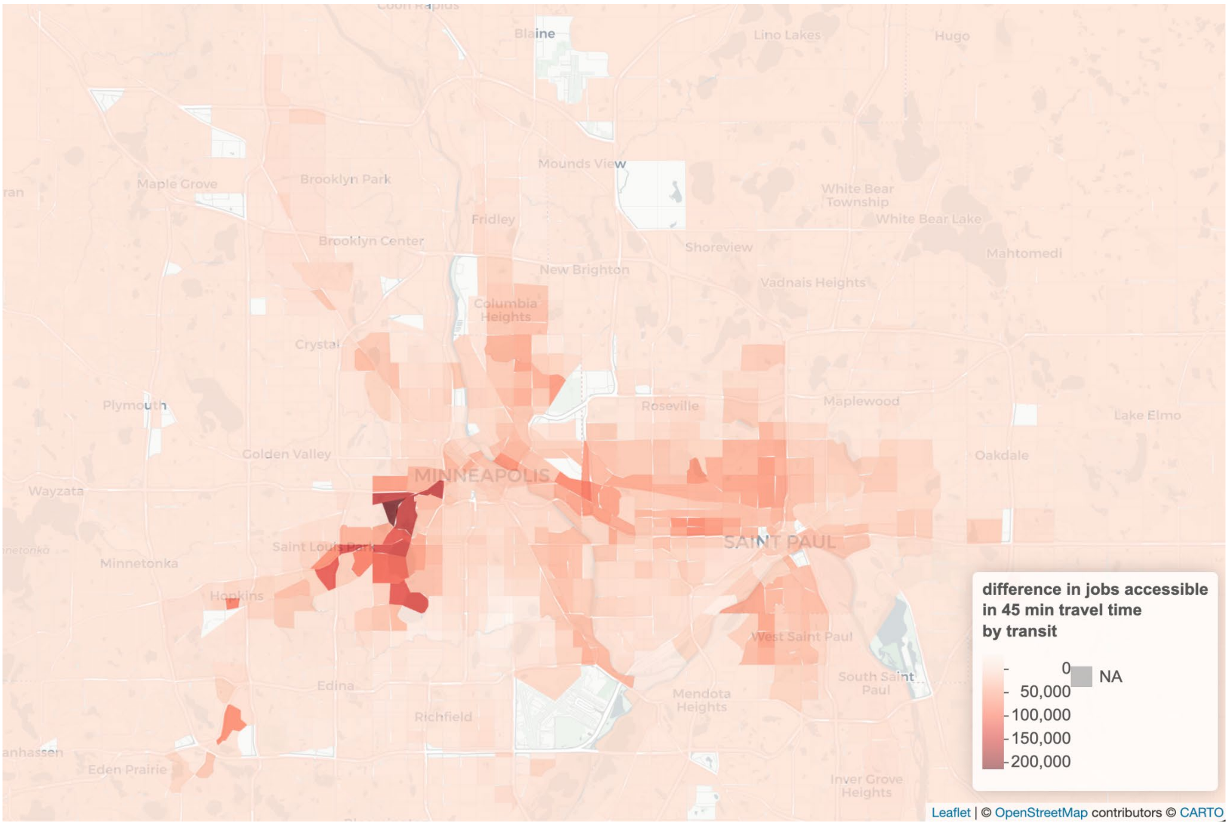


Figure 5.3: Difference in regional transit accessibility under the funded 2050 scenario of the Met Council Transportation Policy Plan

Because the majority of the additional planned access is in the areas most responsive in terms of ridership (TMA I and II), a direct response of additional transit trip making should be expected. But beyond existing residents making more or new trips, the long-term additional potential for access to opportunities should spur coordinated land use—adding residents, employment, and other destinations in areas where the transit investment will be increasing connectivity. To fully leverage their transit investments, the Met Council can coordinate public and private efforts to add residents in existing areas of high access, and to add employment and other destinations within the walkshed of high quality transit. Together these efforts will multiply the impact of improved accessibility to produce stable, long-term ridership growth.

Accessibility via transit can also be increased by coverage services, such as some commuter express, suburban local, suburb-to-suburb, and microtransit services. These types of transit serve a vital role in providing a basic level of mobility to the entire region. As discussed above, ridership and productivity are not necessarily the goals of these service types, so performance expectations should be adjusted to match. Coverage services in TMA III, IV, and V can ensure residents have a way to reach critical destinations without a car, while not expecting high usage from those possessing a vehicle and the ability to drive it.

5.4 FINANCIAL SCENARIOS

5.4.1 Regional sales tax, fare revenue, and sustainability of operations

Revenues from the Regional Sales Tax are projected to provide stable funding for regional transit operations in the coming years. After modeling three funding scenarios and considering various revenue and expenses growth assumptions, **it is anticipated that revenues from the regional sales tax will be sufficient to cover transit operating expenses**. It is worth noting that these conclusions are based on current available information and are consistent with the Metropolitan Council's own forecasting. Crucially, the scenarios assume no expansion beyond current transit operations. The assumptions considered for the scenario analysis are detailed in Table 5-1.

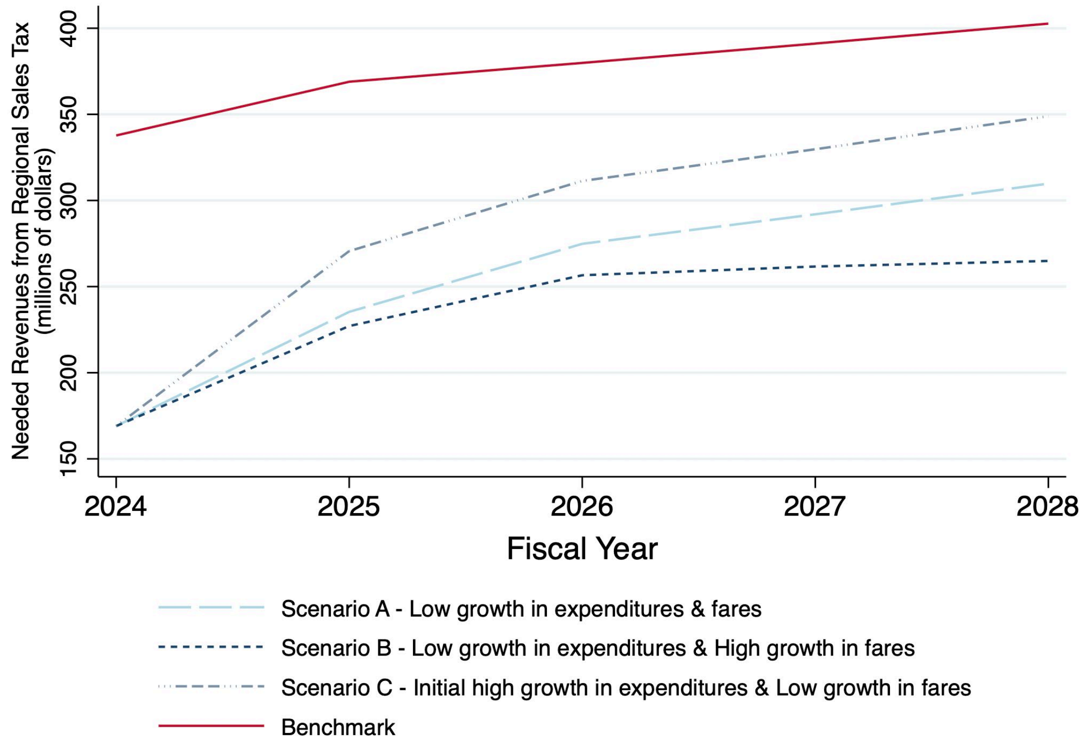
Table 5-1 Revenue and expenditure assumptions used in budget scenarios

Variable	Growth Rate	Observations
Expenses	3.5% for Scenarios A & B; and 8.1% (FY25) and 3.5% (FY26-28) for scenario C	Average level pre-pandemic rate; Average post-pandemic rate
MVST	2.0%	Volatile - Average growth pre- and post-pandemic
MVST Carry-Over	3.0%	Volatile
State Appropriations	0.0%	Assuming no additional appropriations
Other State Revenues	3.0%	Volatile
Federal Revenues	4.6%	Average level pre-pandemic + $23 million remaining from relief funds in FY2025; Average level pre-pandemic & Average growth rate post-pandemic
Local Revenues	2.1%	Average growth rate pre-pandemic
Passenger fares	3.8% for Scenarios A & C; and 17.7% for scenario B	Average growth rate pre-pandemic; rate needed to reach 2019 levels in FY2028
Contract Special Revenue	1.9%	Average growth rate post-pandemic
Investment Earnings	3.0%	Volatile
Other Revenues	3.0%	Volatile

Regional Sales Tax	9.24% in FY2025, and 2.96% in 2026 and going forward	Growth expected from DOR
Projected used reserves	Balance	Expenses minus other revenues

Scenarios A and B assume that total expenses will increase at the pre-pandemic average growth rate, while Scenario C assumes that total expenses will grow for the next fiscal year at the post-pandemic average rate, and at the pre-pandemic average growth rate thereafter. Scenarios A and C assume passenger fare revenues will grow at pre-pandemic rates, whereas Scenario B assumes passenger fare revenues return to pre-pandemic levels by FY2028, which implies a significant growth rate (this is a strong assumption). For all scenarios, federal revenues are modeled to decrease to pre-pandemic levels, other revenue sources are projected to increase at pre-pandemic growth rates, and a 3 percent growth rate is assumed for sources with highly volatile observed growth rates. In addition, there are no changes anticipated to state appropriations.

Given these assumptions, expected revenues from the regional sales tax will provide funding to cover projected transit operating expenses and also be used to cover long term capital maintenance (Figure 5.4 - refer to Appendix C for detailed results). For all scenarios, revenues from the regional sales tax and available operating reserves in FY2025 and FY2026 will cover the depletion of federal relief (between 49.3 percent in Scenario B to 90.4 percent in Scenario C). The need for these revenues to increase would be lower if passenger fare revenues increase at higher rates than anticipated (they are currently at 50 percent of their pre-pandemic level) and transit expenses normalize their growth to pre-pandemic rates.



