Gender-Responsive Mobility Planning:
Evaluating Considerations of Women's Mobility in
New York City Transportation Planning

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Executive Summary

Although gender identity is critical in shaping individuals' travel habits in urban environments, women's mobility patterns are largely overlooked in urban transportation planning and policy. While transportation systems are often portrayed as neutral, in reality, they reflect and perpetuate existing inequities, particularly across gender lines. Women, men, and gender diverse New Yorkers experience the city differently due to various factors, including accessibility, safety concerns, costs, and caregiving responsibilities. This thesis aims to illustrate the differential mobility patterns of women in New York City and explore opportunities for New York's transportation planning to adopt gender-responsive practices.

Grounded in feminist scholarship on gendered mobility experiences, the analysis examines how existing transportation data and a gender-responsive mobility survey implemented for this research validate academic understandings of women's unique mobility patterns. I conclude that there is a pressing need for transportation agencies to capitalize on New York City’s recent investments in gender equity and advocate for the inclusion of gender-responsive mobility in citywide equity investments. I also recommend adopting data collection methods that explicitly account for gendered mobility patterns, requiring an integration of qualitative and quantitative data collection to capture the complexities of women's travel experiences. To support this objective, I propose improvements to existing data collection methodologies and a gender-responsive impact assessment tool to evaluate the gender inclusivity and responsiveness of transportation data collection methods. Additionally, I advocate for greater gender diversity within the transportation planning workforce to encourage the promotion of gender-responsive transportation policy.

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Introduction

Transport is an essential part of daily life for New Yorkers, yet for over half the city's population it's rarely as simple as getting from point A to point B. In a city of 8.4 million people, the New York City subway and bus systems have a collective daily ridership of approximately 3.6 million (Metropolitan Transit Authority), in addition to the hundreds of trips completed each day by foot, bicycle, ferry, and car. Women make up over half of this ridership, a trend that is mirrored in nearly every city in the United States (American Public Transportation Association). Despite comprising a majority of public transit ridership, transportation systems in New York City do not account for the impact of gender identity on urban residents' transit experiences. At the heart of this complexity lies the issue of gendered mobility – the differential ways in which gender influences movement and interactions in urban spaces. While transportation systems are often portrayed as neutral, in reality they reflect and perpetuate existing inequities, particularly across gender lines. Women, men, and gender diverse New Yorkers experience the city differently due to a variety of factors, including accessibility, safety concerns, costs, and caregiving responsibilities.

Mobility is a strong determinant of well-being in urban environments, shaping individuals ability to access jobs, recreation, and public resources such as parks, grocery stores, health care, and schools. However, not all social groups enjoy equal access to mobility. Women in particular face unique mobility challenges, impacting their access to opportunities and resources. Anastasia Loukaitou-Sideris, a leading scholar in the field of feminist transportation theory, argues that "women's mobility in cities is challenged by physical, economic, cultural and psychological constraints, but also inadequate transportation policies that often neglect or disregard women's needs," (Loukaitou-Sideris, 2020).

This thesis explores the nuances of gendered mobility in New York City, shedding light on how gender identity and norms shape women's transportation choices and experiences of daily urban travel patterns. Despite the ever growing body of feminist planning scholarship

focusing on mobility and public space, the integration of gendered perspectives within professional practice remains limited. Through an interdisciplinary lens that draws on urban studies, feminist geography, and transportation planning, this research illustrates the ways in which gender shapes the experiences of women and advocates for more inclusive and accessible transportation systems for all New Yorkers. Drawing on a combination of quantitative and qualitative analysis, this research aims to contribute to both theoretical understandings of gender and mobility, as well as practical efforts to address transportation inequalities and create gender-responsive mobility systems.

While numerous terms can be used to describe gender inclusive planning efforts, I have chosen to frame this work as 'gender-responsive'. As it is used in development policy (see Dazé & Dekens, 2018; European Institute for Gender Equality, 2024) , 'gender-responsive' is defined as a proactive approach that not only identifies gendered challenges, but also strives to correct or improve existing policies and practices to ensure gender is meaningfully engaged in program design, implementation, and evaluation. In the context of urban mobility, gender-responsive mobility signifies a sustained, active effort to recognize gender-specific mobility needs, empower women and gender diverse individuals to influence transportation and mobility-related policies, improve access across gender to public transportation systems, and incorporate gender-sensitivity into data collection and program evaluation processes.

A Note on Gender Identity

This research is limited in its ability to address the mobility challenges of gender diverse New Yorkers who do not identify as women. A more comprehensive discussion of this research's limitations is addressed in the discussion section, but it is important to address this limitation before presenting my research findings to frame the scope of this work. This work focuses on New Yorkers who identify as women, contrasted mainly against the experiences of New Yorkers who identify as men. While not adequately addressed in the scope of this

research, gender diverse mobility in New York is a critical area for further research to develop a more nuanced and inclusionary approach to mobility planning. As articulated by Yasiminah Beebeejaun (2016), gender is a complex and ever-evolving identity challenged across scales, presenting "layers of complexity for coherent analysis." While this research aims to fill a gap in understanding how women's mobility experiences in New York City can be better understood through comprehensive research, advocacy, and progress within the transportation planning workforce, this is one piece of a much larger challenge to incorporate gender responsiveness into transportation planning in New York City. In addition to exploring the impactful work of planners at the Minnesota Department of Transportation included in this research, I encourage readers to explore the works of scholars such as Lubitow & Abelson (2020), Mai & King (2009), and Nash & Gorman-Murray (2014) who devote their research to illuminating the unique mobility challenges faced by gender minorities and the need for an inclusive shift in the ways gender is conceived and addressed by scholars and practitioners.

Literature Review

Despite the decades-long tradition of feminist geographers and urban researchers advocating for gender-inclusive urban planning approaches, mainstream planning scholarship and practice continues to be dominated by the male perspective. Building on scholarship demonstrating the criticality of adopting a gendered lens to shape inclusive urban environments, this section explores the factors that shape women's complex travel habits, demonstrating a need to reimagine gender-blind approaches to transportation planning. Although progress in recent years provides optimism that gender inequities are gaining visibility, transportation planning suffers from a largely gender-blind approach that fails to deliver inclusive services for urban users.

Gender disparities in transportation planning have received greater attention in recent years thanks to the work of geographers and writers such as Caroline Criado-Perez, whose 2019 book *Invisible Women: Data Bias in a World Designed for Men* brought the transportation gender gap into mainstream discourse about gender inequities. As Criado-Perez articulates in *Invisible Women*, transportation planning uses men's travel patterns as the 'standard' to design transportation systems, largely ignoring how women use transit systems (Criado-Perez, 2019). Although *Invisible Women* has brought attention to gendered mobility, Perez has been fairly criticized for the book's erasure of gender diverse experiences and the exclusion of transgender women, demonstrating a need to meaningfully integrate gender inclusivity into mainstream mobility discussions (University of Warwick, 2020). The way planners and researchers talk about gender matters, and as a profession dedicated to improving spaces to serve urban dwellers, planners must do better to elevate the voices of marginalized communities and integrate their needs into our projects and programs.

Whose Right to the City?

Emerging in response to the increasing commodification and privatization of urban spaces in the twentieth century, French philosopher Henri Lefebvre's conception of the 'right to the city' continues to shape discussion about social justice and power in cities. Lefebvre conceived the right to the city as a fundamental right underpinned by social justice and democratization, advocating for citizens' active participation in shaping and governing their cities stemming from concern that the "alienating impact" of the city facilitated an increasing disconnect between urban residents and their ability to participate in the formation of urban space (Beebeejaun, 2017). Lefebvre argued that the right to the city is earned by living in a city "and belongs to the urban dweller, whether citizen or stranger" (Fenster, 2005). As Purcell (2003) articulates, two bodies of rights are embedded in the right to the city. The first is the right to "full and complete use" of space in their everyday lives, or simply the right to live, work, play, and occupy urban space. The second is the right to participation, signifying the ability to influence decision-making processes and the production of space (Purcell, 2003). While this framework aims to reappropriate power over space to urban inhabitants, it fails to engage with identity differences meaningfully. Lefebvre includes the "right to differences as a right which complements the right to the city, but emphasizes the right to 'be' different, rather than the actual difference," (Dikec, 2001). Accordingly, the normative definition of the right to the city does not contend with power struggles inherent in gender identities. It does not challenge gendered power dynamics as a factor impacting individuals' ability to realize the right to use space and influence decisions in the city (Fenster, 2005).

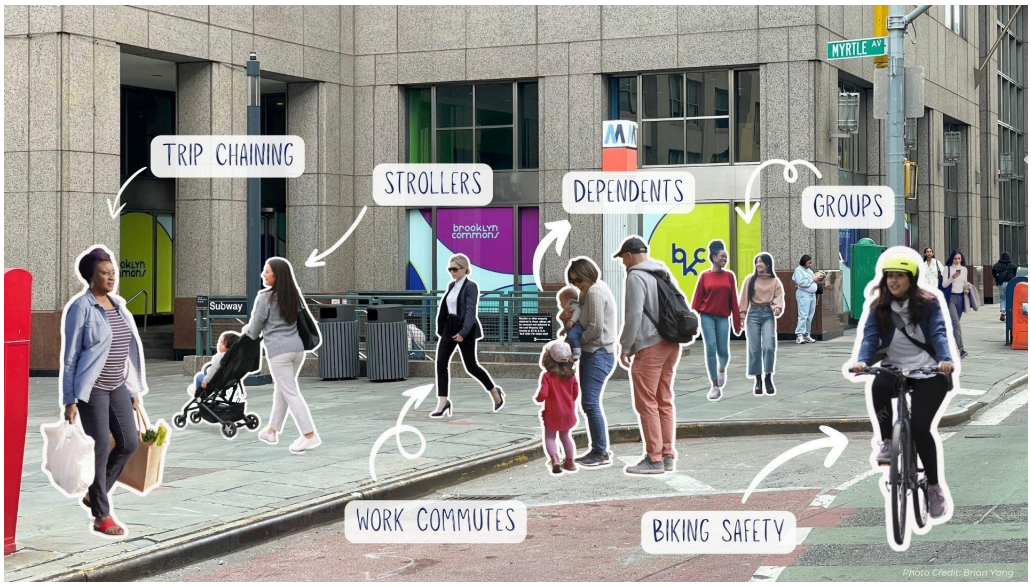
Feminist geographers contend that the right to the city is "underpinned by a patriarchal gender perspective" and fails to conceive of the impact of gender on urban participation (Beebeejaun, 2017). Women do not have a right to the city because rights do not account for their motivations, decisions, and actions. The right to the city's focus on the public realm also fails to account for the influence of women's responsibilities in the private realm on

their ability and decision to participate in public spaces. One of the most formative researchers in feminist urban studies is Dolores Hayden, who conceived the term "non-sexist city" and articulated the tension of women's place in public and private urban spaces (Hayden, 1980). Writing on the experience of late 20th-century women, Hayden describes how women entering the workforce in increasing numbers were expected to shoulder the bulk of household responsibilities in addition to their growing work outside of the home. Although Hayden's argument focuses on developing dwellings responsive to women's array of responsibilities, there are clear parallels to assessing gendered mobility patterns. Hayden's work is foundational to understanding the interplay between women's duties in the private and public realms. Women's increased presence in the public realm is in tension with their 'traditional' roles in private space and has significantly impacted their mobility choices. In recognition of the blurred boundaries between public and private space, Robin Law argues that the investigation of gendered mobility needs to move beyond the tendency to focus on "a sterile dichotomy of (male) public and (female) private." (Law, 1999).

Accordingly, feminist geographers advocate for analysis of everyday life to produce comprehensive insights into the various spatial practices that explicate gendered experiences. A focus on everyday life moves past the traditional lens of transportation analysis, which often narrowly fixates on work-related travel patterns and oversimplifies women's travel patterns, overlooking women's travels related to recreation and household responsibilities (Hillman and Whalley, 1977). Beebeejaun (2017) articulates that "a greater engagement with everyday spatial practices provides critical insights into how claims to urban space and the exercise of rights are inherently gendered." Analysis of the everyday can illuminate the small details of women's daily habits that have significant impacts on their well-being and inclusion in urban spaces and communities. Vaiou and Lykogianni (2006) argue that although the neighborhood is an essential site of analysis for understanding women's identities, it is overused and takes focus away from the spaces women use outside the neighborhood. A more comprehensive analysis of the complexities of women's everyday

lives is essential to understanding their daily spatial practices as caretakers, workers, and leisure seekers and conceiving the wide range of spaces where women's rights are challenged, denied, or asserted (Beebeejaun, 2017).

Determinants of Gendered Mobility Experiences



An illustration of various factors that shape women's travel behaviors in New York City.
Source: Author

Guided by scholarship demonstrating the importance of analyzing women's mobility patterns through the everyday lens, the following topics are areas of focus for examining gendered mobility patterns. The chapter following provides an analysis of data collected on New York City travel patterns to illustrate how these dynamics play out in New York's urban environment.

Trip chaining

A standard definition of a 'trip' in transportation planning is a journey from a single origin to a single destination, typically using one form of transportation. Trip chaining adds complexity to the definition of a trip, describing a travel behavior where individuals link short stops into their trips (McGuckin & Murakami, 1999). While the term is generally used to

describe intermediary stops during a work commute, it can also be used to understand a greater range of commute patterns, such as commuting for child care, leisure, or other household or caretaking responsibilities. Existing research on trip chaining examines trip directionality, timing of travel, and trip purpose with specific attention to gender differences. This research overwhelmingly concludes that women are more likely to make short stops during their commutes to perform household responsibilities, such as shopping and errands. Working women are twice as likely as working men to transport school-age children during their commute. While men do engage in trip chaining and they have added more stops into their commutes to transport children and run household errands in recent decades, they are most likely to trip chain to stop for a meal or coffee on their way to work (McGuckin & Murakami, 1999).

Despite the demonstrated understanding of trip-chaining as a gendered mobility phenomenon, data collection on trip chaining at the city level is extremely limited. Trip chaining is best understood through travel diary data collection, which can be expensive to collect and burdensome for participants. The National Household Travel Survey (NHTS) provides the most comprehensive travel diary data to understand travel patterns across the United States, but the sample size for transit users is too small to extract statistically significant findings on trip chaining (Los Angeles Department of Transportation, 2019). In addition, the quantitative nature of the survey can not provide details on trip chaining. For example, while quantitative data can say that someone trip chained, it cannot say that a caretaker stopped at the pharmacy before walking to their child's daycare center before carrying a stroller down two sets of subway stairs on their way home from work. Only a combination of quantitative and qualitative methodologies can illuminate these nuances to understand the complexities of trip chaining.

