



UNDERSTANDING
HOW WOMEN TRAVEL

APPENDIX A

LITERATURE REVIEW

How Women Travel: A Survey of the Literature

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Abstract

Women face important mobility hurdles, lessening their accessibility to resources and opportunities. These hurdles are even greater for certain groups of women (e.g. non-white, low-income, young, disabled, immigrant) who, due to income, age, physical ability, and legal status, have limited transportation options. In this report, we draw from the existing research to examine gender differences in travel behavior, potential explanations for these differences, and existing policies and practices to meet women's transportation needs.

Some travel behavior research shows a convergence in the travel patterns--particularly in the daily average travel length (for commuting trips) of men and women. Yet despite these trends, substantial gender differences remain. Compared to men, women still travel shorter distances and times, are more likely to make household-supporting trips, and are more likely to travel by automobile, largely as a strategy to manage work and household responsibilities. Finally, the research shows gender differences in the use of transportation services largely due to safety concerns; women are more likely than men to adjust their travel behavior to avoid travel altogether or to travel only during daylight hours, in certain neighborhoods, or with companions.

In general, women's travel behavior can be explained by four underlying factors: economic, cultural, physical, and psychological. Women remain concentrated in sex-segregated occupations in which they earn lower wages than comparably skilled men; they continue to do more household-supporting work than men; and women are more likely to be sexually harassed and assaulted, and to fear for their safety as they move through public space. Collectively, these factors shape the way in which women travel and, potentially, constrain their access to opportunities.

Despite a growing body of scholarship on gender and travel, very few U.S. transportation agencies have adopted programs and services to address women's travel needs. In contrast, meeting women's mobility needs has been a key component of "gender mainstreaming" initiatives associated with the United Nations and other global quasi- or non-governmental organizations. While select number of Western countries such as the U.K., Sweden, and Canada, have enacted policies to address the transportation needs of women, these types of initiatives have been slow to appear in the U.S.

Introduction

Physical mobility—the ability to move from one place to another smoothly, quickly, and without impediment—has been the epitome of modernity. Mobility has been greatly valued in a modern society constantly on the move (Urry, 2000); it has been often associated with privilege, power, and freedom. Mobility often enhances accessibility—the ability to access and take advantage of physical amenities (e.g. parks, super markets, health care, schools) and economic opportunities (jobs). For this reason, physical mobility is often linked to opportunities for the achievement and enjoyment of a better life and more material resources (Wachs, 2009). At the same time, the way that transport is designed and delivered affects mobility patterns.

Not all social groups enjoy equal levels of mobility. Women, in particular, face important mobility hurdles, lessening their accessibility to resources and opportunities. These challenges are even greater for certain groups of women (e.g. non-white, low-income, young, disabled, immigrant) who, due to income, age, physical ability, and legal status, have more limited transportation options. In general, women face unique economic, cultural, physical, and psychological mobility constraints that, with a few exceptions, have been ignored by transportation providers and policies.

In this literature review, we draw from the existing research to examine differences in travel behavior by sex including how transport needs vary among different subgroups of women because of age, class, race/ethnicity, and geographic context. Research shows that while there has been a convergence in the travel patterns of men and women, a substantial gender gap in travel patterns remains (Crane, 2007; Hanson, 2010; Rosenbloom, 2004). Following the discussion of these differences, we review potential explanations for these differences. Finally, we conclude by assessing the extent to which policies and practice in the U.S. have responded to women’s mobility barriers and needs.

Travel Behavior¹

As Hanson (2010) notes, overall “the spatial range of women’s daily mobility is smaller than men’s.” Much of the research on this topic centers on the commute to work, an important trip given its association with employment as well as its contribution to peak period travel and, therefore, to congestion. Commute distance and commute time has increased over time in the U.S. for both men and women (Crane, 2007). From 1985 to 2005, women’s commute distance increased faster than men’s contributing to a narrowing of the gender gap; in contrast, the gender gap in commute time grew over this time period (Crane, 2007). Combined, the data show that for women, the distance between work and home increased faster than the duration of their commute, compared to men. Despite these trends, women tend to commute shorter distances and have shorter travel times than men even controlling for other determinants of travel (Crane, 2007; Gordon, Kumar, & Richardson, 1989; Hanson & Johnston, 1985; Lee, Vojnovic, & Grady, 2018; Rapino & Cooke, 2011).

With respect to non-work travel, women make more household-supporting trips than men; many of these trips are related to parental and household obligations such as taking children to school and to extracurricular activities, accompanying parents to medical appointments, or grocery shopping (Mauch & Taylor, 1997; Taylor, Ralph, & Smart, 2015). Boarnet and Hsu (2015) find significant differences in the non-work travel patterns of men and women in Southern California but only when children are in the household. Women are more

¹See Table 1 for a summary of sex differences in travel in the United States.

likely than men to trip chain, where people stop and complete intermediate trips en route to another destination. For instance, women often make some household-supporting trips while traveling to and from work (McGuckin & Murakami, 1999; McGuckin, Zmud, & Nakamoto, 2005). This sort of ‘hypermobility’ can be constraining to women (Hanson, 2010). Murray (2008) discusses the plight of suburban mothers who are constantly behind the wheel of their cars, transporting their children to various destinations. Sánchez de Madariaga (2013) calls these service trips ‘the mobility of care,’ arguing that they should become more visible and accounted for in transport policies.