Note: Revenues needed refer to the line items “regional sales tax” and “projected used reserves”. Benchmark corresponds to 78 percent of estimated revenues from MnDOT (85 percent from the allocation minus 5 percent needed for active transportation). ***Source:*** *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2024) and author’s calculations.*

Figure 5.4: Projected revenues needed from the regional sales tax to cover transit operating expenses from Metropolitan Transportation Services and Metro Transit under three scenarios

These scenarios maintain transit expenses at their current level. Any additional growth in transit expenditures will have to leveraged with revenues from the regional sales tax, especially without an increase in any of the other revenue sources. This is particularly important for FY2025 and FY2026 when there is a higher budgetary pressure due to an anticipated decrease in federal funding (as emergency relief funds are exhausted).

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APPENDIX A: LITERATURE REVIEW AND PEER SCAN

LITERATURE REVIEW: COVID-19 IMPACTS ON TRANSIT NATIONWIDE

The worldwide pandemic of COVID-19 impacted public transportation nearly everywhere, though consistent effects across the U.S. were a focus of researchers from the beginning of the pandemic.

Early Research - Transmission and Preventative Techniques

At the onset of COVID-19, early research illuminated the potential risks associated with virus transmission in shared spaces, sparking concerns for public transportation safety (Hu et al., 2020), including inflammatory articles based on misleading correlations that nonetheless circulated widely in public media (Harris, 2020). Subsequent studies affirmed the efficacy of preventative measures such as social distancing and mask-wearing, demonstrating the viability of public transportation when these precautions are in place (Hu et al., 2021; Chu et al., 2020). While social distancing proved to be crucial in curbing transmission, this intervention challenged the core concept of mass transit (Tirachini and Cats, 2020). Despite evidence of the low risk nature of public transportation when proper safety precautions are in place, concerns persisted reflected by changes in travel behavior.

Changes in Ridership

The pandemic's impact on public transit ridership quickly received attention. Early predictions of reduced demand due to remote work and safety concerns (De Vos, 2020) materialized, with travel behavior changing significantly during the pandemic. Key changes include shifts in mode preference, predominantly away from public transportation and towards private vehicles and non-motorized modes (Abdullah et al., 2020).

Ridership declined significantly in 2020, with decreases ranging from 50% to 90% ridership loss compared to pre-pandemic levels across the US, culminating in a 100-year low for national transit ridership (Ziedan et al., 2023, Tirachini & Cats, 2020). However, ridership did not decrease equally across different transit modes, with bus-based transit service experiencing a less severe decline, and faster rebound, in ridership than rail transit. (Ziedan et al., 2023).Similarly, the pandemic impacted ridership differently across communities. Ridership declined significantly more for high-income populations than for low-income groups (Wilbur et al., 2020, Parker et al.,2021). By some estimates ridership for high-income users initially decreased by an estimated 70%, compared to between 30% and 40% for those in the lowest-income households, potentially reflecting differences in access to alternative transportation modes and ability to work remotely (Tirachini & Cats, 2020).

In addition to changes in aggregate ridership levels, the COVID-19 pandemic has also altered temporal patterns in public transit use. The pre-covid weekday morning and evening peak commute periods, which traditionally have supported outsized shares of transit users, experienced a far greater reduction in ridership compared to off-peak periods and weekends (Wilbur et al, 2023, Brookings, 2023). This change, which likely reflects the adoption of alternative work arrangements (i.e. hybrid and fully remote work) may have long-term implications for transit agencies and specific routes that have been designed to serve weekday commuters. Depending upon the continued prevalence of work-from-home opportunities, the flattening of the traditional ridership peaks may represent a long-term change in public transportation use which will need to be considered in future system and service planning.

Moreover, many transit systems entered the pandemic in already-wounded conditions. A 2022 report from the Federal Transit Administration-sponsored Transit Cooperative Research Program found that ridership declined by about 15 percent nationwide between 2012 and 2018.[76] The report attributed this decline primarily to changes in household incomes and rates of car ownership, rising fares, falling gas prices making driving cheaper, and the introduction of ride-hailing services like Uber and Lyft.

Ridership Rebound

In the years following the first cases of COVID-19, public transportation ridership has been slow to rebound and has yet to reach pre-pandemic levels in most US cities. Ridership began to slowly increase in late April of 2020, as stay at home orders and travel restrictions were loosened. However, by August of 2020 US ridership levels were just 36% of pre-pandemic numbers. Over the following months, as vaccination rates increased, ridership continued on an upwards trajectory. In May 2021, 50% of adults in the US were fully vaccinated (Ziedan et al. 2023), and by July 2021 national transit ridership reached 50% of pre-pandemic levels.[77]

Additionally, from 2021 to 2024 many companies that had shifted to hybrid work during the height of the Pandemic began requiring employees to return to the office. While the specific timing of these return-to-office mandates varied, their aggregate impact may have been a contributing factor in the steady increase in public transit ridership in the US. However, despite widespread adoption of vaccines, reductions in deaths associated with COVID-19, the loosening of travel restrictions, and return to office mandates, public transportation ridership has yet to reach pre-pandemic levels in most U.S. cities2, and nationally transit ridership was still approximately 75% of pre-pandemic figures as of January 2024 (APTA Ridership Trends).

The return to transit has differed by socioeconomic status. Lower-income groups, who used public transit at higher rates during the pandemic compared to higher-income groups, have been quicker to return to transit as fears of the pandemic have subsided. Conversely, areas with higher average income levels have been slower to return to public transit and ridership rates for this cohort remain well below pre-pandemic levels (Qi et al, 2022).

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[76] Public Transit Rides Out the Pandemic Storm

[77] APTA Ridership Trends

Travel Behavior

Travel behavior changed dramatically during the pandemic, including a significant shift from public transport to private vehicles and non-motorized modes. After the onset of COVID-19, pandemic-related concerns became a primary consideration when choosing a transportation mode for many, while other elements such as travel time, comfort, and cost were less pronounced (Abdullah et al., 2020).

Gender, car ownership, and purpose of travel also emerged as significant predictors of mode choice during the pandemic. Analysis of an international survey indicates that self-identified males, those who own a private vehicle, and people traveling for shopping purposes, are more likely to choose private transportation over public transportation, (Abdullah et al., 2020). In some ways these reflected increases in proclivities present before the pandemic.

In addition to changes in mode shares, the primary purpose of travel also changed for many after the onset of COVID-19. Prior to the pandemic, 58% of respondents to an international survey identified traveling for work as their primary trip purpose, compared to just 30% after the onset of the global health crisis. Shopping trips surpassed work trips as the primary trip purpose for respondents during COVID-19, with 44% of respondents identifying shopping trips as the primary trip purpose compared to just 4% pre-covid (Abdullay et al., 2020).

Research into how COVID-19 has impacted travel behavior in the US indicates that transit rider's travel decisions have been more affected by the pandemic than non-transit riders (Parker et al., 2021). In a survey of US residents, over 70% of respondents reported using public transportation less since the onset of the pandemic, often opting to substitute active transportation modes for public transit. Data from the same survey also found that less than 10% of respondents felt comfortable using public transportation during COVID-19, largely due to concerns of infection risk (Parker et al., 2021).

Changes in Service

The COVID-19 pandemic placed new financial burdens on transit agencies, many of which were facing fiscal challenges prior to the pandemic, leading to reduced coverage and service frequency in many locations (Tirachini & Cats, 2020, DeWeese et al., 2020) These changes resulted in a reduction in nationwide transit revenue miles of approximately 10% between 2019 and 2020 (Kar et al., US Department of Transportation, 2019b, 2020). A survey conducted in 2021 found that nearly half of transit riders in the survey had been affected by transit service changes (Parker et al., 2021).

While transit service changes have differed by location during the Pandemic, nearly all agencies responded with a reduction in transit provision, with the greatest levels of reduction generally being applied to routes and services with the lowest levels of demand (Karner et al, 2022). In many locations, transit service was reduced by applying weekend service schedules to weekdays, reflecting the decrease in demand for public transit (Qi, et al, 2022). In some locations, service frequency was also reduced, with cities like Washington D.C. altering service schedules to run trains every twelve minutes compared to the frequency of every four to eight minutes that was typical during rush-hour prior to the Pandemic (UITP, 2020). Some cities also canceled overnight services, while others replaced rail services with bus based transit so as to reduce transmission risk for rail station agents (Karner et al, 2022). Generally, transit agencies have been forced to balance the dramatic decrease in total ridership with the need to provide transportation options to essential workers, leading to a variety of approaches focused on providing transit services to key destinations like hospitals and grocery stores (Karner et al, 2022).

Emphasis has been placed on understanding the impact of the pandemic on vulnerable population groups who generally use public transportation at higher rates (Kar et al, 2022). In many U.S. cities, transit service cuts have disproportionately impacted vulnerable populations, reducing access to basic life necessities (Karner et al., 2024, Kar et al. 2022, DeWeese et al., 2020). Communities that are particularly impacted included those with high rates of poverty, zero- vehicle households, and those with high concentrations of Black residents (Kar et al. 2022). Karner et al. (2024) found that despite transit accessibility being reduced for both low- and high- income groups with COVID service reductions, the overall outcome was an increase in "transportation poverty" in the lowest- income households.

Service vs. Demand

Specific attention has also been paid to the degree to which public transportation ridership loss is a result of reduced demand vs. reduced supply (i.e. service reductions). Research into public transportation ridership trends in Chattanooga and Nashville found that ridership declined well before any reduction in transit service, indicating that ridership loss was largely due to reduced demand (Wilbur et al, 2023).

Impact on Public Transit Agencies

Public transit agencies initially faced financial challenges due to reduced fare-box revenues associated with ridership declines and increased operational costs associated with new equipment and hygiene protocols (King et al., 2023). From 2020 to 2021 the federal government allocated $70 billion dollars in emergency funds to support transit agencies, which has provided highly beneficial financial relief. However, this intervention is not a solution to long term financial sustainability. Interviews with senior managers of transit agencies in California found that the majority of these entities had entirely expended federal funds by the winter of 2022 (King et al., 2023). As federal financial assistance runs out, attention is increasingly being paid to the looming 'fiscal cliff' that many transit agencies will face as a result of fare-box revenues failing to reach pre-pandemic levels. This issue increasingly represents an existential threat to the long term feasibility of public transportation in many locations, and as a result alternative funding mechanisms are increasingly being explored.