Commute trip length

As critiqued by feminist geographers, differences in trip length between men and women are primarily understood through the context of childcare and work commutes. Research indicates a relationship between "sex segregation and commute distance, with women in female-dominated jobs traveling shorter distances and working closer to home than men" (Gilbert, 1998; Hanson & Pratt, 1992, 1995; Johnston-Anumonwo, 1988). Essentially, it is advantageous or necessary for women to find work closer to home because women are more likely to serve as primary caretakers, and there is a strong correlation between shorter trip length and childcare responsibilities for women, particularly for mothers of young children. Research indicates that low-income mothers often utilize informal networks within their neighborhoods to access job opportunities and opt for localized job hunts to mitigate transit costs of more distant jobs. (Chapple, 2001; Gilbert, 1998; Hanson & Pratt, 1995; Holzer & Reaser, 2000). However, as demonstrated by feminist geographers such as Hillman and Whalley (1977) and Vaiou and Lykogianni (2006), transportation studies have heavily focused on work-related travel, and research must shift its focus to understanding commute trip lengths through a wider lens to understand distinctions of women's trip lengths for non-work travel.

Mobility of care

Inés Sánchez de Madariaga coined the term ‘mobility of care' in response to how transportation planners' analysis of travel purposes does not account for the trips women complete to care for others. This is not to say that women are the only people in caretaking roles, but that women predominantly do caretaking tasks. In the United States, women are responsible for over half of all household tasks and caretaking responsibilities (Gallup, 2020). To categorize travel patterns otherwise concealed in data collection, Sánchez de Madariaga defines mobility of care as a "category that allows us to quantify and to make visible the trips that people do for the upkeep of life and the caring of others in the city" (Sánchez de

Madariaga, 2023). Standard transit surveys "obscure the number of trips caregivers (particularly parents or, more likely, mothers) take; that serial trips [otherwise referred to as chained trips], which women make more often than men, aren't sufficiently defined; and that aggregated ridership figures, particularly by race, create incomplete pictures of the riding public." (Los Angeles Department of Transportation, 2019).

Safety

Psychological barriers constraining women's mobility are shaped from a young age and influence mobility choices into adulthood. Parents generally allow their sons more agency over their movements in urban spaces than their daughters, who are perceived as more vulnerable to "stranger danger" (Loukaitou-Sideris & Sideris, 2009). Social attitudes that dictate girls should be kept closer to home because of perceived safety risks transcend into women's everyday mobility and result in their underrepresentation in public spaces (Rosenbloom & Fraissard, 2009). The experience of fear that permeates women's routine travel decisions is based on this social conditioning, as well as lived experiences of harassment and violence on sidewalks, streets, and transit systems (Los Angeles Department of Transportation, 2019).

Fear and experience of harassment on public transportation is a near-universal experience for women. Women transit riders are often victims of a wide range of offenses of a sexual nature (verbal, non-verbal, and physical) on buses and trains, as well as at train stations, bus stops, and surrounding spaces (Fenster, 2005). Onboard surveys conducted by transit agencies to measure transit riders' experiences indicate that sexual harassment in transit spaces is significantly underreported. A 2007 survey of New York subway riders found that 63% of respondents had been sexually harassed at some point during their subway commute. However, 96% of individuals harassed did not contact the New York Police Department or the Metropolitan Transit Authority to file a report (Stringer, 2007). A more recent 2018 survey conducted by the NYU Rudin Center for Transportation indicates similar patterns, with 78% of

female respondents experiencing some form of harassment or theft while using public transportation, and approximately 86% of those who experienced harassment did not report the incident to authorities (Kaufman et al., 2018). Perceptions of safety are also not uniform across socioeconomic groups of women. Older women feel less safe in public settings than younger women (St. John & Healdmoore, 1995), and low-income women and women of color experience greater fear walking around their neighborhoods (Madriz, 1997). Additionally, women with physical or mental disabilities and LGBTQ women are more fearful of assault in public spaces (Alexander & Pain, 2012; Yates & Ceccato, 2020). Safety concerns have severe implications for women's transit use and mobility. Women may change their travel habits by only traveling with others or deciding against travel, and wealthier women may choose private transportation over public transit (Loukaitou-Sideris, 2014). Women may also choose not to make trips or avoid public spaces they perceive to be unsafe (Loukaitou-Sideris, 2009).

Cost concerns

Safety and caretaking responsibilities also have financial implications for women's mobility. A 2018 report by the NYU Rudin Center for Transportation, *The Pink Tax on Transportation: Women's Challenges in Mobility*, applied the pink tax, or "the gender-based price discrimination concerning the upcharge women pay for specific products and services," to transportation services (Kaufman et al., 2018). The study found that the median extra costs per month due to safety reasons for women in New York City is $26-$50, as compared to men's average spending of $0. In addition, caretaking adds $26-$50 for caretaker trips, with some estimates reaching up to $100 per month. Kaufman et al. (2018) argue that these costs are generated by using alternative modes of transportation at night for safety and taking additional trips, including taking elderly relatives to appointments and transporting children to school.

Impacts of Intersectionality

The mobility gender gap for women in the United States is also more pronounced across specific demographics. Challenges related to cost, mobility of care, safety, and accessibility have a disproportionate impact on the daily mobility decisions of vulnerable groups such as low-income, young, disabled, and immigrant women (Wachs, 2009). For example, researchers have found that while white women in the U.S., on average, have shorter commute times than men, African American and Latina women have longer commutes than men as a result of racially segmented housing and labor markets (McLafferty & Preston, 1991). Women with disabilities must prioritize accessibility in their transportation choices, which can severely limit the modalities and destinations available to them. Education and income also play a significant role in differentiating between women, with educated and high-income women having greater access to more mobility choices (Loukaitou-Sideris, 2014). These differences are only a few examples of the mobility differences across intersectional identities. Although research on intersectional mobility demonstrates apparent differences across social and economic groups of women, intersectionality is insufficiently addressed in mobility planning. As a result, mobility solutions lack the depth and sensitivity afforded by an intersectional lens to meet community needs. Without prioritizing the voices and perspectives of women of diverse racial, economic, and social backgrounds in planning processes and decision-making, urban mobility systems will continue to perpetuate and exacerbate existing inequalities.

Gender-Responsive Transportation Policy?

Despite the apparent differences in women's mobility and corollary implications for their economic and social well-being, policy responses to address gendered transportation inequities have been very limited, particularly in the United States. A survey of 131 U.S. transit agencies showed that less than one-third of the agencies identified the need for transit services to address women's needs. Only three agencies had instigated identified

programming (Loukaitou-Sideris & Fink, 2009). While national and citywide travel surveys can highlight the broad differences between men's and women's mobility differences, few urban transportation agencies have dedicated resources to develop quantitative and qualitative understandings of women's travel needs in the context of their city and the existing data on women's experiences is largely created by researchers interested in studying the topic, not city planners (Chapman & Grant, 2023). While this data collection is valuable, transportation agencies must integrate gender-responsive policies and data collection into their work to facilitate meaningful change.

While there are more examples of efforts to collect data from women about their mobility experiences in foreign contexts (see World Bank Group, 2020; Transport for London, 2012), Los Angeles is leading the movement to integrate gendered data into large-scale planning practices in the U.S. In 2019, the Los Angeles Department of Transportation conducted a landmark survey and analysis of women's travel needs that became a report entitled *Changing Lanes: A Gender Equity Transportation Study* (Los Angeles Department of Transportation, 2019). The report detailed the unique challenges women in Los Angeles face in accessing safe and affordable transportation options for personal and work-related travel. The study also examined how income and race influence these access challenges. *Changing Lanes* is the first large-scale, gender-focused transportation study conducted by a U.S. city transportation department . By utilizing surveys, focus groups, and interviews, the study emphasizes the need for qualitative data to encapsulate the reality of mobility for women and inform a more inclusive transportation planning policy.

New York City transportation agencies have yet to adopt gender-responsive mobility approaches. However, the city has indicated a commitment to advancing gender equity with the creation of the NYC Commission on Gender Equity in 2020 and a $43 million investment announced in January 2024 intended to make New York a "national leader on gender equity... with the ambitious goal of becoming the most women-forward city in the United States." (City of New York). *Women Forward NYC: An Action Plan for Gender Equity* outlines a plan to

leverage investments to tackle gender disparities and promote opportunities for women and gender diverse New Yorkers in economic mobility, women's health, and public safety and housing stability. The plan does include a campaign to encourage women, transgender, and gender-expansive New Yorkers to "embrace cycling as a healthy and accessible transportation option," but this is the extent of the plan's inclusion of gender-responsive mobility interventions. Although transportation is currently not a priority focus of the gender equity initiative in New York City, the recent investment in gender equity provides optimism that gender-responsive mobility planning can, and must, be a focus of future transportation planning for New York to realize its ambitious gender equity goals.

Methodology

The methodology of this research integrates analysis of existing datasets, a mobility survey designed and implemented for this research, and expert interviews to understand women's mobility choices and the landscape of gendered mobility in New York City. The first two methodologies, existing data and mobility survey analyses, were implemented to assess the effectiveness of data collection tools to understand women's mobility decisions. The second approach, expert interviews, explores the ongoing efforts of women working in gender equity advocacy and transportation planning. Their contributions supplement the analysis of women's mobility patterns to demonstrate how women's advocacy shapes mobility planning in New York City and other urban contexts.

Review of Existing Datasets

The methodology involves a thorough review of two previously existing mobility datasets, the National Household Transportation Survey (NHTS) and the New York City Department of Transportation Citywide Mobility Survey (CMS). These datasets were selected for their ability to be gender aggregated and their inclusion of trip diary results. Trip diaries, which use smartphone applications to track travel patterns, provide accurate data on trip routes, frequencies, and purposes. This approach, paired with the supplemental questions integrated into the survey, makes trip diaries an effective quantitative tool for measuring urban mobility patterns. These two datasets are among the few publicly available to examine mobility in New York City and provide valuable insights into the mobility patterns of New Yorkers, albeit without intentional focus on capturing gendered mobility differences.

Gender-Responsive Mobility Survey

To demonstrate how a mobility survey designed with a lens focused on gendered differences can better illuminate women's unique travel habits and needs, I deployed a

mobility survey targeted toward New Yorkers of all genders. The survey was designed to capture various aspects of mobility, including modes of transportation, trip purposes, perceived safety, and experiences of traveling for work and with dependents. Survey questions were informed by scholarship on gendered mobility patterns discussed in the preceding literature review chapter, survey strategies deployed by the Los Angeles Department of Transportation in developing the *How Women Travel* report (Los Angeles Department of Transportation, 2017), and New York City mobility surveys, including the Citywide Mobility Survey and Physical Activity & Transit Survey (NYC DOT, 2019; NYC Department of Health and Mental Hygiene, 2010). The survey was supplemented with open-ended response questions to allow respondents to provide additional feedback and comments on safety and accessibility, traveling with dependents, and general mobility decisions. The survey was distributed to New York residents via social media platforms (Instagram, Facebook, and LinkedIn), postering around Columbia University, word of mouth, and direct emails to business improvement districts and community groups.

Expert Interviews

To supplement the data analysis, I conducted five expert interviews to facilitate in-depth discussions with professionals with expertise in transportation planning and gender equity advocacy. These interviews provide valuable perspectives on the intersectionality of gender and mobility within the context of New York City, as well as gender-responsive mobility initiatives in other U.S. cities and abroad. I focused outreach to experts who have demonstrated experience in advancing gender-equitable transportation interventions and policies and New Yorkers working to make parents and caretakers' mobility needs more visible in the city. The interviews were conducted using semi-structured protocols, allowing flexibility to explore emergent themes and delve into specific areas of interest.

Data Analysis

Existing Data

This first part of the data analysis section examines existing public data sets that measure the travel behaviors of New York City residents, including the National Household Travel Survey (2017) and the New York City Citywide Mobility Survey (2019). While these surveys were not designed to address gender disparities specifically, they can be gender-aggregated. The proceeding part of the analysis section details findings from a small-scale survey conducted for this thesis research to provide an updated comparison against the previously existing datasets.

National Household Travel Survey (NHTS)

The NHTS, conducted by the Federal Highway Administration, is the only source of national transit data (Federal Highway Administration). It includes all non-commercial travel and characteristics of American travelers and their households. The 2017 NHTS is the latest available dataset containing geographic information on survey respondents. The smallest unit of analysis pertinent to New York City includes respondents residing outside the city boundaries in Rockland, Westchester, and Putnam counties. Findings from the analysis of this dataset have been included despite this significant limitation to demonstrate the importance of scale for gender-responsive mobility analysis. The NHTS surveyed 10,922 residents from the New York MSA, comprising 53% female and 46% male residents.[1] Gender-diverse residents account for the remaining one percent of respondents, but considering this small sample size, only the results of female and male respondents are analyzed here. The respondents are predominantly white (78.8%), Black or African American (7.3%), and Asian (6.6%).

[1] Note: The NHTS and CMS both use male and female as gender categories. I decided to use these terms to reflect the survey's structure. I recognize that male/female divisions cannot be used interchangeably with man/woman and this is a severe limitation of this section as I draw conclusions about women's habits based on data examining females' experiences. However, the Gender-Responsive Mobility Survey implemented for this research uses the terms man, woman, and gender diverse to describe gender categories.

Travel Patterns

Analysis of travel modes for the NY MSA highlights the challenge of drawing conclusions about New York City travel habits at this scale. Driving is by far the most common mode of transportation according to the trip survey, with over 70% of both male and female respondents using personal cars for daily trips. This does not reflect New York City, where over half the population does not own a car, and cars are not a highly preferred mode of transportation, as will be demonstrated in the analysis of the Citywide Mobility Survey and Gender-Responsive Mobility survey (Komanoff, 2023). As shown in Figure 1 below, mode selection is largely consistent between genders. The most significant difference in mode selection that may be pertinent to New York is the difference in bike ridership. While only 0.5% of females utilize bicycles to commute, 1.2% of men use them. This finding is consistent with literature on bike usership which indicates females are less likely to ride bicycles in cities because of heightened fears of infrastructural safety. However, the percentage difference is relatively small, and gender disparities across modes are better evaluated at a smaller scale within New York City boundaries. Trip purposes (Figure 2) are also broadly consistent across genders. Females took 3% more trips for 'shopping/errands' and men took 3% more trips for 'work', and although not significant differences, these disparities could indicate females are completing more household related trips. Findings were consistent across race, income, and age.