As public transit ridership has slowly returned, financial difficulties have been surpassed by labor shortages as a primary issue that transit agencies continue to face. Labor shortages, driven by increased rates of retirements and difficulties in recruiting and retaining operators (drivers), are increasingly being cited as the primary obstacle in restoring service to pre-pandemic levels (Transit Center Report, 2022). As of 2022, more than nine in ten transit agencies reported difficulties in hiring new operators and nearly two thirds of agencies reporting difficulties in retaining operators, despite the increased prevalence of increased pay, signing bonuses, and retention bonuses. More than 70% of agencies also reported worker shortages as the primary reason for cut or delayed service (APTA, 2022).

PEER SCAN: HOW COMPARABLE AGENCIES DEALT WITH COVID-19

The COVID-19 pandemic has had a profound impact on public transportation worldwide, but the effects have varied considerably across different systems and agencies. Factors such as network size, services offered, organizational structure, and local conditions have led to differences in the extent of ridership loss, the pace of ridership recovery, service provision, and financial challenges. These variations can complicate direct comparisons, as each city and agency faces a unique set of circumstances. For instance, comparing the impact of COVID-19 on public transportation in New York City with that in the Seven County Metropolitan Region would likely yield misleading results, given the significant inherent differences between these two locations. Nonetheless, certain cities and systems are frequently used as points of comparison for the public transportation network in the Seven County Metropolitan Region. These include:

- Denver Regional Transportation District (RTD)
- Portland TriMet
- Dallas Area Rapid Transit (DART)
- Charlotte Area Transit System (CATS)
- Seattle King County Metro and Sound Transit

Despite differences in ridership numbers (ranging from 400,000 weekly riders in Charlotte to nearly 2 million in Seattle) these transit networks offer a similar mix of services, including buses, rail lines, commuter services, and paratransit options.

Ridership Trends

In March 2020, peer transit systems experienced a sharp reduction in riders, with ridership ranging from 20% to 55% of 2019 figures. Since then, there has exhibited a slow but steady upward trajectory and as of February 2024 ridership had reached between 60% and 80% of pre-COVID levels across peer agencies[78]. In some locations ridership has approached and even exceeded pre-pandemic levels for short periods of time, often due to agency interventions. One example is the ‘Zero Fare’ campaign

[78] APTA

implemented by RTD in Denver, where transit fares were waived in July and August 2023, resulting in ridership reaching over 90% of 2019 levels. However, these relative peaks have generally been short lived, with ridership dropping below 2019 averages shortly thereafter. Specific services in some locations have also experienced differences in ridership recovery. In Dallas for instance, weekend ridership had nearly met or exceeded pre-pandemic levels across services provided[79], and microtransit exceeded pre-pandemic ridership on weekdays, Saturdays, and Sundays by 404%, 5,379%, and 5,710% respectively. This remarkable increase in microtransit ridership is likely due to service expansions that occurred after the onset of COVID-19[80][81], which included contracting with Uber drivers to provide service under the DART system.

Service Alterations

The COVID-19 pandemic necessitated significant adjustments to the services provided for all peer transit agencies, with service frequency along various routes being reduced, and certain routes being eliminated altogether[82]. For instance, in Denver CO and Charlotte NC service levels declined to 60% and 50% of pre-pandemic levels in 2020, respectively[83,84]. While comprehensive data on service reductions is not available for all peer agencies, restoring service has widely been identified as a priority, with the majority of peer agencies currently working toward bringing service back to pre-pandemic levels.[85,86,87]

Staffing Challenges

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[79] DART Update

[80] DART Microtransit Program Pilots Service in New Area, Dallas, TX, 2021

[81] Dallas: Welcome to Your New Network

[82]Portland Service Reductions

[83] Charlotte Area Transit System to cut back on service as ridership plummets during pandemic

[84] Unprecedented Times

[85] TriMet's proposed budget adds back service, builds on 'A Better Red,' expands bus electrification and further supports riders with low incomes

[86]DART Restores Pre-Pandemic Service Levels in October

[87] CATS renewing select routes that were discontinued during COVID-19

A persistent challenge hindering reliability and service expansion for many transit agencies is a shortage of available vehicle operators.[88,89,90,91] This staffing constraint has impeded efforts to expand service coverage to meet demand, and have even made it difficult to maintain already reduced service schedules. For example, in 2022 Denver's A Line, which connects Denver International Airport to the Central Business District, experienced persistent and significant delays and cancellations due to staffing shortages[92]. The public transit systems in Dallas, Seattle, and Charlotte have experienced the same staffing challenges, resulting in the reduction of service and longer headways for many of the systems transit lines[93][94][95]. While this issue has been widespread, as of 2023 at least one of the peer transit agencies seemed to have surmounted staffing challenges. Operator shortages impacted Portland's Trimet system early in the pandemic. However, thanks to the hiring of 290 new bus operators in 2022, by 2023 staffing for the system had stabilized to the point where existing services could be maintained and service expansion could be considered. A spokesperson for TriMet attributes this positive change to increases in operator wage and the offering of signing bonuses[96].

Pre-Existing Challenges

Even prior to the onset of the COVID-19 pandemic, transit agencies were grappling with several challenges. Most notably, transit bus ridership had been experiencing a gradual decline since 2013, with 2019 national ridership numbers being the lowest since the 1970s[97]. For the most part, peer agencies

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[88] Portland Service Reductions

[89] Denver RTD faces future clouded by new commuting patterns, staff shortages and big questions about service

[90] Portland-area TriMet boosts starting pay to counter severe staffing shortage

[91] CATS to reduce route frequencies amid driver shortage

[92] RTD's A Line cancellations caused by third-party contractor's staffing shortage

[93] https://www.transittalent.com/articles/index.cfm?story=DART_Operator_Shortage_6-27-2022

[94] CATS plans to reduce service in response to continuing labor shortages

[95] Staff shortage leads Metro Transit to suspend six commuter routes for mid-June

[96] TriMet's Operator Shortage Stabilizes As Agency Looks to Expand Service

[97] The Mystery of the Missing Bus Riders

were experiencing these same trends prior to COVID-19, with the exception of bus ridership in Seattle which was well above 2013 figures[98].

Peer agencies were also facing financial challenges before 2020. In 2019, there were plans in place to expand the Charlotte transit system, however CATS CEO John Lewis noted that the funding mechanisms in place at the time would not be sufficient to finance the planned expansion. In Denver, the RTD system grappled with a $40 million dollar deficit in 2019, largely due to shortfalls in anticipated fare box and sales tax revenue[99], in addition to a $290 million dollars in maintenance and asset replacement costs that had been differed from past years[100]. In Portland, the TriMet system was experiencing reduced farebox revenues prior to the onset of COVID-19, which was partially attributed to gentrification and displacement along key transit routes resulting in fewer low income residents who on average use public transit at higher rates[101]. The Seattle Transit 3 (ST3) 2017 program expansion plan was also found to have significant financial risks associated with its funding framework in a 2019 assessment, with anticipated costs outpacing anticipated revenues resulting in the potential to reach the allowable debt limit for capital projects.[102,103] These preexisting issues reveal that many peer agencies were in a tenuous position prior to the onset of COVID-19, with ridership loss and financial issues making these entities especially vulnerable to the negative impacts of the pandemic.

Current Fiscal Situation/approaches

Major losses in ridership, combined with pre-existing financial struggles, has left many transit agencies in dire fiscal situations. While federal aid kept transit agencies afloat through the pandemic, these funds were never intended to be a long term solution. As such, the looming 'fiscal cliff' facing many agencies as federal funds run out is seen as an existential crisis for public transportation in the United States. However, the degree of financial difficulties facing peer cities and agencies is not ubiquitous, with different interventions being implemented to stave off financial woes.

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[98] The Mystery of the Missing Bus Riders

[99] RTD facing $40 million in budget cuts — but not service cuts

[100] Special report: RTD's financial pressures make budgets tight, reducing service for years to come

[101] In Portland, Economic Displacement May Be A Driver of Transit Ridership Loss

[102] Presentation - FAC - Risk Simulation Update 190620

[103] Financial risks to the ST3 plan have grown

In 2020 Seattle residents demonstrated overwhelming support for transit when over 80% of voters supported a 0.15% sales tax increase, equating to approximately $42 million dollars per year, to be directed to public transit in the area[104].

Portland Oregon took a different approach to improving the fiscal situation of the TriMet system, implementing a controversial increase in transit fare cost[105] which will result in an approximate $4.9 million dollar increase in revenue in 2024[106].

While still in the development phase, Denver and the RTD agency may also soon receive much needed additional funding. In 2023 Senator Faith Winter, the chair of the Colorado Senate's transportation committee, was working on crafting legislation that would increase public transportation funding statewide through a potential combination of new fees and voter approved tax increases[107].

Moving Forward

Despite ongoing financial and operational challenges, peer transit agencies are generally moving forward with planned system expansions and enhancements. The Denver FasTracks programs, a 2004 voter-approved initiative to significantly expand the RTD's network to connect to other front range cities, is still being pursued despite challenges associated with COVID-19. Additionally, the Trimet system in Portland initiated the 'Forward Together' program in 2022, which engaged residents and transit users to understand changes in travel patterns caused by the pandemic, and adjust transit services to reflect this new reality while emphasizing increased equity and access. Key elements of the program include expanding the frequent service bus network, extending and adding bus based transit to new markets, and increasing transit frequency on key routes[108]. In 2023 the first 'Forward Together' service changes were implemented,[109] increasing service coverage and frequency on specific high-ridership routes that serve low-income communities, while reducing (and in some cases eliminating) service on low-ridership routes. System expansions that were planned prior to the pandemic are also still being pursued in

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[104] Seattle sales tax to fund transit wins overwhelmingly in 2020 election results

[105] Some Fares Will Increase Jan. 1, 2024

[106] TriMet votes to increase single-use fares starting in 2024

[107] As frustrations with RTD simmer, key Colorado lawmaker working on bill to boost funding and accountability

[108] Forward Together

[109] TriMet implementing first Forward Together service changes starting Aug. 27

Charlotte,[110] including the expansion of the CATS light rail system. In 2023 Seattle updated its high capacity transit plans for the first time since 2014[111][112], calling for extensions to the existing light rail system and an expansion of the bus rapid transit system.

However, in Dallas not all pre-pandemic transit projects survived recent challenges. The D2 line, a $2 billion dollar proposed subway which was to serve Dallas's downtown core, was removed from DART's capital expense plan in 2023[113]. This move was largely caused by the loss of ridership associated with the COVID-19 pandemic, but the D2 line project may be resumed in the future according to DART representatives[114]. This development does not necessarily mean that the DART system is forgoing all system expansions, however. The funds which were freed up by this change may be used to expand the existing urban street car network, an option that multiple Dallas City Council members are interested in exploring[115].