Figure 1. Modes of Transportation Logged in NHTS Travel Diary, NY MSA, by Gender (n= 10,922)

Gender	SUV	Car	Taxi/ Rideshare	Subway	Rail	Bus	Boat/Ferry	Bicycle	Walking
Female	26.8%	44.7%	0.9%	4.2%	1.1%	2.3%	0.2%	0.5%	18.6%
Male	24.9%	46%	0.9%	3.7%	1.7%	1.8%	0.2%	1.2%	18.4%

Data Source: NHTS (2017)

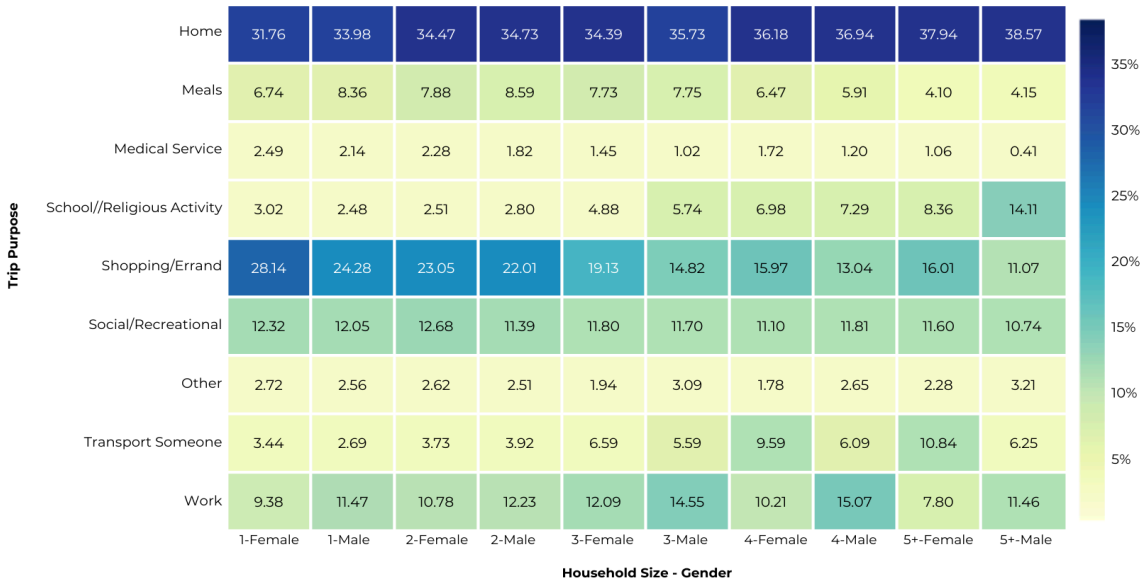
Figure 2. Trip Purpose as Logged in NHTS Travel Diary, NY MSA, by Gender (n= 10,922)

Gender	Home	Shopping/ Errands	Social/ Recreation	Work	Meals	Transport Someone	School/ Daycare	Medical Care	Other
Female	35%	21%	12%	10%	7%	6%	4%	2%	3%
Male	36%	18%	12%	13%	7%	5%	5%	1%	3%

Data Source: NHTS (2017)

The NHTS does provide insights into differential travel patterns across household sizes. As household size increases, there are more significant gendered differences between the rate of trips for 'shopping/errands' and 'transporting others'. While the share of trips for 'shopping/errands' is relatively equal for males and females in two-member households, the percentage difference between females' and males' 'shopping/errands' trips increases as household size increases (Figure 3). Females are also slightly more likely to take trips to 'transport someone' in households larger than two members. While these findings must be validated by analysis at a smaller scale within New York City boundaries, they support scholarship on mobility of care, indicating that household and caregiving responsibilities impact women's travel habits.

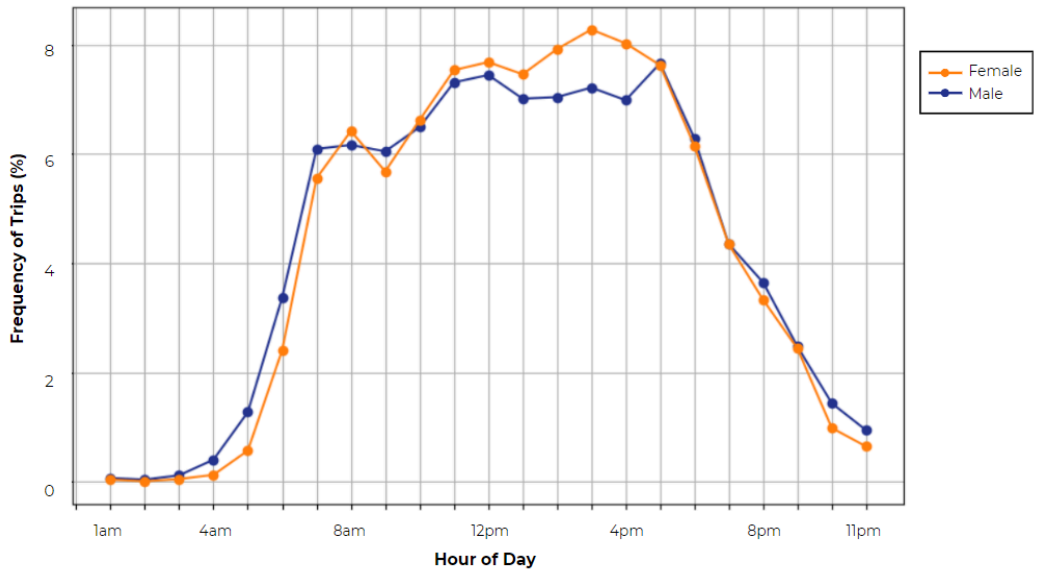
Figure 3. Trip Purposes Logged in NHTS Travel Diary, NY MSA, by Gender and Household Size (n= 3,346)



85,459 total trips
Data Source: NHTS (2017)

The NHTS also provides supportive evidence for gendered trip-chaining behaviors. Females are 5% more likely than males (40% and 35%, respectively) to make at least one stop during their commute, consistent across race, age, and income. However, there were surprisingly few differences between males and females regarding trip travel times throughout the day. While literature suggests women take fewer trips after dark, the trip diary shows that survey respondents' trip start times were broadly consistent. Males were less than 0.5% more likely to travel after dark than females. I hypothesize that this consistency is more representative of populations with access to personal cars, where traveling after dark presents fewer safety risks often associated with public transportation. As demonstrated in the proceeding analysis, a survey targeted towards New Yorkers contradicts this finding and indicates that women are less likely to travel after dark.

Figure 4. Trip Start Times of Travel Diary Trips, NHTS, by Gender (n= 3,346)

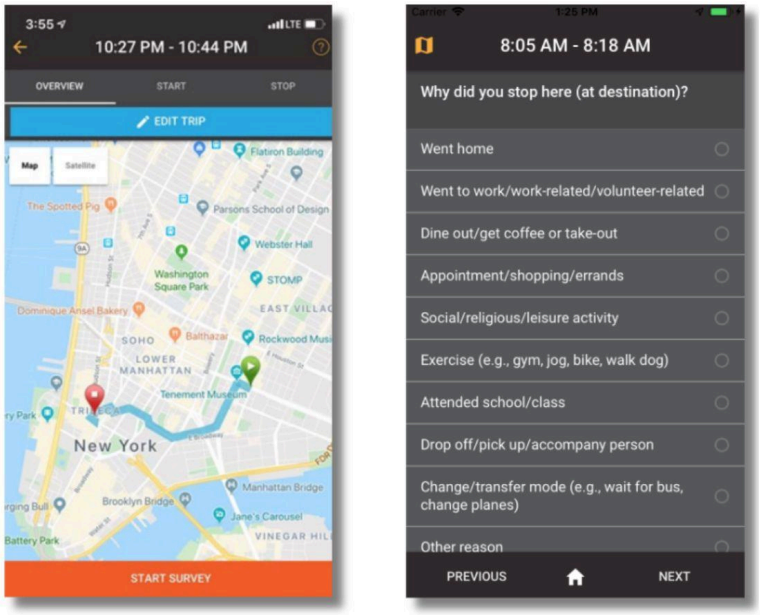


85,459 total trips
Data Source: NHTS (2017)

Citywide Mobility Survey (CMS)

The CMS is a mixed methodology survey of New York City's residents' travel behaviors conducted by the NYC Department of Transportation. The survey has been conducted since 2017, with the most recent dataset available from 2019. The results of a smaller-scale survey, *Citywide Mobility Survey: Transportation Impacts from COVID-19*, was released in 2020 to measure the impacts of COVID-19 on travel behaviors. The 2019 data is examined here as the generalized survey questions are more appropriate for the scope of this research, as the 2020 release focused specifically on COVID-19's impacts on mobility. (New York City Department of Transportation, 2020). Although NYC DOT's website indicates the survey is conducted annually, there is no evidence that the survey has been conducted since the 2020 release.

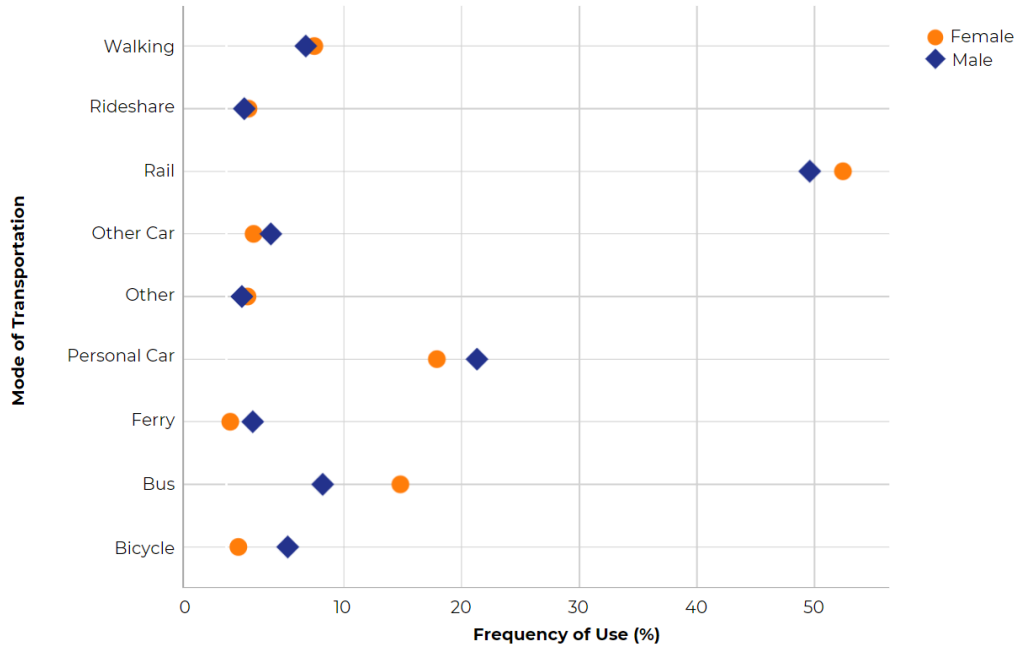
In contrast to the NHTS, the CMS is geographically specific to New York City. Data can be aggregated into ten survey zones within the city's five boroughs and further analyzed by gender, race, age, and income. Based on research into existing New York City datasets, the CMS is the most comprehensive public dataset that can be gender aggregated to provide information about New York City residents' trip modes and purposes, work commutes, and experiences of harassment while traveling in the city. The 2019 survey sample includes 3,346 participants who logged 18,459 trips over a 7-day period and answered additional questions about their travel habits via a digital or phone survey. The respondents comprised 55% female, 44% male, and .5% nonbinary New Yorkers aged 18-75. Approximately 46% of respondents identified as white, 16% as Black, 13% as Asian, and 25% as two or more races or 'other' (New York City Department of Transportation, 2019).



NYC Department of Transportation 2019 Citywide Mobility Survey Travel Diary Interface (Source: NYC DOT)

According to the survey's trip diary, male and female respondents took an average of 4.2 daily trips. Rail is by far the most preferred mode of transportation among respondents. Females were more likely to use a bus, with 14% of trips made via bus, compared to only 8% for males. While 5% of males chose to ride a bicycle to travel, only 1% of females did so (Figure 5). Across geographies, while rail was the most preferred mode of transportation overall, Staten Island, Northern Bronx, and Outer Queens residents were most likely to commute to work by personal car. Residents in all other survey areas were most likely to commute to work by rail.

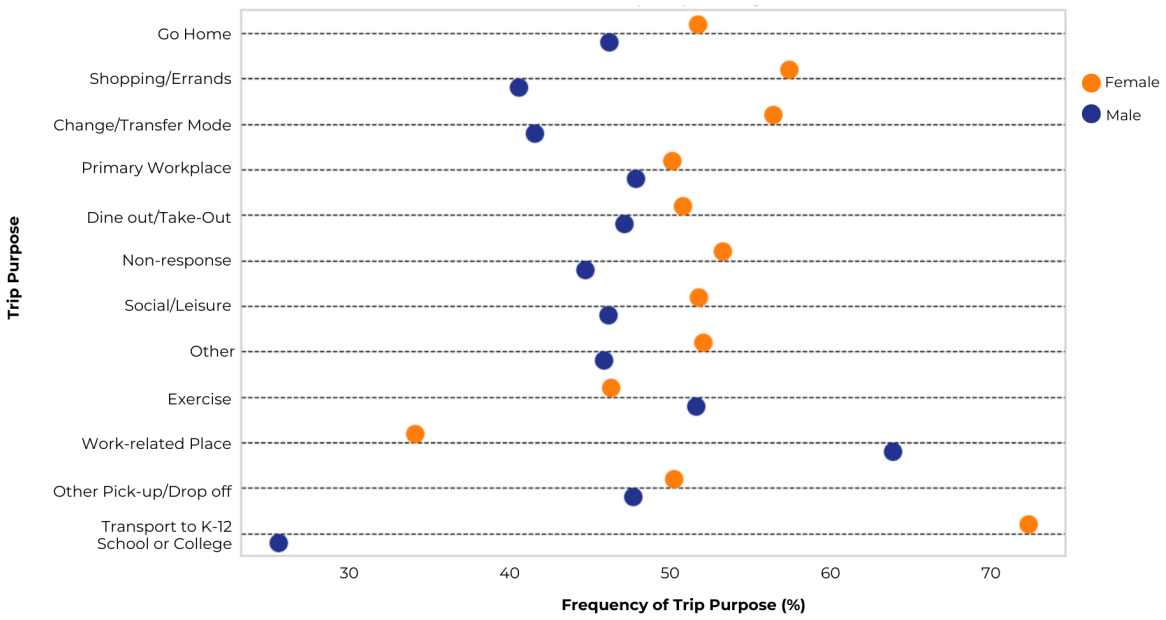
Figure 5. Modes of Transportation Logged in CMS Travel Diary, by Gender (n=3,346)



85,459 total trips
Data Source: NYC Citywide Mobility Survey (2019)

The survey highlights more significant differences across gender in terms of trip purpose. Figure 6 shows the percentage split between males and females for the twelve most common trip purposes. Males completed 60% of all work-related trips logged in the travel diaries. Females were more likely to take trips for activities categorized as mobility of care trips, taking 16% more trips for appointments/shopping/errands, 17% more for transporting a child to preschool or a babysitter, and 45% more for transporting a dependent to school. Additionally, females were more likely to change or transfer modes (58% for females, 40% for males). While more information is needed to understand the nature of these mode changes, it could suggest that females are trip chaining at a higher rate.

Figure 6. Trip Purposes Logged in CMS Travel Diary, by Gender (n=3,312)



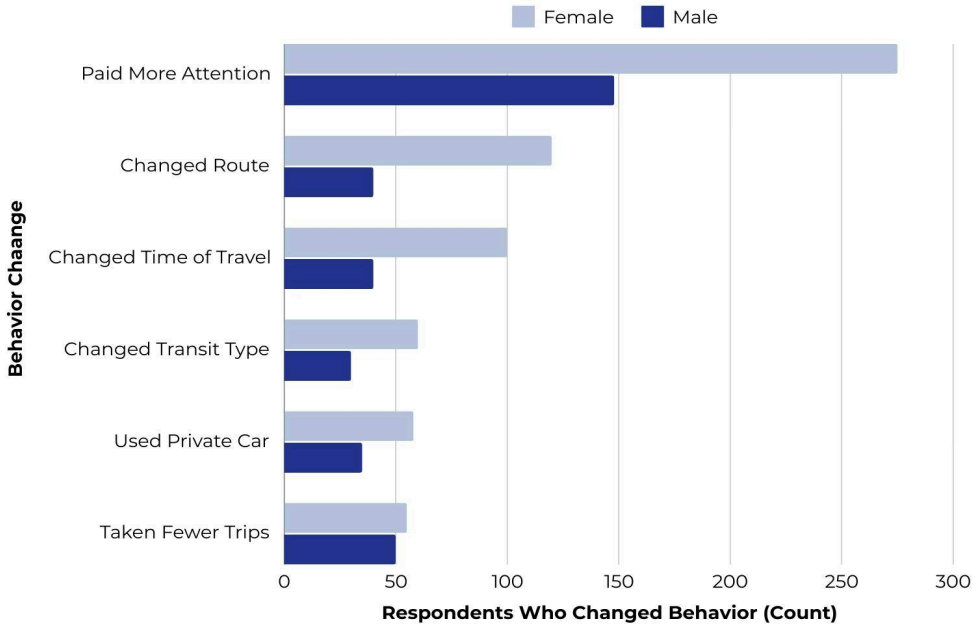
85,459 total trips
Data Source: NYC Citywide Mobility Survey (2019)

Experiences and fear of harassment and violence on transit

As demonstrated in the literature review section, harassment is a common concern for women navigating New York City. The CMS sought to understand experiences of harassment and its impacts on New Yorkers' mobility decisions. When asked if they had seen or experienced harassment or violence while traveling in NYC in the past week, males and females had similar responses. While over half of respondents had neither seen nor experienced harassment or violence, 7% of females and 4.9% of males had seen and experienced harassment or violence, and 18.9 and 16.9% of females and males, respectively, had seen harassment or violence in the past week. I hypothesize that the results of this question would likely be very different if respondents were asked if they have *ever* experienced harassment or violence while traveling around NYC.

Despite having similar responses about experiences of harassment or violence in the past week, when asked if experience or fear of harassment or violence changed their travel behaviors, 14% of females changed their travel behaviors, compared to only 7% of males.

Figure 7. Transit Behavior Changes Due to Experiences/Fear of Harassment, by Gender (n=3,312)



85,459 total trips
Data Source: NYC Citywide Mobility Survey (2019)

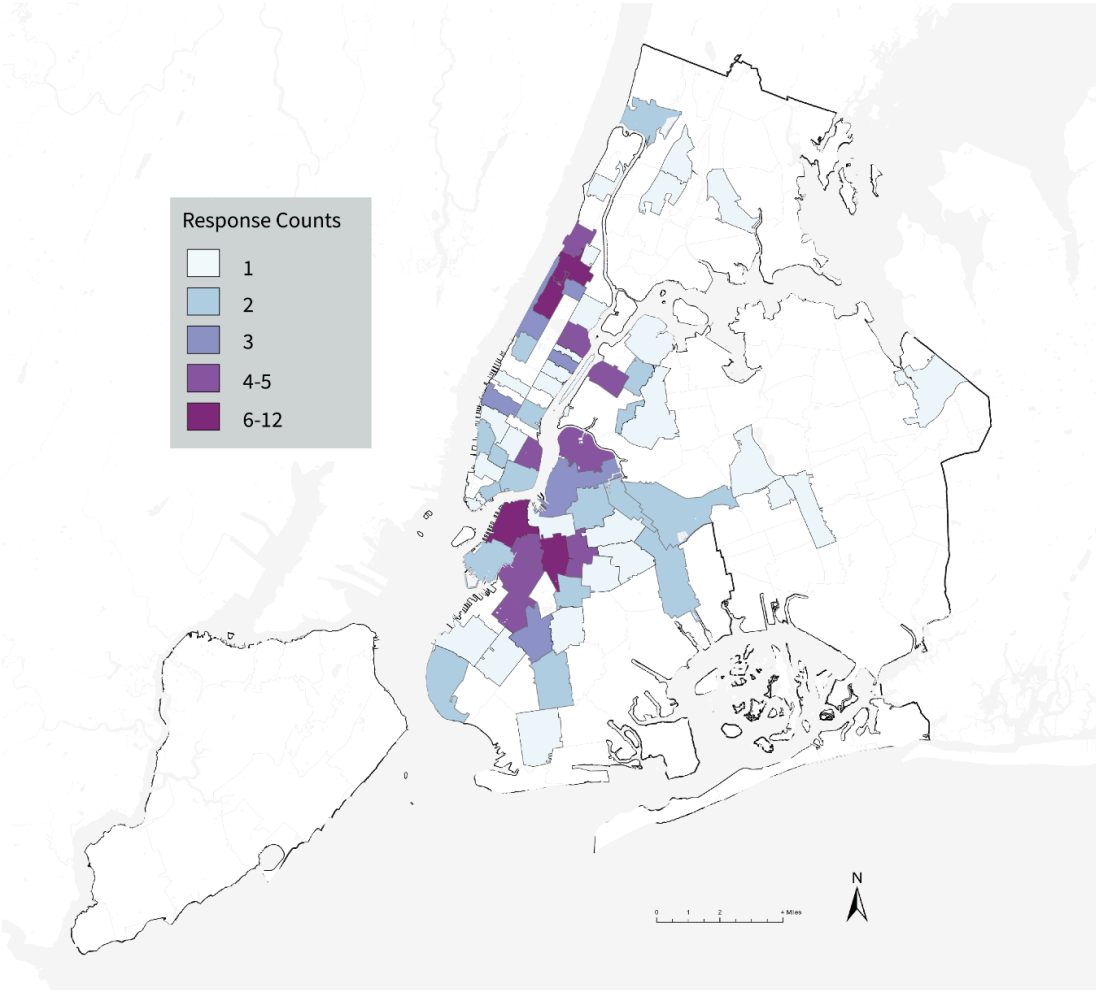
The most common behavior changes were paying more attention to surroundings and others, changing routes, changing time or avoiding nighttime travel, and reducing the use of public transit (Figure 7). White females were most likely to change their behaviors (57% of white female respondents), followed by Black/African American females (51% of Black/African American females). This could indicate that white females are more impacted by fear or experience of harassment or violence, but it could also be indicative of the survey sampling. Considering the survey consisted of over 70% white females, this finding could indicate that a larger sample size correlates with an increased rate of behavior changes. This hypothesis needs to be confirmed by conducting this research with a more equitable sample of women who do not identify as white. Geographically, females residing in the Bronx and lower Manhattan were most likely to alter their travel patterns across the four categories (see Figure 23 in the appendix). However, it is important to note that these sample sizes are small, and further research is necessary to understand how geography impacts behavior changes.

Gender-responsive Mobility Survey

To gain further understanding of gendered mobility decisions of New Yorkers, I deployed a brief survey, the *Gender-responsive Mobility Survey*, designed to capture gendered mobility differences. The survey was available for six weeks during early February through mid March 2024. Consisting of 32 questions and requiring an average of 5-7 minutes to complete, the survey collected information about respondents' travel habits and demographic information. To incorporate gender responsiveness, the survey was designed with gender-inclusive language, included questions about traveling with dependents, trip-chaining habits, safety concerns, influences on modality choices, and provided opportunities for open-ended responses to encourage qualitative supplements to the quantitative analysis. Additionally, the survey was advertised to promote gender equity, which I hypothesize encouraged women to participate and approach the survey through a gendered lens. The survey did not request any personally identifiable information. See Figure 18 in the appendix for a complete list of survey questions.

The survey received 176 survey respondents. The map below (Figure 8) illustrates the geographic distribution of survey responses based on zip codes. The demographic profile of the survey sample is a subset of the New York City population that is not representative of the diversity of city residents. The survey consists of 68.8% women, 29% men, and 2.3% New Yorkers who identify as non-binary or 'other gender.' Respondents are predominantly white (58.3%) and Asian or Pacific Islander (22.6%). The remaining respondents identified as 'other race' (6.9%), Black or African American (4.3%), or Hispanic/Latino (3.2%). Most survey respondents have higher annual incomes than the average New Yorker, with 46% earning over $100,000 annually, above the $76,607 median income in New York City (U.S. Census Bureau, 2020). The respondents are also highly educated, with over half of respondents (55%) holding a master's degree or higher. See Figures 19-22 in the appendix for a detailed breakdown of survey respondents' income, education, and age distribution.

Figure 8. Geographic Distribution of Gender-Responsive Mobility Survey, by zip code (n=176)



Data Source: Gender-responsive Mobility Survey (2024)

Mode Preferences and General Travel Behaviors

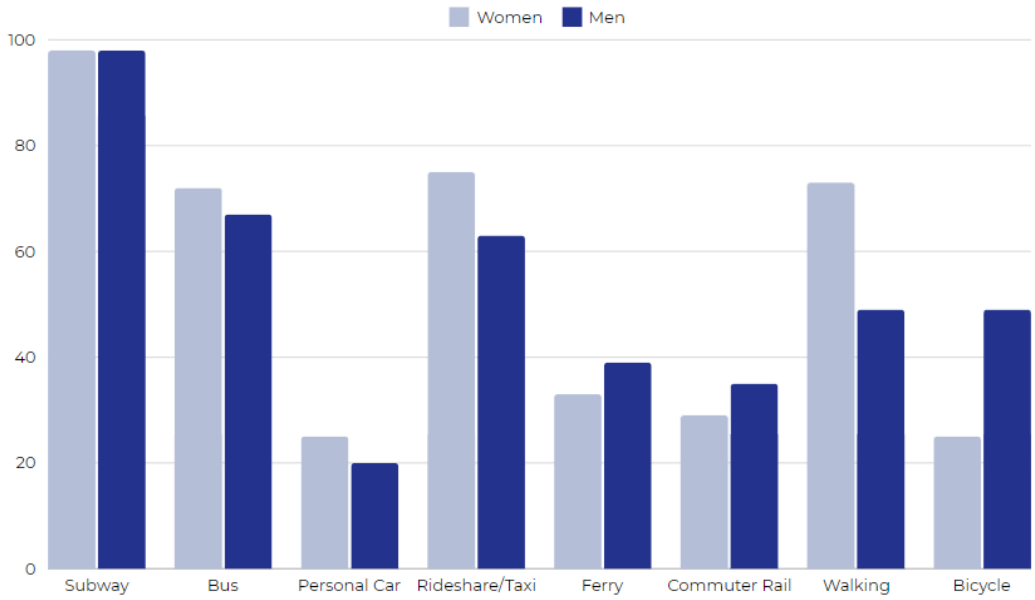
The survey collected information about respondents' routine travel habits, including modal usage and preferences, motivation to use public transportation, and frequency and time of travel and transit use. On average, men and women take 11 trips per week.[2] The number of average weekly trips is consistent across race, income, and age.

[2] The survey provided an example of a trip to guide participants' response. The example was "Example of ONE trip would be going to the grocery store and returning home." The intent was to prevent respondents from double counting trips, but there is potential for different interpretations of what constitutes a tip.

Modality Usage and Preferences

Figure 9 indicates women and men use most transportation modes at similar rates. Women are more likely to walk and use rideshare services, and men are slightly more likely to ride bicycles to get around. Most respondents (64%) chose the subway as their preferred mode of transportation, followed by walking (22%). While mode preferences are relatively consistent for men and women, there are differences in preferences for women across income. Women who earn more than $100,000 are the only respondents who selected personal cars as their preferred mode of transportation. All women earning less than this selected subway, bus, or walking as their preferred mode.

Figure 9. Modes of Transportation Typically Used by Survey Respondents, by Gender (n=176)



Data Source: Gender-responsive Mobility Survey (2024)

Mode Selection Motivations

While men and women's overall highest priority is time savings (56.8% of men, 40.5% of women) and cost (15.7% of men, 24% of women), women prioritized safety and accessibility at higher rates. As one 25-34 year old man shared, "Reliability and frequency of service is the most important. It affects every other part of commuting. For example, safety is less of an issue if a train is coming in a few minutes rather than 15." Among women, 11.2% selected

accessibility as their highest priority, compared to only 5.6% of men, and 7.1% of women selected safety as their highest priority, compared to only 1.9% of men. The ‘other’ responses highlighted the importance of experience for many respondents. Respondents that wrote in ‘other’ prioritize weather, considerations of traveling with kids or pets, and the number or convenience of transfers. As one respondent explained, “If the train ride is a "transfer" or if I have to change stations to arrive at my destination. I prefer choosing the transfer option even if it takes longer to arrive at the destination." Another respondent wrote, “Sometimes I like to walk even if it takes more time and make stops along the way to just see the sights and sounds (I'm still new-ish to the city).”