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110 Charlotte city leaders moving forward with $13.5 billion transportation plan

111 Seattle Transportation Plan Draft

112 Map of the Week: Seattle's New Long-Range Rail Plan Goes Big

113 Downtown Dallas Subway 'D2' Is No Longer Part of DART's Long-Term Plans

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APPENDIX B: TRANSIT OPERATING REVENUES AND EXPENSES BY TRANSIT MODE

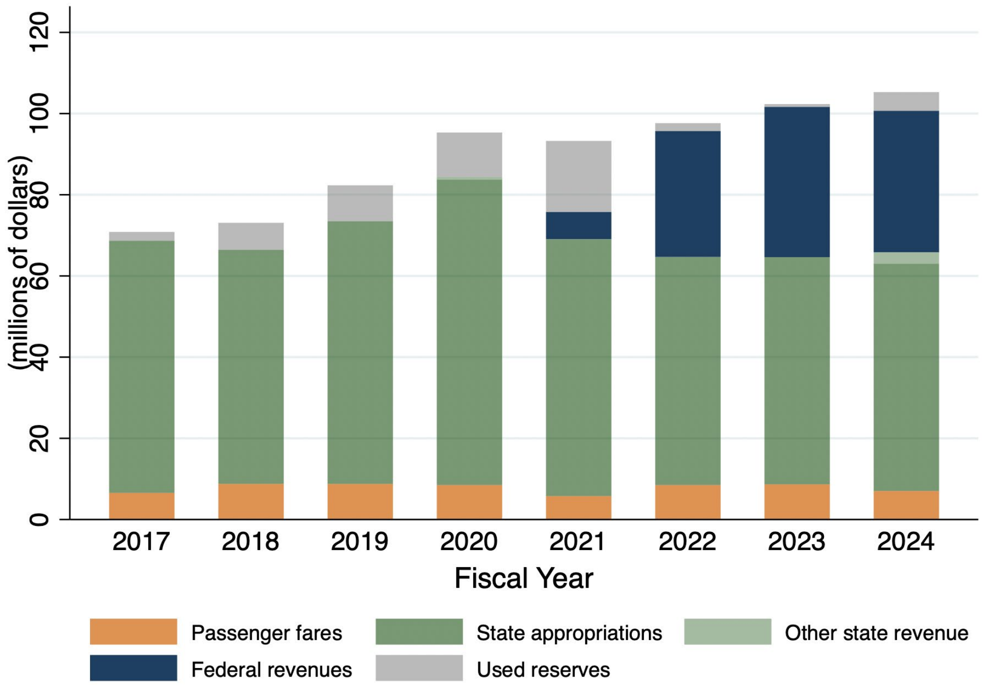
This appendix presents the make-up of revenue sources and expenses across services provided Metropolitan Transportation Services (MTS) and Metro Transit. Total passenger fare revenues are allocated across transit modes based on ridership and do not necessarily represent the actual revenue received from each service type. Because of this, trends in passenger fare revenues for individual transit service types are not emphasized in this appendix. An analysis of this data needs to be done with caution, accordingly, the analysis presented in the main report discusses passenger fares revenue trends for fixed route services which aggregates bus, light rail, and contracted fixed route services.

MTS oversees Metro Mobility, Transit Link, and contracted fixed route services. Metro Mobility provides transportation services for individuals with disabilities in the metropolitan area. Transit Link provides shared-ride public transportation for the metropolitan area where regular route transit service is infrequent or unavailable. Lastly, contracted fixed routes provide transit services mostly in suburban areas and typically have fewer riders (compared to Metro Transit Operations).

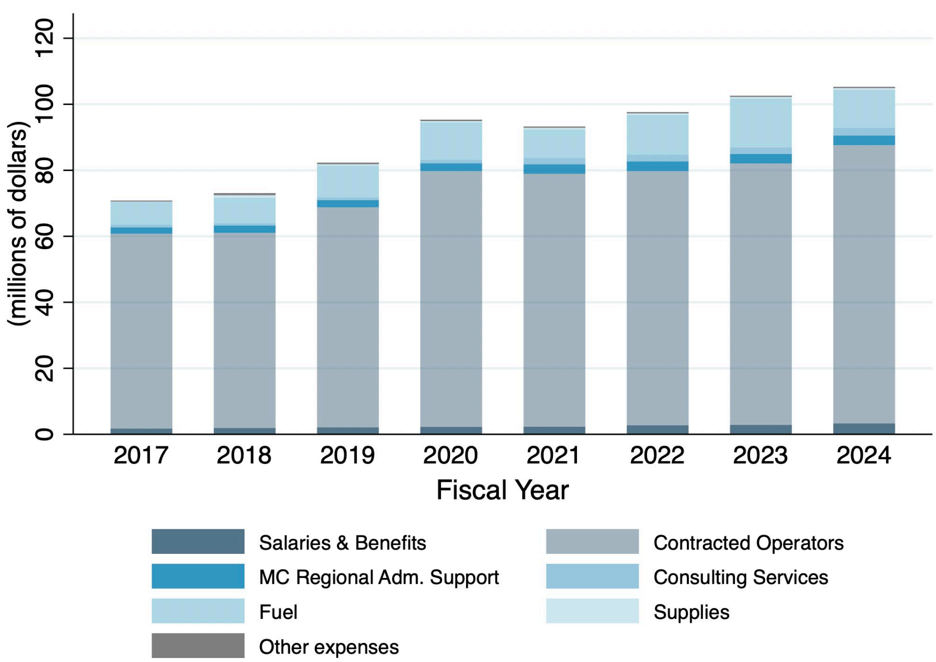
Figure B.0.1 presents revenues and expenses for Metro Mobility. On the revenue side, most revenues came from state appropriations which accounted for an average of 69.7 percent of the funding between FY2017 and FY2024. The share went from 81.7 percent of total revenues pre-pandemic to 55.1 percent post-pandemic. Passenger fares accounted for an average of 8.9 percent of total revenues. Revenues from this source decreased by 32 percent during FY2021, but rapidly recovered to FY2019 levels in the following fiscal year. Federal aid was crucial to support this type of services during the COVID-19 pandemic. Federal aid contributed about 33.6 percent of total revenues post-pandemic. On the expenses side, most expenses are contracted operators, which accounted for an average of 80.6 percent of total expenses in the FY2017- FY2024 period and have increased at an annual average rate of 5.4 percent.

Figure B.0.2 presents revenues and expenses for Transit Link. On the revenue side, most revenues came from the MVST which accounted for an average of 69.5 percent of the funding between FY2017 and FY2024. Passenger fares accounted for an average of 6.6 percent of total revenues. Revenues from this source decreased by 46.4 percent during FY2021 and while recovering are currently at 80 percent of their FY2019 levels. Federal aid provided about 41.7 percent of total revenues in FY2021 and FY2022 and about 7.3 percent in the following years. On the expenses side, most expenses are contracted operators, which accounted for an average of 90.4 percent of total expenses in the FY2017- FY2024 period and have increased at an annual average rate of 6.6 percent.

Figure B.0.3 presents revenues and expenses for contracted fixed route services. On the revenue side, most revenues came state appropriations which accounted for an average of 79.5 percent of the funding between FY2017 and FY2024. On the expenses side, most expenses are contracted operators, which accounted for an average of 89 percent of total expenses in the FY2017- FY2024 period and have increased at an annual average rate of 4 percent.



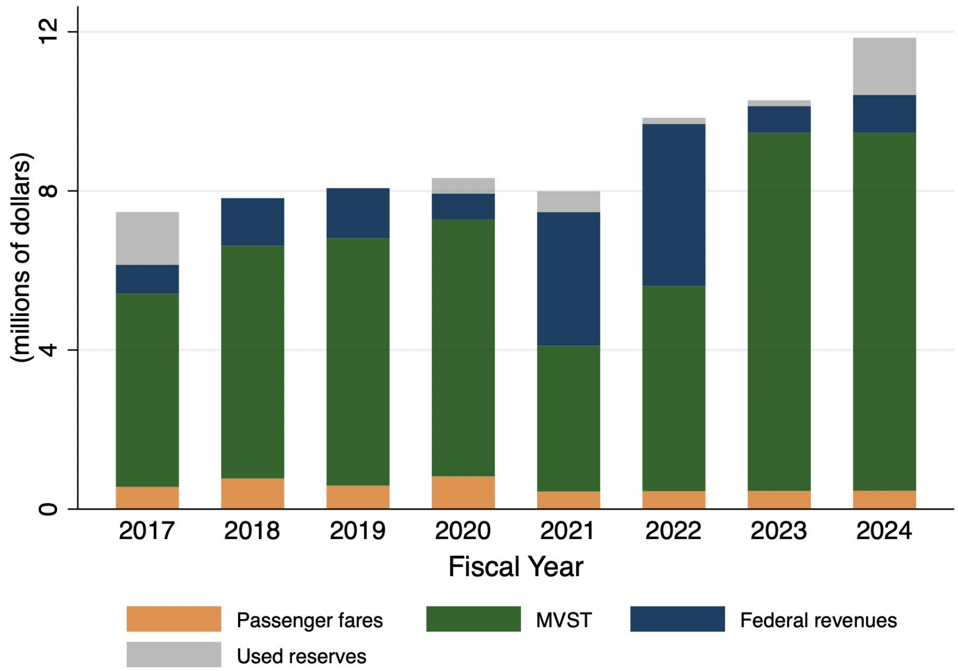
Panel A: By funding sources



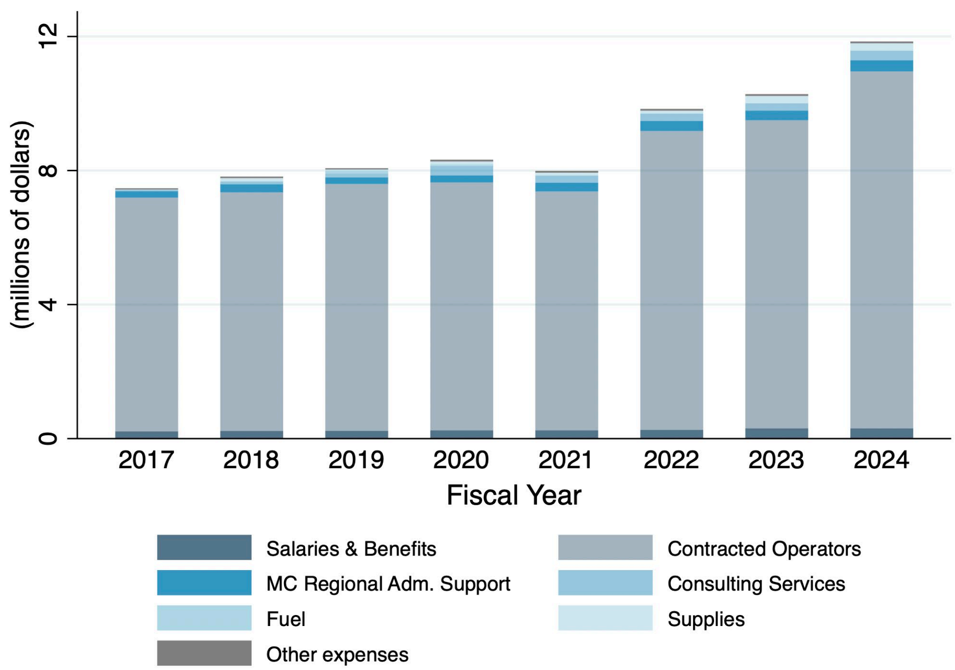
Panel B: By type of expenses

Source: *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure B.0.1 Revenues and Expenses for Metro Mobility