Work Travel Patterns

Of all respondents, 120 residents commute to work regularly. Across genders, respondents who commute for work do so a few times a week (63%), with approximately 26% of respondents commuting five days a week. While men’s average commute time is more evenly dispersed among respondents, women were more likely to commute between 15-30 minutes. While the difference between men's and women's work commutes is not significantly different, women’s commute times suggest that research indicating women are more likely to have a shorter work commute applies to New York City travel patterns.

Figure 10. Average Work Commutes, by Gender (n=120)

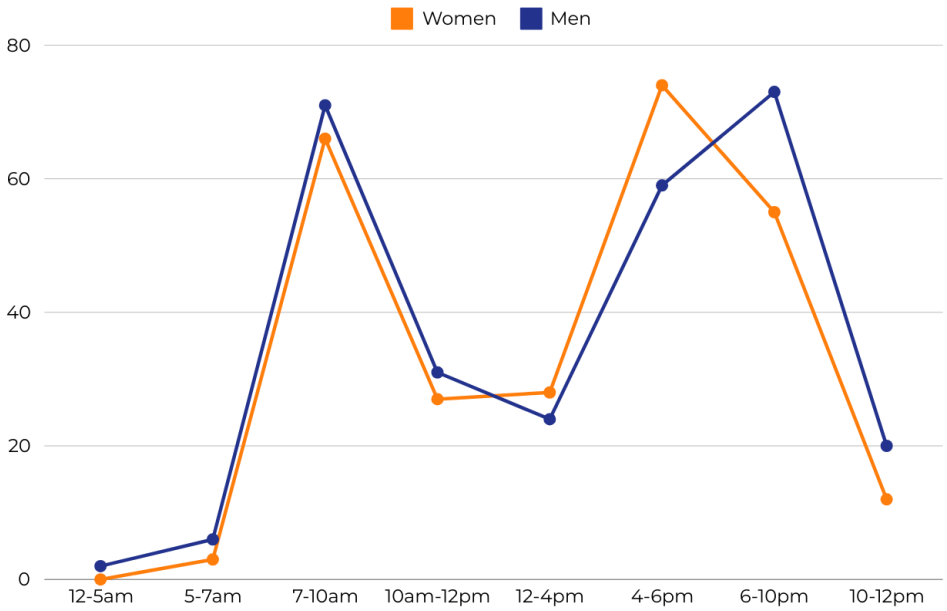
Commute Times	Women	Men
Less than 15 minutes	2.4%	2.7%
15-30 minutes	42.6%	33.3%
30-45 minutes	29.3%	33.3%
45 minutes-1 hour	19.5%	22.2%
1 hour +	6.1%	8.3%

Data Source: Gender-responsive Mobility Survey (2024)

Travel Times

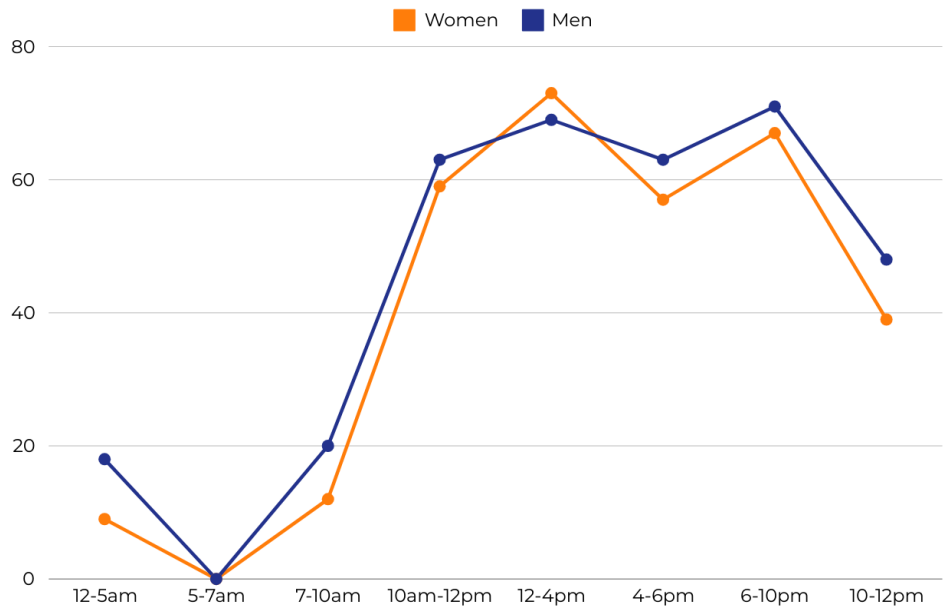
As demonstrated in Figures 11 & 12, women and men travel at similar rates during early morning and daytime hours on weekdays and weekends. However, the results indicate women are less likely to travel after 6 pm, as compared to men. The difference in nighttime travel is particularly notable on weekdays. 73% of men typically travel between 6-10 pm, compared to only 55% of women. Only 12% of women travel between 10 pm-12 am on weekdays, compared to 20% of men. Travel times are less contrasted on weekends, when men are only 4% more likely to travel between 6-10 pm. However, men are still 9% more likely to travel between 10 pm-12 am and 12 am-5 am on weekends.

Figure 11. Typical Travel Times, Weekday, by Gender (n=176)



Data Source: Gender-responsive Mobility Survey (2024)

Figure 12. Typical Travel Times, Weekend, by Gender (n=176)

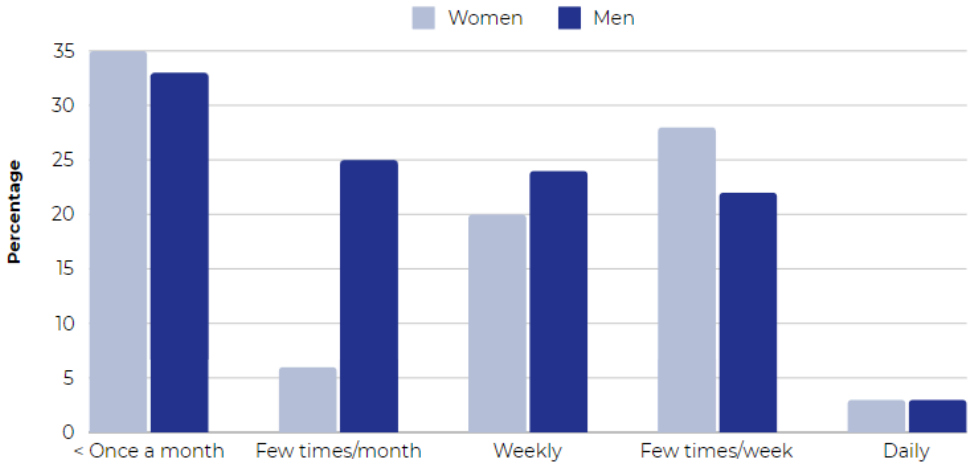


Data Source: Gender-responsive Mobility Survey (2024)

Trip Chaining

As discussed in the literature review, trip chaining describes an intermediary stop that briefly interrupts a commute and is most frequently used in research on work commutes. According to the survey results, men are more likely to trip chain a few times a month, but women are more likely to trip change a few times a week. A quarter of men trip chain a few times a month, compared to only 7% of women. Only 22% of men make a stop a few times a week, as compared to 28% of women (see Figure 13). The survey was not designed to capture more qualitative information about trip chaining behaviors, which is needed to understand why respondents trip chains fully. A trip diary and qualitative methodologies such as focus groups may be better positioned to draw conclusions about trip chaining behaviors.

Figure 13. Frequency of Trip Chaining, by Gender (n=122)



Data Source: Gender-responsive Mobility Survey (2024)

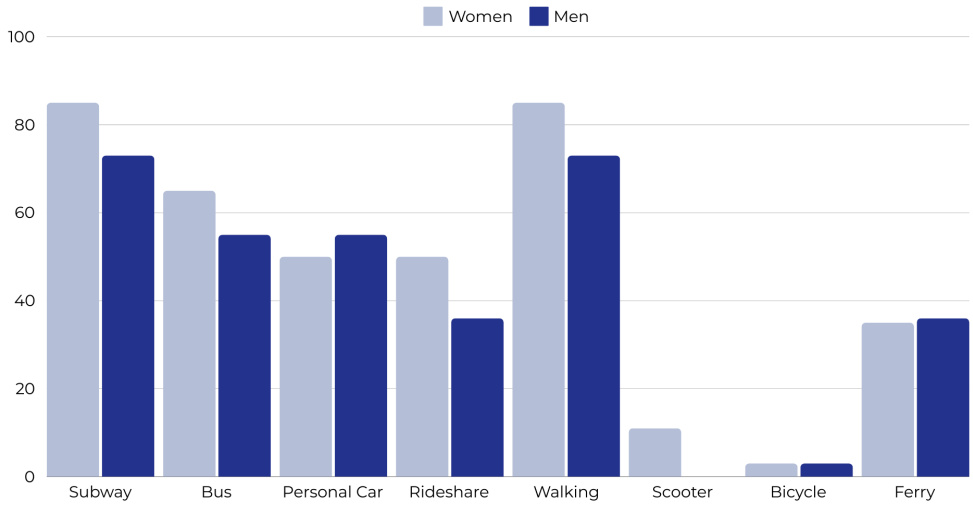
Traveling with Dependents

Of the 176 survey respondents, 40 respondents traveled with dependents, of which 29 were women, and 11 were men. Dependents were defined as children and older adults living in their households who require supervision or an escort on transportation. It is important to note that given the smaller sample size of this respondent subset, the following findings are especially limited in their ability to reflect the experience of New Yorkers who travel with dependents. However, the findings are consistent with scholarship on traveling with dependents and suggest this focus area deserves greater attention in future research.

Of the respondents who travel with dependents, 38% of women and 45% of men travel with dependents daily, and 27% of women travel with dependents a few times a week, compared to 9% of men. Women and men who travel with dependents use modes of transportation at similar rates. As demonstrated in Figure 14, women are slightly more likely to use rideshares or walk to transport dependents. One notable finding is the increased use of the ferry while traveling with dependents, compared to the modes of transportation typically used by the general survey sample. As one 35-44 year old woman shared, “I will always prefer

the ferry when traveling with my kids! I just wish I could take it to more destinations around the city."

Figure 14. Typical Modes of Transportation Used While Traveling with Dependents, by Gender (n=40)



Data Source: Gender-responsive Mobility Survey (2024)

While traveling with dependents, both men and women prioritize safety. Women are more likely to prioritize accessibility and space for strollers. In contrast, men are more concerned with time savings and distance between transit stations and destinations. The survey also allowed respondents to write additional comments about traveling with dependents. Out of the 36 respondents who indicated they travel with dependents, 19 provided additional comments detailing the challenges or factors that shape their travel decisions when traveling with dependents. Some respondents shared their preference for public transit but a tendency to use a personal car when traveling with kids. Others voiced frustration about the subway's accessibility, with one respondent stating, "I avoid traveling outside of my neighborhood when I have my stroller. It's just too difficult and stressful to get around the subway with it." Additionally, respondents shared that other considerations they value include crowdedness, length of waits at stations, availability of car seats in rideshares, and comfort for their dependents. These comments demonstrate a willingness to contribute

thoughtful feedback about travel experiences and demonstrate a need create space for more in-depth conversations with communities through community engagement efforts.

Safety

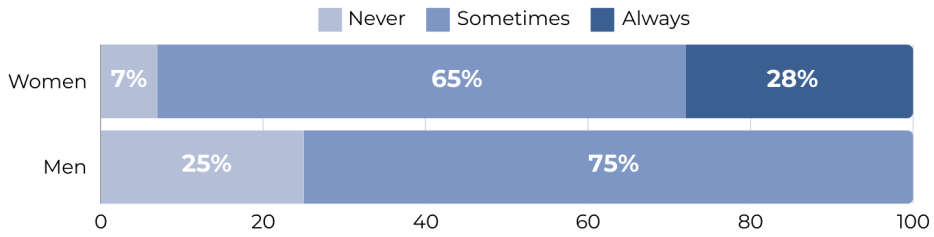
Figure 15. Prioritization Ranking- Safety While Traveling in NYC, by Gender (n=175)

Gender	Ranking of Safety as a Priority				
	1- Not Important	2	3	4	5- Extremely Important
Women	0	6.6%	16.5%	33.9%	42.1%
Men	7.8%	11.8%	35.2%	35.3%	9.8%

Data Source: Gender-responsive Mobility Survey (2024)

Survey respondents were asked to rank safety as a priority while traveling around New York City on a scale from 1-5 (see Figure 15). Most women ranked safety as a high priority (76%), compared to only 45% of men. While 74% of women feel safe during the day, only 27% feel safe while traveling around NYC at night, compared to 48% of men. Most women and men change their travel patterns after dark sometimes, but women are more likely to always adjust their travel patterns. Among women respondents, there are no significant differences in adjusted travel behaviors after dark across income, age, or race. One 25-34 year old woman respondent shared, “I am open to any transportation during the day, but at nighttime, I am willing to pay more to feel safer/get home more quickly.” This sentiment was shared among several women, with seven additional women providing short responses voicing their hesitance to use public transit after dark. Of the seven women, six indicated they choose to use rideshares if they travel after dark to avoid public transit for safety reasons.

Figure 16. Frequency of Travel Pattern Adjustments at Night, by Gender (n=176)



Data Source: Gender-responsive Mobility Survey (2024)

Geography

Place was also a determinant of transportation decisions among respondents. One 24-35 year old woman provided a detailed overview of how her neighborhood impacts her perception of safety and modality choices. She stated, “My safety level is very dependent on which neighborhood I'm in--I've never felt unsafe in my own neighborhood, I know my neighbors, but that gets trickier when navigating spaces I don't know as well, thus not instigating a sense of belonging or security. I also live in South Brooklyn where having a car is almost a necessity-- there aren't Citi bike stations near me, the subway is more than a 10 minute walk. I never used a car before living in this neighborhood, but when there is a real lack of services available, it's often the only option.” Frustration about outer-borough connectivity was shared among two other respondents. Additional respondents also shared their preference for traveling within their neighborhood, citing heightened perceptions of safety and comfort.