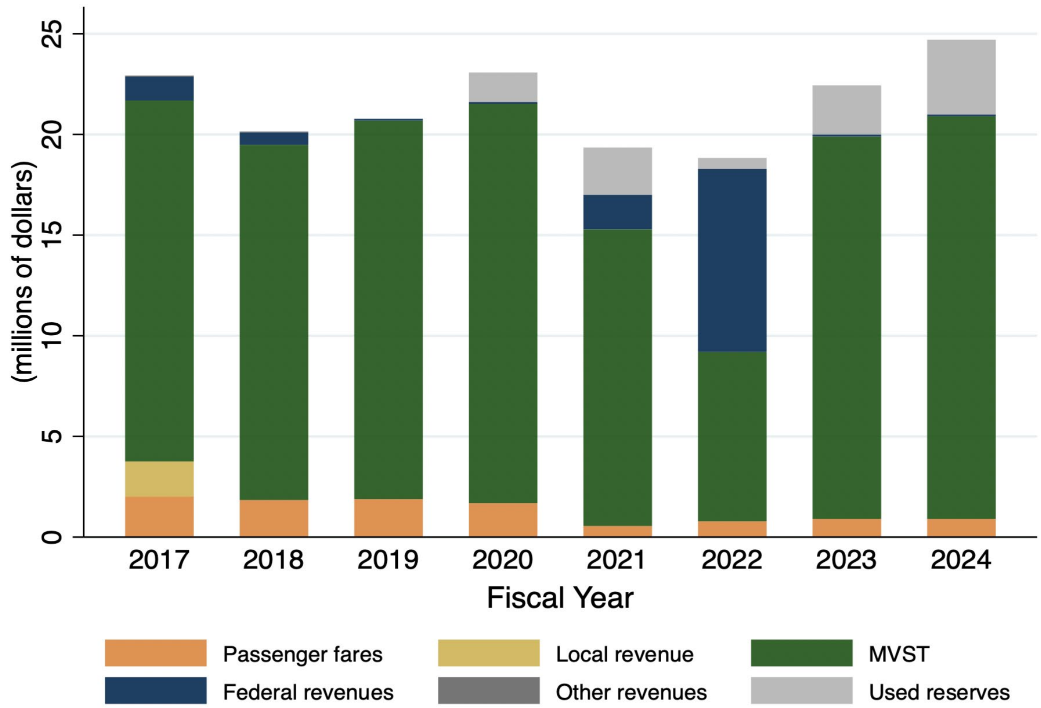
Panel A: By funding sources



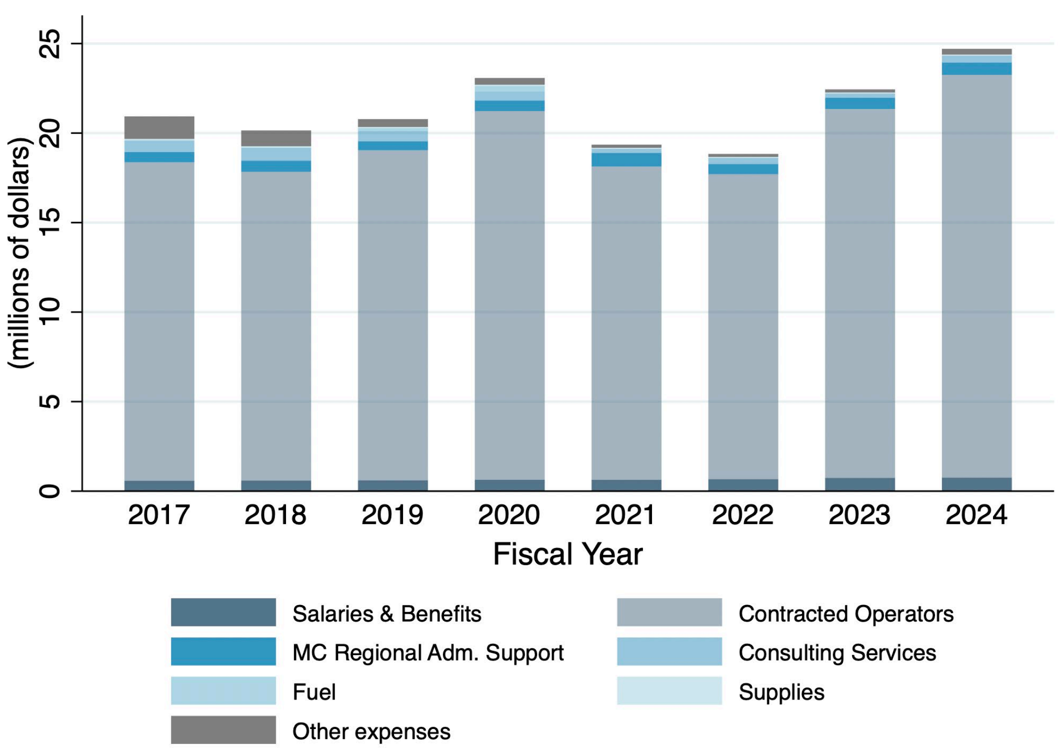
Panel B: By type of expenses

Source: *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure B.0.2 Revenues and Expenses for Transit Link



Panel A: By funding sources



Panel B: By type of expenses

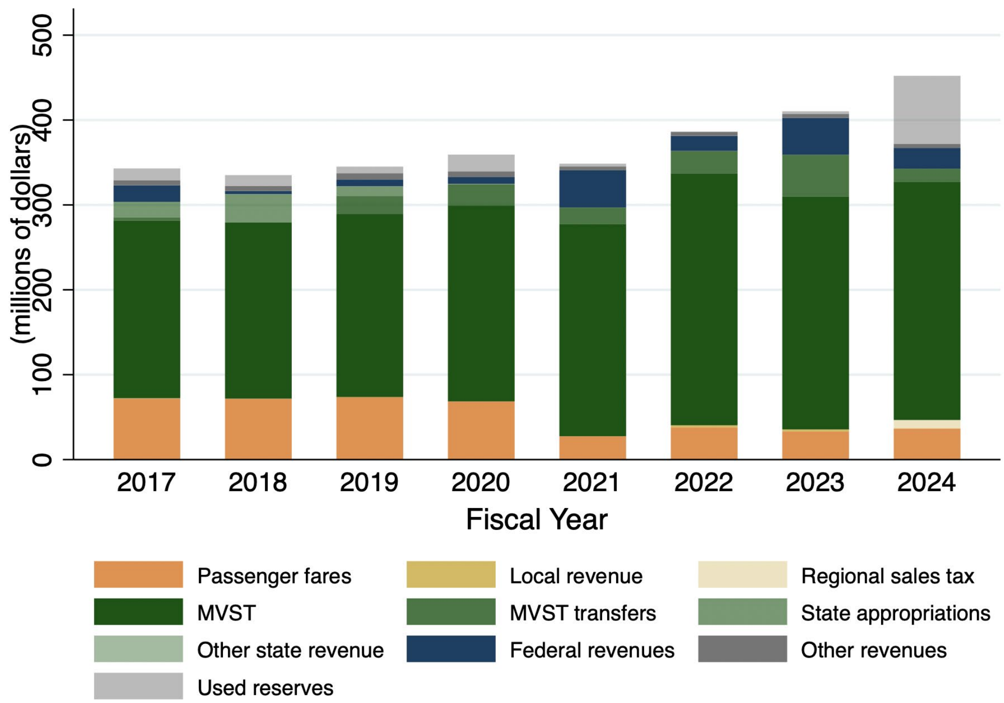
Source: *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure B.0.3 Revenues and Expenses for Contracted Fixed Route

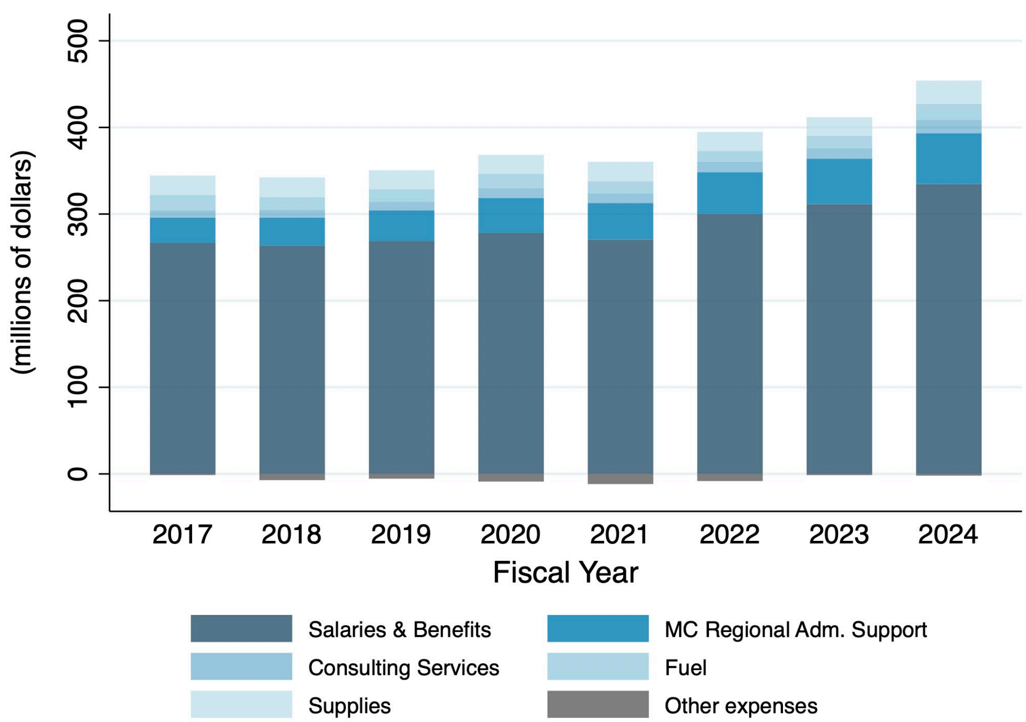
Metro Transit oversees bus, light rail, and commuter rail services. Figure B.0.4 presents revenues and expenses for bus services. On the revenue side, most revenues came from the MVST which accounted for an average of 71.1 percent of the funding between FY2017 and FY2024. The share went from 64.2 percent of total revenues pre-pandemic to 76 percent post-pandemic. On the expenses side, most expenses are salaries & benefits which accounted for an average of 77.1 percent of total expenses in the FY2017- FY2024 period and have increased at an annual average rate of 3.4 percent.

Figure B.0.5 presents revenues and expenses for light rail services. On the revenue side, revenues between FY2017 and FY2024 came from state appropriations (29.2 percent) and local revenues (27.9 percent). In the years following the peak of the pandemic (FY2021, FY2022, and FY2023), federal aid contributed about 23.2 percent of total revenues. In FY2024, the regional sales tax replaced the portion that was previously coming from local revenues and absorbed some of the decrease in federal aid. On the expenses side, most expenses are salaries & benefits, which accounted for an average of 53.6 percent of total expenses in the FY2017- FY2024 period and have increased at an annual average rate of 5.5 percent.

Figure B.0.6 presents revenues and expenses for commuter rail services. On the revenue side, most revenues between FY2017 and FY2024 came from local revenues (44.7 percent) and state appropriations (26.4 percent). Passenger fares revenues went from representing an average of 12.8 percent of total revenues pre-pandemic to 2.7 percent post-pandemic. Revenues from this source decreased by 85.4 percent during FY2021 and have not recovered. Current revenues are at 19.6 percent of their FY2019 levels. On the expenses side, most expenses are salaries & benefits and consulting services representing 31.3 and 27.8 percent of total expenses.



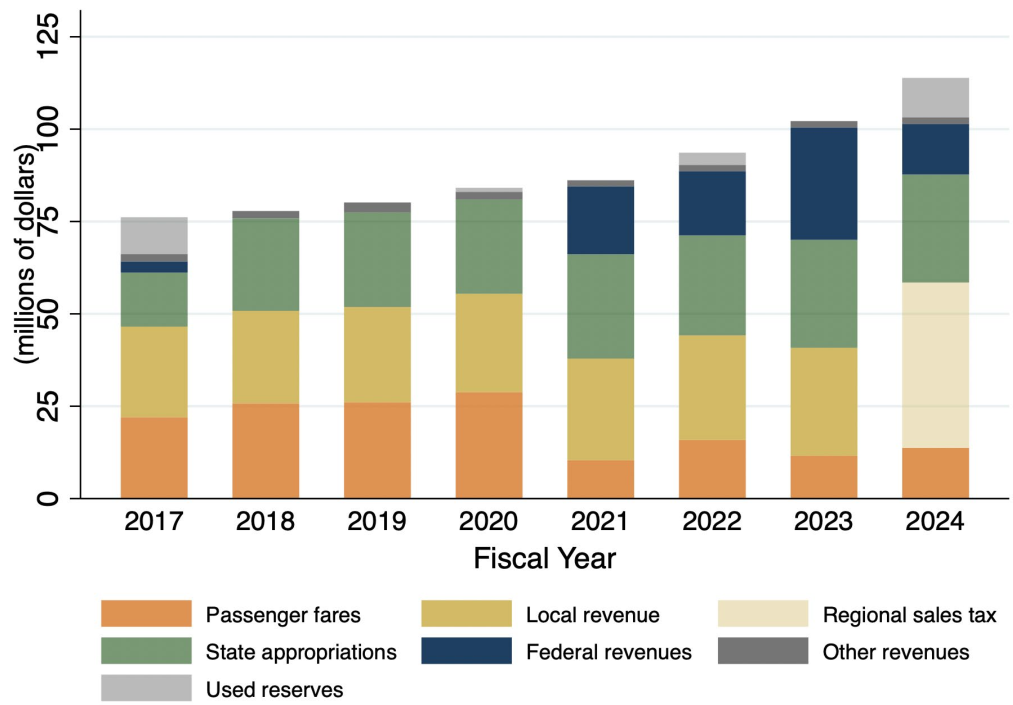
Panel A: By funding sources



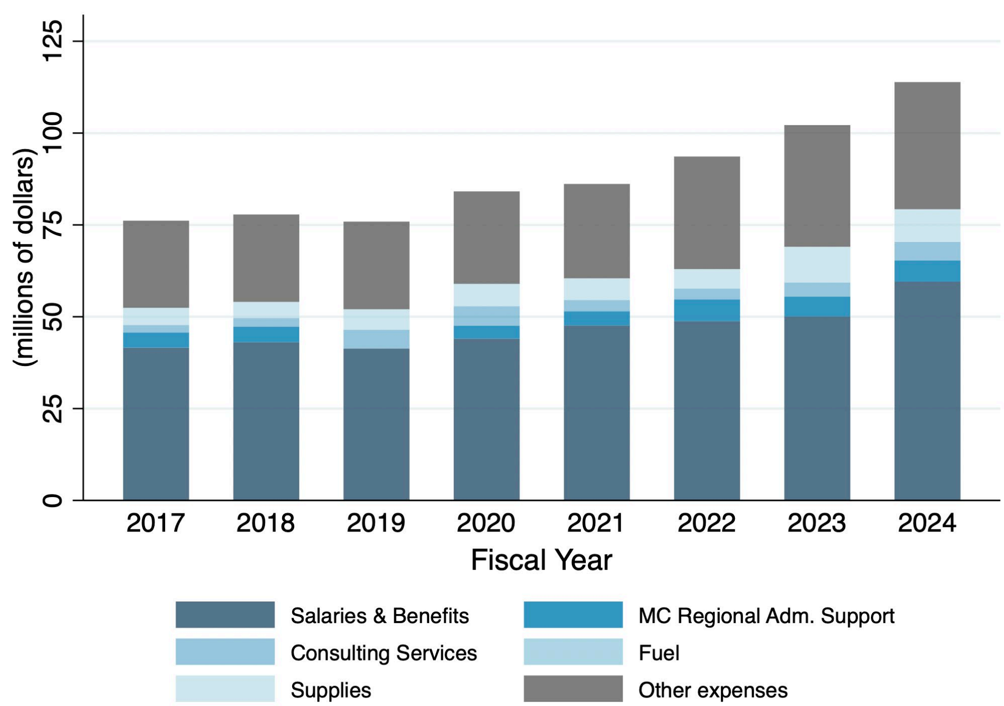
Panel B: By type of expenses

Note: *The majority of other expenses are modal allocations.* ***Source:*** *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure B.0.4 Revenues and Expenses for Bus