Speaking about his experience living in the Bronx, a 25-34 man shared, “Another thing about my commute is that, here in the Bronx, I have to take a bus just to get to the subway line that takes me to work. The other thing you should consider is that a lot of people are really struggling out here. The $2.90 fare is a lot for many people in communities of color, and many can't afford it and are tired of the MTA's delays, filth, over-policing, etc. So, many people also calculate their commute in regards to how they can evade the MTA fare. They won't go to busy subway stations that are overpoliced and prefer to take the bus so they could save

money and help put food on the table for their families." This thoughtful comment highlights the complexity of navigating the transit system, particularly for low-income New Yorkers who live in neighborhoods with limited transit connectivity. The nuances respondents articulate in a brief paragraph also highlight the importance of harnessing qualitative data to understand New Yorker's travel habits. Other methodologies, such as community engagements and focus groups, are potent tools planners must leverage to further investigate the nuances of New Yorkers' travel patterns.

Accessibility

Although a question about accessibility needs was included in the survey, the responses suggest the sample does not represent New Yorkers' diverse accessibility needs. When asked to rank accessibility as a priority when selecting a mode of transportation on a scale of 1 to 5, the average response was 2.4 for men and 2.8 for women. This average ranking is consistent across race, age, and income. As analysis of priority for mode selection highlights, only 11.2% of women and 5.6% of men rank accessibility as their highest priority. Research focused on accessibility in transit systems incorporating tailored outreach to individuals with disabilities who use New York City's transit system would likely be a better space to address accessibility concerns among New York populations who need to prioritize accessibility in their mobility decisions.

However, the inaccessibility of subway stations was noted in seven open-ended responses, with one 45-54 year old male respondent sharing, "Although it doesn't affect me directly, it is extremely jaunting to see how inaccessible our subway stations are being that they are the most used mode of transportation. not sure what the exact statistic is but the fact that every station is not accessible in 2024 is absolutely ridiculous. even when stations have elevators, they are poorly kept and don't work half of the time." Another 35-44 year old woman shared, "Although accessibility isn't my primary concern right now, many of the stations/routes I use are accessibility nightmares, to the point where I'd consider leaving the

area if I developed persistent mobility issues. (I take the PATH to WTC from Jersey City and then transfer to MTA; the PATH elevators are in varying states of dysfunction, and the Oculus is already a labyrinth when able-bodied, not to mention whatever is going on in the NYC subway system.)" While accessibility may not be a high priority among the survey sample, accessibility problems in the subway are a visible reality that concerns transit users and must be better prioritized by public transit agencies.

Expert Interviews

To supplement the quantitative analysis of this research and learn from experts working to advance the visibility of women's mobility needs, I interviewed professionals working in transportation planning, advocacy, and gender policy to understand how gendered mobility influences their work. Their perspectives illustrate how the challenge of bringing gender to the forefront of mobility planning extends beyond a need for more gender-responsive data collection, requiring leaders in planning and advocacy roles to demonstrate how gender-responsive mobility planning enhances transportation systems and urban spaces, not just for women, parents, and caretakers, but for all urban residents.

Advocating for Mobility of Care

The challenges of prioritizing mobility of care in transportation were thoroughly illustrated by experts, particularly in my discussions with Danielle Avissar, an advocate for the NYC Open Strollers program, and Christine Serdjenian Yearwood, founder of UP-STAND, a NYC-based organization advocating for greater accessibility in transportation to benefit pregnant women and families, and member of the MTA Advisory Committee for Transit Accessibility.

As Danielle Avissar put it, she became an advocate out of necessity. A long-time New Yorker, Avissar relied on the subway for most of her transportation needs before becoming a mother. However, as supported by literature and the data analysis in this research,

accessibility in the subway is a serious issue for parents traveling with children, strollers, and bags, and she became more dependent on the bus system to travel with her child. After learning from a bus driver that she was required to fold up her stroller on public buses, she rallied fellow parents to advocate for an open stroller policy on MTA buses. Safety concerns aside, Avissar expressed the difficulty of folding a stroller on a bus while balancing her child and belongings, sharing, “You’d have to have five hands. It's impossible to do and really what it does is that it deters moms from using public transportation. How is that fair?” Alongside other parents, Avissar attended MTA’s public group hearings to share their demands for an open stroller policy and spoke with media outlets to increase the issue's visibility. MTA responded to the demands by working with bus operators, accessibility advocates, and engineers to create designated areas on buses for strollers, in addition to accessibility areas. In 2023, the Bus Open Stroller pilot program was rolled out in the five boroughs on over 1,000 buses. The program's success demonstrates how improvements related to the mobility of care have extensive benefits. Avissar articulated that the program makes transportation less stressful for caretakers and reduces bus operators’ burden to police riders for bringing strollers on board, making bus commutes more comfortable and efficient for all riders.

Danielle Avissar tested a bus open stroller area as part MTA Open Stroller Pilot in 2022. (Source: MTA)

Christine Serdjenian Yearwood's work with UP-STAND seeks to make transportation more accessible for parents, with many actions requiring small interventions to improve transit accessibility. Like Avissar, Serdjenian Yearwood's motivation to work as an advocate stems from feeling that her role as a parent restricted her mobility choices. After seeking community with fellow parents, she discovered she was not alone in this feeling and started UP-STAND as a product company to support pregnant women and families, and the organization grew into an advocacy organization.

UP-STAND's work highlights how small interventions make a significant difference in the lives of parents and caretakers. This is evident in one of the organization's first initiatives, the development of a pin for pregnant women to wear on public transportation so they can get a seat without asking. Serdjenian Yearwood also created a pin for those who want to offer their seat but may be hesitant. In a study of 115 NYC subway riders, the pregnancy pins had a 97% success rate in getting a seat when visibly displayed (UP-STAND). In 2017, the MTA adopted the pregnancy pin idea to create a pilot program for New Yorkers to order pins for free. Even with minimal advertising, approximately 15,000 pins were ordered in the first month. Despite this success, the pilot program was discontinued. According to Serdjenian Yearwood, there were issues with the rollout of the program but it's difficult to understand why an inexpensive initiative that is well received would not be a desirable investment for a public transportation agency.

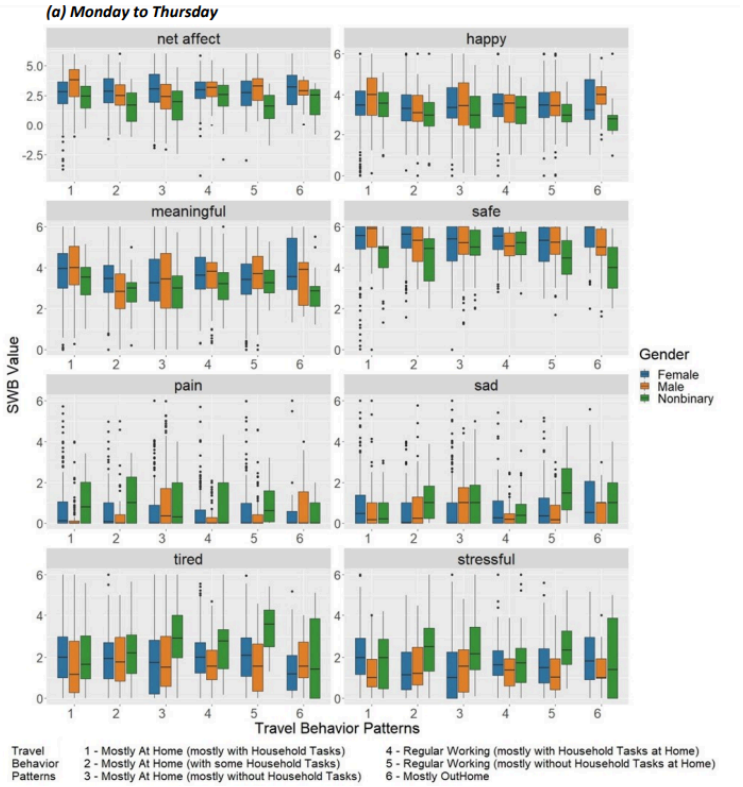
UP-STAND's Pregnancy Awareness Pins (Source: UP-STAND)

Avissar and Serdjenian Yearwood's advocacy demonstrates that advocates must push transportation agencies in New York to prioritize the needs of women and families in transportation planning. When asked how transportation agencies could better respond to parents' and caretakers' needs, both women focused on improvements to accessibility and improved infrastructure for 'family-friendly' transit modes. They would like to see more subway stations with working elevators and escalators, better lighting in transit systems, and expansion of open stroller designs on buses across the city. Additionally, they both explained how expanding access points and routes for transportation, such as the ferries, would greatly benefit families. Both women noted that ferries are family-friendly, allowing space for strollers and easy accessibility and expanded ferry connectivity would provide families with greater mobility within the city. Serdjenian Yearwood also noted that improvements to micro-mobility options, such as adding child seats to bike shares, would allow parents to access other modes of transport.

Lessons from Minnesota

While the impetus for gender-responsive mobility improvements in New York City currently falls heavily on advocates, the Minnesota Department of Transportation has demonstrated how a public agency can utilize data to understand the influence of gender on mobility decisions. I spoke with Hally Turner, Policy Planning Director, and Erika Shepard, Regional Planning Program Coordinator, at Minnesota Department of Transportation about the development of the 2023 study, *Gender Equity in Transportation*, to understand how other U.S. cities are advancing gender sensitivity in transportation data collection. *Gender Equity in Transportation* is the first gender equity study completed by a state transportation department in the U.S. The study, developed in partnership with researchers from the University of Minnesota's Geography, Environment, and Society department, "examined whether and how gender, in a broader sense, can result in distinctly different activity-travel patterns and subjective well-being (SWB) outcomes using survey data." (Minnesota

Department of Transportation). Foundationally, the study emphasized gender as complex and intersectional, not a simple binary. Much of the research validated what other data sets indicate about gendered mobility patterns, including gendered trip chaining behaviors, modal selections, and differential perceptions of safety, with an added focus on gender diverse experiences. The research also contributes a progressive addition to quantitative analysis in transportation planning. The quantitative travel diary analysis was supplemented with an analysis of subjective well-being outcomes, which measure emotional responses to daily activities and trips. The research concluded that gender played a significant role in the subjective experiences of survey participants, with differences in perceptions of safety, stress, burdens, and happiness associated with travel behaviors clear across gender identities. While the analysis demonstrated a difference in subjective well-being, the researchers recognize that further qualitative outreach and research are necessary to develop a deeper understanding of these responses.



Subjective well-being (SWB) outcomes, by gender, from 2023 *Advancing Equity in Accessibility and Travel Experiences: The Role of Gender and Identity* report. (Source: MN DOT)

Turner and Shephard agree that this research is foundational and only the beginning of integrating gender into transportation planning. When they started thinking about how they wanted to investigate gendered mobility, they quickly learned that they would need to convince other transportation professionals that gender had *any* impact on mobility decisions and experiences. While Turner and Shepard hope this study will catalyze future research into gendered mobility experiences, they recognize the impact of adopting an inclusive gender approach to open the door for planners to develop a more holistic and responsive understanding of transportation needs.

Women in Transportation Planning

While this research has focused on the gaps in understanding women's mobility needs and the existing data and work being done by advocates and planners, I also wanted to consider how women's representation in the transportation planning workforce impacts the prioritization of gendered mobility in planning decisions. I first spoke with Ariadne Baskin, a Sustainable Mobility Project Manager with the German Development Corporation and co-lead of the Women Mobilize Women initiative. Started in 2018 under the Transformative Urban Mobility Initiative, Women Mobilize Women is an international network of "female change-makers'' working to make the mobility sector more diverse. The organization strives to educate planners and decision-makers in the transport sector on gender and mobility topics, primarily focused on the gender differences in transportation systems in the Global South (WomenMobilizeWomen). In our discussion, Baskin articulated that "you can't build systems that will represent the needs or support the needs of women and other groups if they're not in decision-making roles. We have found that only around 17% of women work in transportation-related industries compared to men, and that goes into the single digits when it comes to managerial roles,". The lack of women in transportation leadership precludes women's perspectives in decision-making processes and prevents the sector from sufficiently

addressing women's needs and designing better transportation systems for all. Women Mobilize Women is working to close this gap by ensuring transportation agencies are dignified and safe places that attract women employees. Policy recommendations include creating sexual harassment policies and codes of conduct, as well as sexual harassment onboarding training in agencies that do not have protocols in place. While these policy recommendations are generally tailored for cities in the Global South, Baskin emphasized that the need to create more inclusive transportation is a global concern. While policy interventions in cities will be varied, the need to develop more diverse transportation workforces is universal.

Sarah Kaufman, Executive Director of the New York University Rudin Center for Transportation Policy and Management, validated the importance of diversity in the transportation workforce to advance gender-responsive mobility planning in New York City. Kaufman authored *The Pink Tax on Transportation: Women's Challenges in Mobility* in 2018 with Christoper Polack and Gloria Campbell to examine the additional costs women incur for transportation services, as discussed in the preceding literature review. In the years since its publication, Kaufman has seen more attention given to gender and mobility. The day I spoke with her, she mentioned that I was the third graduate student she had spoken with about gender and mobility research that week, which was certainly not the case in 2018. Kaufman noted that while this increased interest indicates progress, supporting women in transportation leadership must be a priority for transportation agencies to focus on gender-responsive transportation policy. Women's perspectives will not be adequately championed and reflected in transportation planning decisions without their inclusion in decision-making and leadership.

Discussion

Findings

The preceding analysis provides insight into differential travel behaviors across genders for New York City residents and lessons learned for future mobility policy and data collection designs. As contrasted against men's experiences in the three surveys examined, women face significant differences across the categories of modality selection, mobility of care, and safety. Additionally, the analysis demonstrates an urgent need to address the lack of gender diversity within the urban planning profession.

Modality Differences

The citywide mobility and gender-responsive surveys indicate that men and women use the subway at similar rates, but women are more likely to use the bus system. The quantitative nature of modal comparisons in these surveys makes it difficult to conclude the specific reason for these differences among survey respondents and literature on gendered use of public transportation does not typically differentiate between bus and subway use, so I can only speculate on the reason for the difference in bus use. I hypothesize the difference is a result of women's heightened attention to safety, tendency to take shorter trips, and increased likelihood to travel with dependents and personal items. Regarding safety, women may ride the bus at night to avoid being alone on subway station platforms. Buses also make more stops so women may take the bus at night to get off the bus at a stop closer to their final destination. Although anecdotal, this hypothesis is supported by a response in the *Gender-responsive Mobility Survey* from a 25-34 year old woman who stated, "I usually prefer the subway during the day because it's faster, but take the bus home when I commute after dark to avoid having to walk 10 minutes from the subway to my home." Because women are more likely to make shorter trips, bus routes with more frequent stops may also be a better modality to reach their destinations. Regarding mobility of care, as demonstrated by the

interview with Danielle Avissar, while accessing buses is not always easy, accessing subway station stairs and cars with strollers, dependents, and bags is comparatively more challenging.

Additionally, men in the survey samples are more likely to bike as a form of transportation. This finding supports existing research on American women's cycling habits. A League of American Bicyclists survey found that women are most comfortable riding on quiet streets, followed by off-street paths and multilane streets. Only 6% of American women, compared to 13% of men, are confident riding on all roads with traffic, and more than half of American women (53%) say more bike lanes and bike paths would increase their riding (Szczepanski, 2013). Dedicated cycling infrastructure increases women's cycling participation by 4% to 6%, and this increases when riders can access protected paths (AitBihiOuali & Klingen, 2022). While the mayor's gender equity investment to encourage women and gender diverse New Yorkers to use bicycles positively contributes to mitigating one modal disparity, further research and investment in other modal disparities would improve transportation planning's responsiveness to gendered mobility differences.

Mobility of Care

Results from all three surveys also provide evidential support for gender differences related to the mobility of care. The NHTS results indicate that females complete trips for household-related tasks, including shopping/errands and transport of others, at higher rates as household size increases. The citywide mobility survey also indicates that females travel more for mobility of care-related tasks. The gender-responsive survey did not include a travel diary component and, therefore, did not collect data about trip purposes. However, it concluded that women are more likely to travel with dependents. Examination of trip chaining behaviors provided less conclusive findings. Although the data analysis indicates women are more likely to trip chain, the analysis demonstrates the limitation of examining trip chaining through a quantitative approach. Transportation planners may benefit from

more nuanced information about trip chaining collected through qualitative methodologies such as focus groups and interviews which help build understanding of the motivations and challenges related to trip chaining behavior.

Safety

The importance of safety for women in urban environments demonstrated in urban studies scholarship was largely validated by the findings of the gender-responsive survey and, to a lesser extent, the citywide mobility survey. Results of the gender-responsive survey indicate that women and individuals traveling with dependents prioritize safety at higher rates. Women are more likely to change their travel patterns because of safety concerns or after dark. These findings demonstrate a need for transportation agencies to invest in safety improvements in and around transportation stations. As experts expressed in the expert interviews, better lighting, infrastructural improvements, and improvements to access points could make New York transit systems safer for New Yorkers, not just women and caretakers. However, the data analysis also highlighted a limitation in existing analytical approaches to examining safety. The citywide mobility survey only examined safety concerns related to harassment and violence in a weeklong time frame. The time constraints have limited usefulness for understanding travel experiences, and the focus on harassment and violence overlooks other safety concerns, such as infrastructural safety concerns. The gender-responsive survey failed to define safety, making it challenging to understand which safety concerns shape respondents' perspectives. Future gender-responsive survey designs incorporating safety measures should provide definitions of safety for greater clarity and consider how different conceptions of safety beyond harassment may shape New Yorkers' travel habits.

Overall, this analysis illustrates the complexity of women's mobility and the challenge of measuring gendered mobility in transportation data. As articulated by Gauvin et al. (2020), "Mobility is a complex issue, and no single dataset or approach is sufficient to unpack its

multidimensionality and offer insights on the way forward for decision-makers." A multidimensional approach is necessary to attempt to mirror the complexities of women's mobility patterns.

Diversity in the Transportation Planning Workforce

The perspectives and expertise of women in transportation planning are essential to realize gender-responsive mobility planning. As discussed in the expert interview with Women Mobilize Women and Sarah Kaufman, women are vastly underrepresented in the transportation sector, comprising only 15% of the national transportation workforce. In New York City, women comprise only 10% of public transportation roles (NYC Department of Citywide Administrative Services). The lack of women's representation at all employment levels prevents the sector from addressing the needs of women transit users or implementing gender-responsive transit policies. Women's decision-making and leadership in the transport sector will not just benefit women transportation users. Diversifying the perspectives within agencies is proven to result in improved innovation, employee retention, service delivery, and safer working environments (World Bank, 2023).

Transportation agencies are making strides to diversify the gender profile within the transportation sector. Internationally, organizations like Women Mobilize Women continue to create professional networks of women working in the transportation sector to increase the visibility of their work and advocate for gender inclusive transportation workforces. Within New York City, professional networks of women in transportation such as WTS aim to provide opportunities and mentorship for women to advance within the industry. Public agencies should invest in educational and career recruitment opportunities to encourage greater gender equity within the workforce. Investments in outreach and educational programming at local high schools, colleges, and community centers can demonstrate the opportunities for women within the industry. Research indicates that as women enter the industry, they are

more likely to mentor and sponsor other women and further professional diversity, catalyzing long-term growth within professional sectors (Mineta Transportation Institute).

Limitations

Scale

Although the NHTS is a valuable national mobility dataset, its scale limits its utility in examining the mobility decisions of New Yorkers. While the geographic units of the CMS are more appropriate for analyzing New York City mobility patterns than the NHTS, the survey zones do not provide geographic specificity to understand the differences in mobility experiences across New York's diverse neighborhoods. The gender-responsive survey used the smallest units of analysis by mapping the geographic location of respondents' by zip code. Although the units of analysis are preferable over the other surveys' units, the gender-responsive mobility survey sample lacks the geographical diversity necessary to evaluate how women's place of residence correlates to their mobility patterns.

Socioeconomic Diversity

The gender-responsive mobility survey data lacks sufficient socioeconomic diversity to assess differences among respondents. Future research should focus on increasing the diversity and scale of gendered mobility surveys to encompass the diversity of New York City residents. Outreach for the survey was conducted digitally and would have benefitted from in-person outreach targeted to reach more New York residents who are difficult to reach digitally. Because of the limited geographic diversity within the gender-responsive survey sample, I could not draw conclusions about travel habits across neighborhoods. As a large and diverse city, future surveys should prioritize geographic diversity in order to draw conclusions on mobility differences across the city's diverse communities.

Timeframe

The most recent releases of NHTS and CMS are from 2017 and 2019, respectively. The survey results do not represent the current mobility patterns of survey respondents, especially in light of changes in transportation patterns after the COVID-19 pandemic.

Recommendations

As demonstrated in the preceding chapters, despite a growing body of evidence showing their distinctive travel habits, women's needs are not adequately considered in transportation planning in New York City, or the United States more broadly. To advance gender equitable transportation planning, transportation agencies must invest in gender-responsive practices and adopt comprehensive data collection methods that encompass gendered mobility considerations. New York City's recent investment in gender equity presents an opportunity for transportation agencies to capitalize on the City's goal of advancing gender-focused initiatives. I also recommend New York City transportation planning agencies augment existing data collection methods and integrate qualitative methods to capture the complexity of women's mobility patterns. Additionally, I propose a gender-responsive impact assessment for mobility planning. This evaluation tool is designed to measure the gender-responsiveness of transportation data collection methods to guide inclusive data design and hold agencies accountable for incorporations of gendered needs in transportation planning.

Capitalize on Gender Equity Momentum in the Public Sector

The ongoing campaign to encourage women and gender diverse New Yorkers to embrace cycling as part of the City's recent gender equity investment shows promise for the promotion of gender-responsive mobility, but more significant investments are needed to elevate the mobility needs of women and gender diverse residents and integrate gender considerations into transportation planning decisions. For transportation planning to be prioritized in the New York City government's push to advance gender equity, transportation planners and advocates must increase the visibility of gender-responsive mobility as a critical tenant of gender equity. Planners and advocates must prioritize education and advocacy targeted to the general public and public officials. An impactful educational campaign

demonstrating the impacts of gender on everyday mobility illustrates the necessity of engaging in gender-responsive transportation planning to realize the City's ambitious gender equity goals. As public agencies like the Department of Transportation may be slow to initiate this action, transportation advocates may be responsible for catalyzing education and advocacy efforts. As advocacy and educational campaigns gain traction, the Mayor's office and the Commission on Gender Equity should foster collaboration with transportation agencies, experts, and advocates to integrate mobility solutions into future gender equity initiatives. As an agency committed to bettering public space and streetscapes, the Department of City Planning should also be involved in these collaborative efforts to leverage its expertise in advancing community-based solutions to mobility challenges.

Collaborations between city agencies and the Mayor's administration should engender policy changes and institutional reforms that promote gender-responsive planning practices. This may involve advocating for legislation that mandates gender impact assessments for transportation projects, establishing gender equity committees or task forces within transportation agencies, and integrating gender equity considerations into planning guidelines and performance metrics. By institutionalizing gender-responsive planning practices, the Commission on Gender Equity can work alongside transportation planners and advocates to ensure gender equity remains a central focus of transportation decision-making processes in the long term.

Diversify the Transportation Planning Workforce

Hiring practices in transportation planning are crucial in advancing gender equity by fostering diversity, inclusion, and representation within the workforce. To effectively promote gender equity in this field, transportation agencies should prioritize diverse recruitment, offer flexible work policies, provide professional development opportunities, and foster a gender-inclusive workplace. A diverse workforce that is more representative of the diversity of

New York City is better positioned to understand the complex challenges and experiences of diverse communities and realize more equitable mobility outcomes.

- *Diverse Recruitment:* Agencies should actively recruit candidates from diverse gender backgrounds by advertising job opportunities through channels that reach a range of demographics. This may include partnering with organizations that promote women and gender-diverse individuals in STEM fields, attending career fairs targeting underrepresented groups, and utilizing diverse recruitment panels to reduce bias in the selection process.
- *Flexible Work Policies:* Agencies can offer flexible work arrangements, such as telecommuting, flexible hours, and parental leave policies, to accommodate the diverse needs of employees, particularly women who may have caregiving responsibilities (Pytlik, 2023). Flexible work policies can help attract and retain talented individuals from diverse gender backgrounds and demonstrate a commitment to mitigating gender-based professional challenges.
- *Professional Development Opportunities:* Agencies should provide professional development opportunities, mentorship programs, and networking events specifically designed to support the advancement of women and gender-diverse employees. Investing in the growth and development of employees from underrepresented groups enhances individual career prospects and strengthens the overall talent pipeline within the industry. Additionally,
- *Promotion of Gender Equity Values*: Agencies can foster a culture that values and prioritizes gender equity by incorporating gender-responsive principles into organizational policies, practices, and decision-making processes. (Pavlou, 2023). This may include establishing gender equity committees or affinity groups within transportation agencies, conducting regular diversity and inclusion training sessions, and publicly advocating for gender equity initiatives within the agency and in the broader New York community.

Improve Existing Data Collection

The Citywide Mobility survey was last implemented in 2019 and should be revamped by the New York City Department of Transportation. As demonstrated in this analysis, the survey successfully leverages a trip diary to detail the travel habits of New Yorkers. In its current form, the trip diary sufficiently illustrates modality patterns, trip frequencies, and impacts of harassment on transit users' experience. The dataset should be updated to better account for gendered mobility concerns by integrating the following improvements:

- *Invest in Gender-responsive research*: The Department of Transportation must invest resources to understand the relationship of gender diversity and mobility experiences. By partnering with gender experts and researchers, the Department should develop a study similar to the Minnesota Department of Transportation *Advancing Equity in Accessibility and Travel Experiences: The Role of Gender and Identity* to understand gender diversity and mobility in New York City. This study would equip DOT planners with a foundational understanding of the criticality of gender-responsive mobility planning and communicate their commitment to advancing gender equity in future projects and policy. The study could also guide outreach strategies for a new release of the citywide mobility survey by identifying New York communities that have been historically overlooked in transportation data collection and planning.
- *Prioritize inclusive outreach*: Survey outreach could be designed to reach more women and gender diverse communities to ensure data collection reflects their experiences. As demonstrated by the Minnesota study, integrating gender diversity into data collection approaches furthers inclusion of other intersectional identities such as race, income, and family type (MN DOT). Outreach for an updated release of the survey should be tailored to encourage participation from parents and caretakers, gender diverse individuals, and other marginalized communities who would benefit from transportation system improvements to connectivity, accessibility, and safety.

- *Augment survey with Subjective Well-Being Outcomes*: Subjective well-being (SWB) outcomes measure emotions experienced during trips and activities. As implemented by MN DOT, the smartphone application used to conduct survey outreach recorded participants' emotions during each trip logged on the application. Emotions included "happy, meaningful, and safe for positive emotions, and pain, sad, tired, and stressful for negative emotions." (Song, 2023). Emotions were selected based on research indicating these emotions as key determinants of social health (Das et al. 2020). The intensity of each emotion was ranked on a scale of 1 to 7, with 1 being the least intense and 7 the most intense. The team calculated a net effect based on responses to assume a SWB score for participants across gender identities and socioeconomic status. Application of the SWB revealed patterns of emotions related to individuals' travel patterns and household responsibilities. The research team concluded that work-life balance could bring more positive SWB outcomes and sharing household tasks may make people more tired but increase their experiences of happiness and meaningfulness. Leisure and family time also had positive emotional benefits (Song, 2023). I recommend that the NYC DOT use the Minnesota study as a precedent to integrate SWB into a release of the citywide mobility survey. The tool is an effective way to quantify subjective experiences and investigate the emotional response to transportation systems. Investigation of emotional responses would add a new dimension to transportation studies and make NYC transportation systems more responsive to the stresses and benefits of existing transit infrastructures.
- *Differentiate categories of safety:* As demonstrated by the gender-responsive mobility survey, a majority of women prioritize safety in their travel decisions and are likely to change travel patterns because of safety concerns. The 2019 CMS addressed safety through the lens of experiences of harassment and related impacts on travel behaviors. I recommend the survey be modified to address historic experiences of harassment and general travel behavior changes resulting from concerns of violence

and harassment. The time constraints of the current survey design limit participants' ability to communicate the impacts of harassment on their travel choices. While safety from harassment is a critical component of gendered mobility, planners must adopt a more nuanced understanding of women's safety concerns. The survey should expand on its inclusion of safety concerns related to infrastructure to understand how infrastructural safety concerns impact gendered mobility decisions and inhibit micro mobility usage.