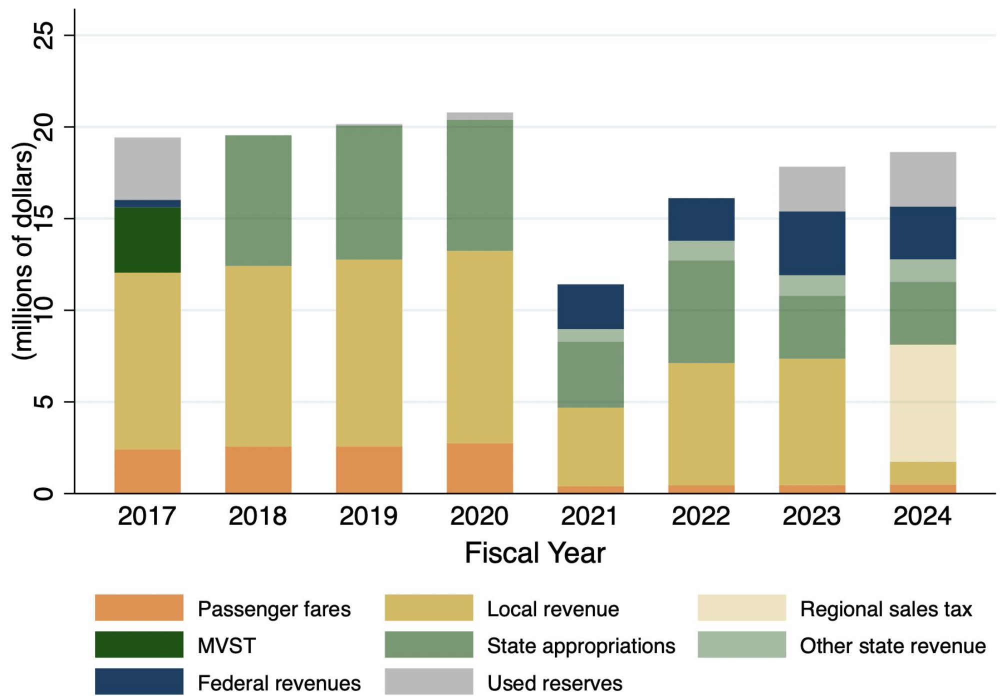
Panel A: By funding sources



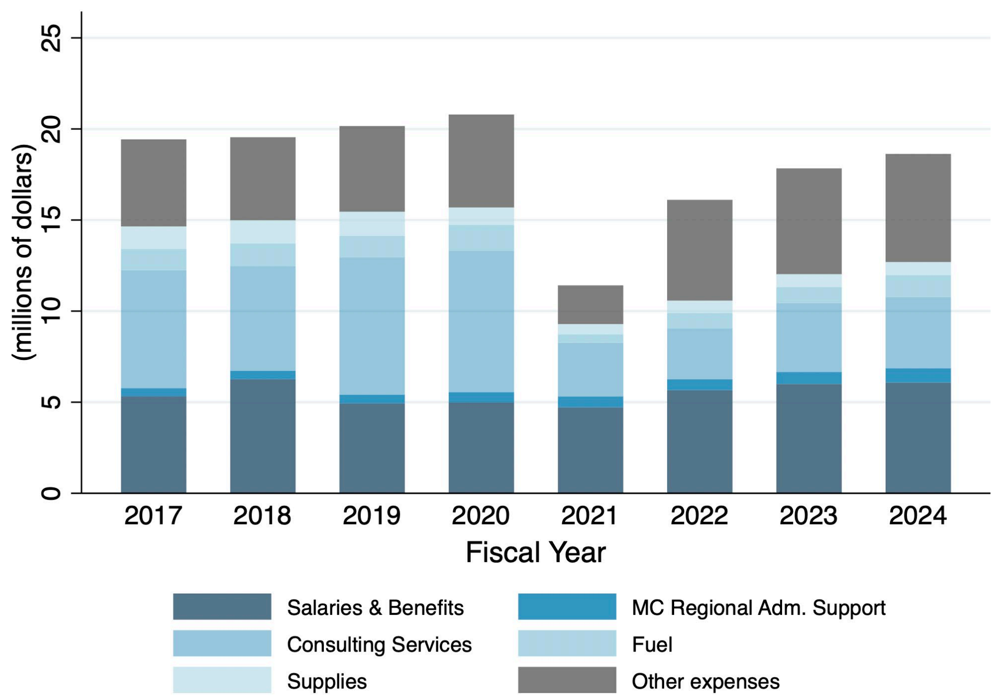
Panel B: By type of expenses

Note: *The majority of other expenses are modal allocations.* ***Source:*** *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure B.0.5 Revenues and Expenses for Light Rail



Panel A: By funding sources



Panel B: By type of expenses

Note: *The majority of other expenses are modal allocations.* ***Source:*** *Summary budget (Table C-1), Transportation Division, Metropolitan Council (FY2017-FY2024).*

Figure B.0.6 Revenues and Expenses for Commuter Rail

APPENDIX C: REGIONAL FARE REVENUES AND EXPENSES BY TRANSIT SERVICE TYPE

The regional supply and demand of transit services changed with the COVID-19 pandemic. On the supply side, the hours of service provided decreased by 18.8 percent which reduced the costs of operating transit services by 1.8 percent. This trend speaks about the high proportion of fixed costs that exists in the operation of transit services. On the demand side, passenger trips declined by 50.9 percent which reduced passenger fare revenues by 49.6 percent. These statistics compared 2022 data -the most recent available data, with 2019 data -based year before the pandemic for all transit providers in the metro region (Metropolitan Transportation Services, Metro Transit, Minnesota Valley Transit Authority (MVTA), Maple Grove Transit, Plymouth, and SouthWest Transit).

Transit services were not affected the same by the pandemic (see Table C.0.1). Commuter rail and commuter & express bus services experienced the highest decline in passenger trips and in service hours, likely due to working from home arrangements.[116] Operating costs and fare revenues associated to them also decreased but at a much lower rate. Contrarily, supporting and suburban local bus services experienced an increase in the hours of service provided which increased costs but more than proportionally. While the number of passenger trips as well as fare revenues increased for supporting local services, they decreased for suburban local bus services.

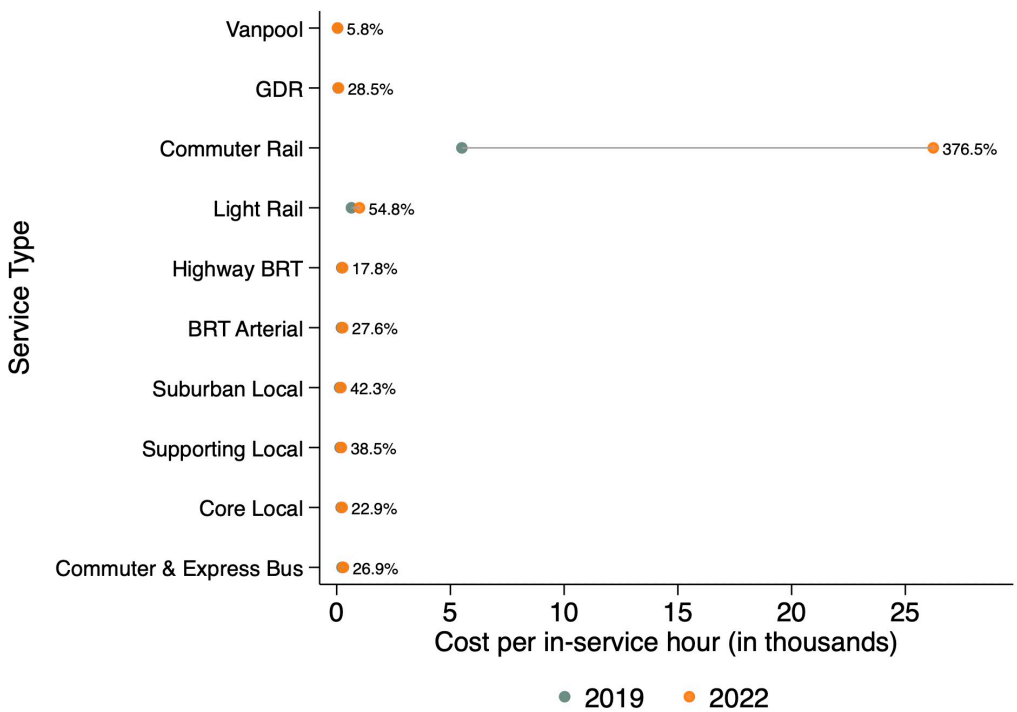
Table C.0-1 Differences between 2019 and 2022 by service type in the Metro region

Service Type	Cost (%)	In Service Hours (%)	Fare Revenue (%)	Passenger Trips (%)
Supporting Local	89.6	36.9	50.9	32.7
General Demand Response	53.7	19.6	-8.2	-5.1
Vanpool	-35.2	-38.8	-16.5	-25.5
Highway BRT	17.9	0.2	-6.5	-26.7
Arterial BRT	-3.0	-24.0	-32.5	-26.8
Suburban Local	56.2	9.8	-31.2	-38.4
Core Local	-1.5	-19.9	-28.7	-49.4
Light Rail	9.8	-29.1	-59.8	-51.1
Commuter & Express Bus	-53.5	-63.4	-77.5	-84.6
Commuter Rail	-33.5	-86.0	-90.1	-90.0

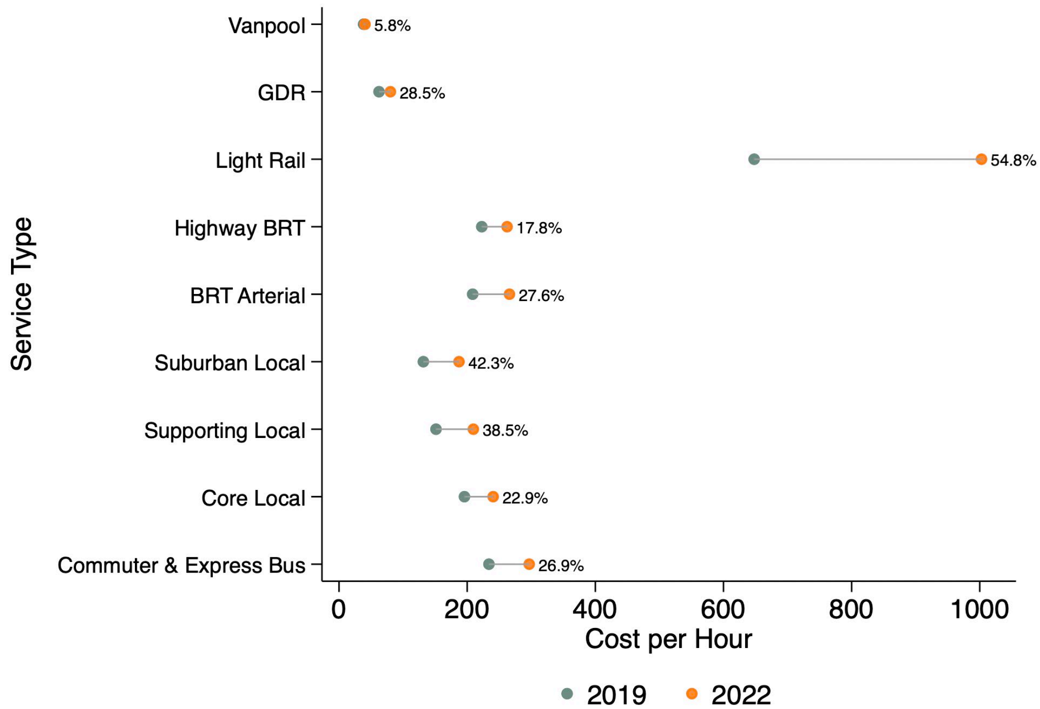
Note: *Information from all transit providers in the metro region.* ***Source:*** *Metropolitan Council Performance Data, 2019-2022.*

[116] For instance, MTS and MT offered 75 routes as commuter & express bus services in 2019. This number decreased to 26 in 2022.

Across all services in the region, the average cost per in-service hour, on average, increased from $212.6 in 2019 to $257.1 in 2022. Figure C.0.7 presents costs per in-service hour by transit service in metro region. Overall, rail services, which are the most expensive to provide per hour of service, experienced the highest cost increase with the pandemic. Providing an hour of commuter rail service went from $5,504 in 2019 to $26,229 in 2022; while light rail went from $647 to $1,002. The costs of providing an hour of bus services also increased, but to a lesser extent (growth rates between 17 and 43 percent).