- *Integrate Mobility of Care:* The CMS travel diary requires participants' to log the number of people traveling with them during each trip. However, this is the extent of the survey's effort to understand the impacts of dependents on travel decisions. The survey should be augmented to supplement trip diary entries with information about trips completed with categories of dependents, such as children and older adult dependents, to understand how trip patterns differ for parents and caretakers. Additionally, the survey should collect information about the personal items respondents carry during trips. It would be informative to examine the impacts of carrying personal items such as strollers and grocery bags on SWB and modality selection. Based on scholarship and the Minnesota DOT study, I hypothesize that inclusion of questions that aim to understand mobility of care in New York City would demonstrate higher levels of stress for mobility of care related trips.
- *Quantify costs related to transportation:* As demonstrated by Kaufman et al. (2018) in *The Pink Tax on Transportation*, women incur more monthly transportation related costs. The survey would benefit from a measure of participants' transportation spending to quantify transportation costs and investigate interventions to make transportation systems more affordable and accessible for overburdened populations.

Supplement survey with qualitative research

In addition to the improvements outlined above, an updated release of the CMS should be supplemented by qualitative research that provides planners with a more comprehensive and narrative-based understanding of New Yorkers' daily travel habits and concerns. Qualitative approaches, including community pop-ups, focus groups, and public forums, can reach communities who do not have access to a smartphone to participate in a digital survey or individuals and communities who are not interested in participating in a travel diary survey, which requires an understanding of the application interface, comfortability with DOT tracking their travel patterns, and a significant time commitment.

The Los Angeles Department of Transportation demonstrated the impact of qualitative research methods to capture gendered mobility experiences in the 2019 *Understanding How Women Travel* study. Their qualitative approach included participant observation, participatory workshops, and pop-up engagements in transit stations. Researchers indicated that qualitative methods helped fill gaps that quantitative approaches could not address, such as the motivations behind trip chaining behaviors, reasons for not taking trips, and detailed concerns about accessibility and safety (Los Angeles Department of Transportation 2019). As demonstrated by the gender-responsive mobility survey, the inclusion of only a few open-ended questions allowed participants to share more about their personal experiences, enhancing the findings about preferences, accessibility, and the importance of place. Investing in qualitative research to augment quantitative findings would result in a more holistic understanding of gendered mobility challenges.

Gender Impact Assessment Tool for Mobility Data Collection

As the final recommendation, I propose a gender impact assessment tool for mobility data collection. An evaluative framework could be adopted by public agencies to guide the development of gender-responsive data collection methodologies and leveraged by advocates to demonstrate the gaps in existing data collections and advocate for more inclusive alternative methodologies. While the gender impact assessment is designed primarily to promote gender inclusivity, methodologies designed following the matrix would produce better outcomes for all urban residents, promoting inclusion and addressing issues of safety, costs, accessibility, and connectivity. The proposed evaluation framework (see Figure 17 below) can be adapted to meet the specific goals of transportation planning efforts and is intended to serve as an example of what an evaluative matrix can achieve.

The evaluation criteria were selected based on the priorities of gender-responsive data collection identified in this research, which included gender inclusivity and intersectionality, accessibility, safety, costs, mobility of care, and measurements of subjective well-being. The framework consists of a point-based technical rating system adopted from an Oregon Department of Transportation transportation policy evaluation matrix (Oregon Department of Transportation, 2023):

- Most desireable: The methodology fully addresses the criteria [+1]
- No effect: The criterion does not apply to the methodology or the methodology has no influence on the criterion [+0]
- Least desirable: The methodology does not support the intent of and/or negatively impacts the criteria category [-1]

Figure 17. Gender-Responsive Impact Assessment for Mobility Data Collection

Criterion Number	Evaluation Criteria	Evaluation Measures
Goal 1: *Gender Inclusivity*- The methodology integrates gender inclusive language and demonstrates a commitment to capturing the experiences of gender diversity across NYC through audience appropriate recruitment and outreach.		
C1.1	Gender inclusive language	Does the methodology consistently and appropriately incorporate gender inclusive language?
C1.2	Gender inclusive participation (women)	Does the methodology encourage gender diversity by encouraging participation from individuals who identify as women?
C1.3	Gender inclusive participation (gender diverse)	Does the methodology encourage gender diversity by encouraging participation from individuals who identify as gender diverse?
C1.4	Gender aggregation	Is the methodology designed so that resulting data can reasonably be gender aggregated to analyze differences across gender identities?
Goal 2: *Intersectionality*- The methodology demonstrates a commitment to capturing mobility experiences across demographics including but not limited to race, income, and geography.		
C2.1	Racial inclusivity	Is the methodology designed to encourage participation across racial identity? Does the methodology include language and content conducive to understanding racial inequities of mobility?
C2.2	Income inclusivity	Is the methodology designed to encourage participation across incomes? Does the methodology include language and content conducive to understanding economic inequities of mobility?
C2.3	Geographic inclusivity	Is the methodology designed to encourage participation across geographic areas? Does the methodology include language and content conducive to understanding geographic inequities of mobility?
Goal 3: *Accessibility*- The methodology is designed to capture the use and need for accessibility accommodations in NYC's transportation system.		
C3.1	Accessible infrastructure	To what extent does the methodology capture experience using and satisfaction with transit accessibility accommodations/facilities?
C3.2	Connectivity	To what extent does the methodology attempt to capture connectivity needs, such as ability to access transit facilities and modalities?
Goal 4: *Safety*- The methodology is designed to evaluate perceptions of safety while using transit or traveling around NYC.		
C4.1	Safety from harassment and violence	Does the methodology measure perceptions of safety related to concerns/experiences of harassment and violence?
		To what extent does the methodology attempt to capture behavioral changes due to safety concerns related to harassment

		and violence?
C4.2	Infrastructural safety	Does the methodology measure perceptions of safety related to transit infrastructure, including micro mobility usage (i.e. bike lanes and sidewalks)?
		To what extent does the methodology attempt to capture behavioral changes due to safety concerns related to traveling at night/certain times?
C4.3	Temporal safety	Does the methodology measure perceptions of safety across time of day?
		To what extent does the methodology attempt to capture behavioral changes due to safety concerns related to traveling at night/certain times?
Goal 5: *Mobility of Care*- The methodology is designed to evaluate the demands of mobility of care, including experiences and challenges of traveling with dependents and for household and caregiving responsibilities.		
C5.1	Caregiver inclusivity	Does the methodology encourage participation from individuals who identify parents and/or caregivers?
C5.2	Trips with Dependents	Does the methodology allow respondents to identify when dependents are involved in trips?
		Is information about the identity (i.e. relation, age) of the dependent captured in the methodology?
C5.3	Caregiver challenges	To what extent does the methodology attempt to capture the travel challenges of parents and/or caregivers?
C5.4	Trip chaining	Does the methodology attempt to capture trip chaining patterns?
		To what extent does the methodology attempt to capture motivations for trip chaining behavior?
Goal 6: *Cost*- The methodology measures transportation costs incurred by respondents.		
C6.1	Transportation costs	Does the methodology measure costs incurred for transportation purposes?
C6.2		To what extent does the methodology attempt to capture behavioral changes due to transportation cost concerns?
Goal 7: *Subjective Well Being*- Methodology demonstrates an effort to understand the subjective experiences and emotions associated with travel around NYC, either through qualitative methodologies or inclusion of a tool such as the subjective well being (SWB) index.		
C7.1	Subjective well-being	Does the methodology deploy a tool or metric to measure emotions related to transit experiences?
C7.2	Qualitative Responses	To what extent does the methodology allow for qualitative responses to gauge experiences not captured through the quantitative research design?

Conclusions

In conclusion, the findings presented throughout this thesis underscore the critical importance of considering women's unique transportation needs in transportation planning initiatives in New York City. Despite a wealth of evidence illustrating women's distinct travel behaviors, there remains a significant gap in incorporating these considerations into transportation planning practices.

To address this gap, I have outlined several recommendations aimed at promoting gender-responsive transportation planning. First and foremost, there is a pressing need for public agencies to collaborate to capitalize on the City's gender equity agenda and integrate gender-responsive mobility improvements into the gender equity movement to realize the City's goal of being the "most women-forward city in the United States." Diversifying the transportation workforce is also crucial to ensure diverse perspectives are represented in decision-making and leadership.

Additionally, transportation agencies must adopt more comprehensive data collection methods that explicitly account for gendered mobility patterns. This entails integrating qualitative approaches and quantitative data collection to capture the nuanced complexities of women's travel experiences. Furthermore, I advocate for implementing a gender-responsive impact assessment tool in mobility planning processes. This assessment framework serves as a mechanism for evaluating the inclusivity of transportation data collection methods and ensuring that gendered needs are adequately addressed in planning initiatives. By leveraging such tools, transportation agencies can foster more equitable and inclusive urban transportation systems that better serve the diverse needs of all residents.

The recommendations put forth in this thesis represent tangible steps toward advancing gender-responsive transportation planning practices in New York City and beyond. By prioritizing the integration of gendered considerations into planning processes and

leveraging innovative assessment tools, transportation planners and advocates can advance equitable and accessible transportation systems that benefit all urban residents.

Appendix

Figure 18. List of Gender-responsive Mobility survey questions

1. Which modes of transportation do you use to travel around New York City?
2. Which mode of transportation do you use MOST OFTEN to travel around New York City?
3. What is your biggest priority in selecting your mode of transportation?
4. When you use public transit, what is your strongest motivation for using it?
5. On average, how many trips do you make each week? (Example of ONE trip would be going to the grocery store and returning home)
6. During which time frames do you typically use transportation on weekdays (Monday-Friday)?
7. During which time frames do you typically use transportation on weekends (Saturday and Sunday)?
8. On a scale of 1-5, how important is safety to you when you are choosing a transportation option?
9. On a scale of 1-5, how safe do you feel when you are traveling around NYC during the day?
10. On a scale of 1-5, how safe do you feel when traveling around NYC at night?
11. Do you adjust your travel patterns after dark?
12. On a scale of 1-5, how important is accessibility (i.e. access to stairs, elevators) to you when choosing a transportation option?
13. Are there any specific safety/accessibility concerns that influence your transportation choices?
14. Do you commute for work?
15. Which modes of transportation do you use to commute to/from work?
16. How often do you commute for work?

17. On average, how long is your commute for work?
18. In a typical work week, how often do you make at least one intermediate stop (ie. dropping a child off at daycare/school or grocery shopping) during your work commute?
19. How important are the following considerations to you when you are commuting for work? (1=most important, 5=least important)
20. Do you ever travel around NYC with children or dependents?
21. Which mode(s) of transportation do you use when you travel around NYC with children or dependents?
22. How often do you travel around NYC with children or dependents?
23. How important are the following considerations to you when you are traveling around NYC with children or dependents? (1=most important, 5=least important)
24. Are there any other factors/concerns that shape your transit choices when traveling with children/dependents?
25. Which mode(s) of transportation do you use to complete errands? Errands include routine tasks such as grocery shopping, going to the pharmacy, picking up take-out, or going to the laundromat.
26. How often do you run errands?
27. Demographic Information (Gender, Zip Code)
28. Age
29. Which race or ethnicity best describes you?
30. What is your annual income?
31. What is the highest level of school you have completed? (If you're currently in school, please indicate the highest degree you have received.)
32. Please feel free to share any other thoughts on what influences your travel habits as you navigate New York City.

Figures 19-22: Demographics, Gender-Responsive Mobility Survey

Figure 19. Age

Age	Percentage of Respondents
18-24	14.3%
25-34	57.3%
35-44	22.3%
45-54	2.9%
55-64	1.1%
65+	2.1%

Figure 20. Education

Education	Percentage of Respondents
High School	2.3%
College Degree	43.1%
Master's Degree	49.5%
Professional/Doctorate	5.1%

Figure 21. Race

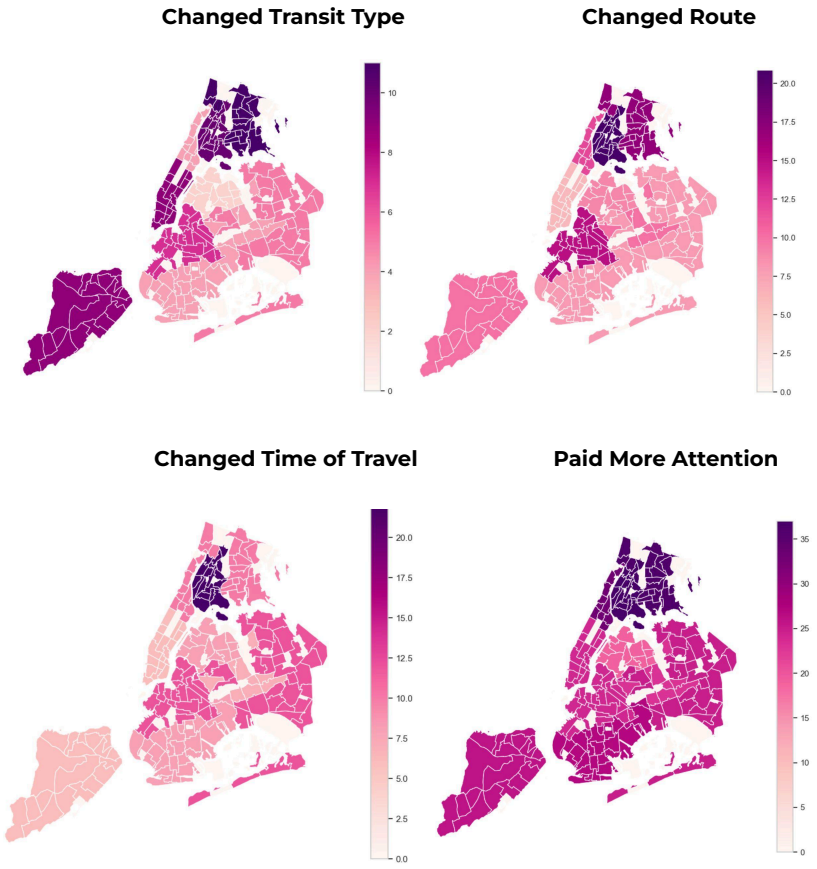
Race	Percentage of Respondents
White/Caucasian	62.9%
Asian/Pacific Islander	22.6%
Other	6.9%
Black/African American	4.3%
Hispanic/Latino	3.2%

Figure 22. Income

Income	Percentage of Respondents

Less than $14,999	9.2%
$15,000-24,999	5.7%
$25,000-34,999	2.9%
$35,000-49,999	2.3%
$50,000-74,999	15.5%
$75,000-99,999	13.8%
$100,000-149,000	21.8%
$150,000-199,999	8%
$200,000+	13.8%

Figure 23. Impacts of Harassment on Travel Behavior, Female Respondents, CMS (n=3,346)



Data Source: NYC DOT Citywide Mobility Survey (2019)

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