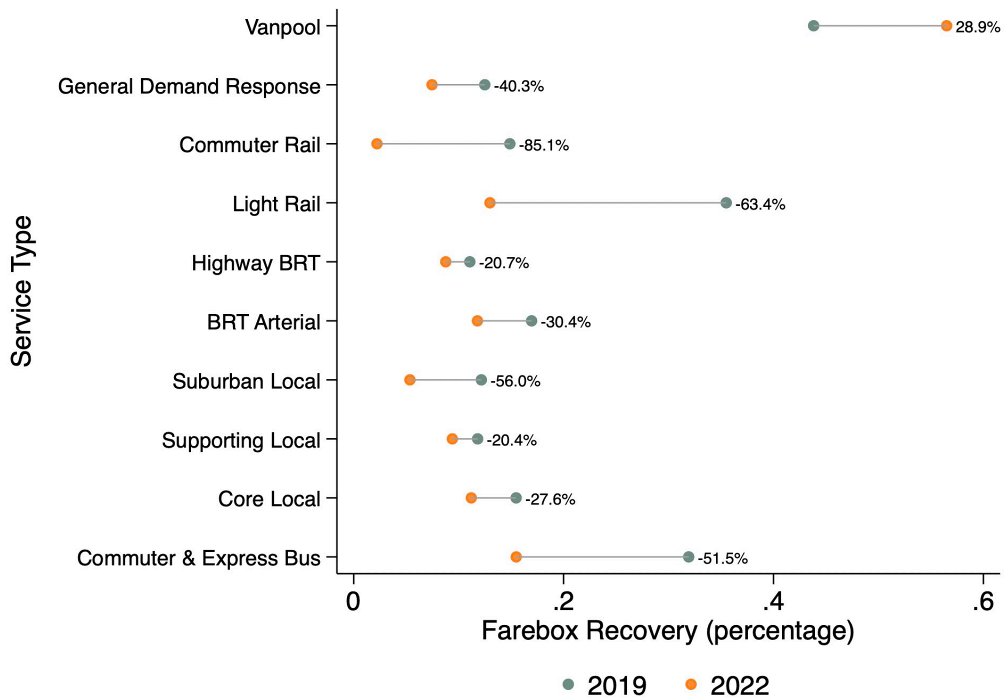


Panel A: Regional transit operating costs per in service hour with commuter rail services



Panel B: Regional transit operating costs per in service hour excluding commuter rail services
Note: *The x-axis presents the cost per in service hour. The supplemental percentages correspond to the percentage change between 2019 and 2022. Information from all transit providers in the metro region.* ***Source:*** *Metropolitan Council Performance Data, 2019-2022.*
Figure C.0.7 Regional transit operating costs per in service hour by transit service

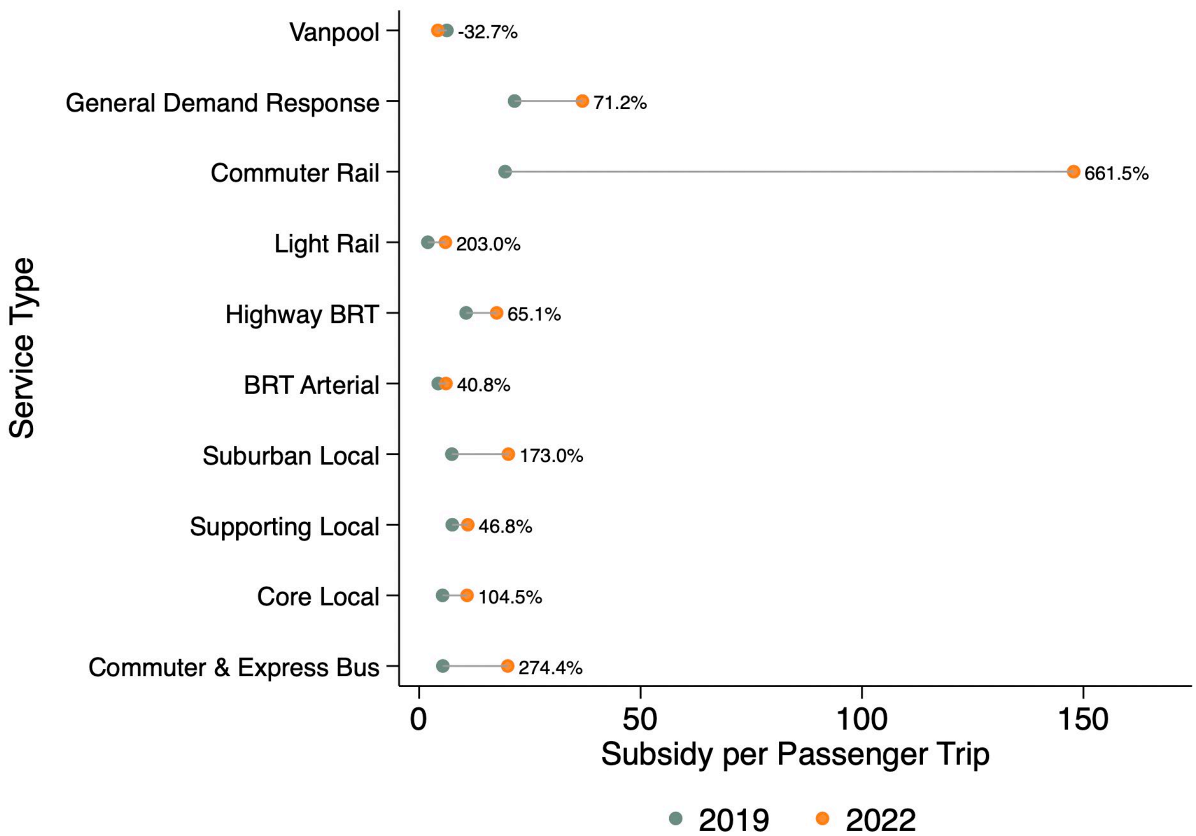
With the decline in fare revenues and the varying operating costs, the ability of fare revenues to cover operating costs was negatively affected (Figure C.0.8). Across all services in the region, rail services experienced the highest decline in their ability to cover operating costs.



Note: *The x-axis presents the farebox recovery rate. The supplemental percentages correspond to the percentage change between 2019 and 2022. Information from all transit providers in the metro region.* ***Source:*** *Metropolitan Council Performance Data, 2019-2022.*

Figure C.0.8 Farebox recovery by transit service

The decline in passenger fare revenues also translated in a higher subsidy to cover transit operating expenses in the metro region. Across most services in the region, the subsidy per passenger trip increased significantly, with rail services and commuter & express bus services experiencing the highest increases (Figure C.0.9).



Note: *The x-axis presents the subsidy per passenger trip. The supplemental percentages correspond to the percentage change between 2019 and 2022. Information from all transit providers in the metro region.* ***Source:*** *Metropolitan Council Performance Data, 2019-2022.*

Figure C.0.9 Subsidy per passenger trip by transit service

APPENDIX D: FUNDING SCENARIOS BY THE NUMBERS

Table D.0-2 Revenues for scenario A

Scenario A (in thousands)	FY2024 (current)	FY2025	FY2026	FY2027	FY2028
MVST	313,813	320,089	326,491	333,021	339,681
MVST Transfers In	15,745	16,217	16,704	17,205	17,721
State Appropriations	88,630	88,630	88,630	88,630	88,630
Other State Revenues	4,067	4,189	4,315	4,444	4,577
Federal Revenues	110,092	61,337	40,106	41,957	43,892
Local Revenues	1,362	1,391	1,420	1,449	1,480
Passenger fares	59,208	61,438	63,752	66,153	68,645
Contract Special Revenue	1,662	1,694	1,726	1,760	1,793
Investment Earnings	525	541	557	574	591
Other Revenues	4,240	4,367	4,498	4,633	4,772
Needed revenues:					
Regional Sales Tax	63,147	68,980	71,022	73,124	75,289
Projected Used Reserves	105,880	166,356	203,805	218,845	234,496
Total Revenues = Expenses	**768,371**	**795,229**	**823,026**	**851,795**	**881,569**
Revenues needed Growth		*39.2%*	*16.8%*	*6.2%*	*6.1%*
Revenues needed as a share of total revenues	*22.0%*	*29.6%*	*33.4%*	*34.3%*	*35.1%*
Passenger fares compared to FY2019 levels	*52.2%*	*54.1%*	*56.2%*	*58.3%*	*60.5%*

Table D.0-3 Revenues for scenario B

Scenario B (in thousands)	FY2024 (current)	FY2025	FY2026	FY2027	FY2028
MVST	313,813	320,089	326,491	333,021	339,681
MVST Transfers In	15,745	16,217	16,704	17,205	17,721
State Appropriations	88,630	88,630	88,630	88,630	88,630
Other State Revenues	4,067	4,189	4,315	4,444	4,577
Federal Revenues	110,092	61,337	40,106	41,957	43,892
Local Revenues	1,362	1,391	1,420	1,449	1,480
Passenger fares	59,208	69,673	81,988	96,479	113,532
Contract Special Revenue	1,662	1,694	1,726	1,760	1,793
Investment Earnings	525	541	557	574	591
Other Revenues	4,240	4,367	4,498	4,633	4,772
Needed revenues:					
Regional Sales Tax	63,147	68,980	71,022	73,124	75,289
Projected Used Reserves	105,880	158,121	185,569	188,519	189,610
Total Revenues = Expenses	**768,371**	**795,229**	**823,026**	**851,795**	**881,569**
Revenues needed Growth		*34.4%*	*13.0%*	*2.0%*	*1.2%*
Revenues needed as a share of total revenues	*22.0%*	*28.6%*	*31.2%*	*30.7%*	*30.0%*
Passenger fares compared to FY2019 levels	*52.2%*	*61.4%*	*72.2%*	*85.0%*	*100.0%*

Table D.0-4 Revenues for scenario C

Scenario C (in thousands)	FY2024 (current)	FY2025	FY2026	FY2027	FY2028
MVST	313,813	320,089	326,491	333,021	339,681
MVST Transfers In	15,745	16,217	16,704	17,205	17,721
State Appropriations	88,630	88,630	88,630	88,630	88,630
Other State Revenues	4,067	4,189	4,315	4,444	4,577
Federal Revenues	110,092	61,337	40,106	41,957	43,892
Local Revenues	1,362	1,391	1,420	1,449	1,480
Passenger fares	59,208	61,438	63,752	66,153	68,645
Contract Special Revenue	1,662	1,694	1,726	1,760	1,793
Investment Earnings	525	541	557	574	591
Other Revenues	4,240	4,367	4,498	4,633	4,772
Needed revenues:					
Regional Sales Tax	63,147	68,980	71,022	73,124	75,289
Projected Used Reserves	105,880	201,628	240,310	256,626	273,598
Total Revenues = Expenses	**768,371**	**830,501**	**859,531**	**889,576**	**920,671**
Revenues needed Growth		*60.1%*	*15.0%*	*5.9%*	*5.8%*
Revenues needed as a share of total revenues	*22.0%*	*32.6%*	*36.2%*	*37.1%*	*37.9%*
Passenger fares compared to FY2019 levels	*52.2%*	*54.1%*	*56.2%*	*58.3%*	*60.5%*