What modes do women use? Most women travel by car. Previous studies show that working women are slightly *more* likely to commute by car than working men (Rosenbloom & Burns, 1994). Recent data from the 2017 National Household Travel Survey confirm this finding and show that 88 percent of women commute by car compared to 86 percent of men. Working women are, however, slightly more likely to carpool with others--particularly with other family members--as part of their work trip compared to men (Ferguson, 1995; Wachs, 2009).

Recently, there has been a profusion of other auto-based transportation services—car sharing, ride hailing, etc. These services are relatively new and, therefore, have been the subject of only a few studies that include sex differences in their use. Moreover, most of these services are private, making it difficult to access data on their use. When data are available, they rarely contain information on rider characteristics. There are a few exceptions. A recent international ride hailing study (International Finance Corporation & Accenture, 2018) shows that women benefit from ride hailing services and, consequently, comprise a high proportion of riders. In a recent study using U.S. data, Conway, Salon, and King (2018) find that men are slightly more likely than women to use ride hailing services and to take slightly higher average numbers of trips (Conway, Salon, & King, 2018). Finally, there is evidence of gender differences in attitudes about ride hailing. In one study, women expressed a preference to know more information about the other passengers in their shared rides and 16 percent of women said they would choose to be paired only with other women, given the option (Sarriera et al., 2017).

While women’s use of private vehicles has increased over time, their use of transit has declined (Crane, 2007; Klein, Guerra, & Smart, 2018). Transit times can be long, transit trips can be expensive (relative to the operating costs of car trips), and transit travel can be inconvenient (Rogalsky, 2010). While these conditions affect all transit riders, they may be particularly onerous for women. For example, it may be difficult for transit to easily accommodate women’s need to make multiple stops on the way to and from work (Blumenberg, 2016). Also, women are more likely than men to travel during off-peak hours when transit service can be limited. The data show that women are *more* likely than men to leave for work during the peak period (6:00 to 9:00 am); however, they also are more likely than men to travel during the middle of the day (10:00 to 4:59) (U.S. Department of Transportation, 2017).

Data from the 2017 National Household Travel Survey show that bicycling captures less than two percent of all trips in the U.S. (U.S. Department of Transportation, 2017). In the United States and other countries with low levels of bicycling, men cycle more than women. In the U.S., studies estimate that men take two to three times more bicycle trips than their female counterparts (Emond, Tang, & Handy, 2009; Pucher & Buehler, 2008, 2012). While data from bike share systems show narrower gender disparities than for cycling overall, a gender gap remains even among bike share users (Fishman, 2016).

Both household responsibilities and safety concerns contribute to disparities in biking. As discussed previously, women make more household serving trips than men. These trips often

require the use of travel modes capable of carrying people and goods. Transporting other people or household goods can be difficult by bicycle (Singleton & Goddard, 2016) contributing to sex differences in cycling rates.

Gender differences in bicycle facility preferences also may contribute to sex differences in cycling. A recent systematic review of gender and stated cycling preferences finds that women express stronger preferences than men for cycling along lanes that are completely separated from cars, instead of along painted lanes (Aldred, Elliott, Woodcock, & Goodman, 2017). The general lack of segregated bicycle facilities in U.S. cities likely contributes to gender disparities in cycling rates. While the number and presence of separated bicycle facilities is increasing, this type of bicycle infrastructure is not as commonplace in U.S. cities as it is in European cities with higher overall rates of cycling (Buehler & Pucher, 2016).

Finally, about 10 percent of all trips are taken on foot, a rate almost 2.5 times higher than for transit (U.S. Department of Transportation, 2017). While men and women walk at similar rates, the research suggests that these data obscure gender-related differences in walking behavior and attitudes about walking and the pedestrian environment. Women walk shorter distances and to different locations than men (Clifton & Livi, 2004). Similar to the research on bicycling, women's walking behavior seems to be more sensitive to the influence of built environment characteristics than men's, and women are more likely than men to alter their walking behavior as a result (Clifton & Livi, 2004).

Travel Behavior Across Different Groups of Women

A common misconception is the assumption that women have uniform travel patterns, while ignoring important differences across different groups of women. Conditions vary widely among women by race/ethnicity, age, income, cultural and educational background, sexual orientation, and disability status, as well as other individual characteristics such as personality traits and lifecycle stage. Such differences affect travel patterns and result in substantial variation in the gender gap across groups. We discuss some of these differences below.

Race/ethnicity. There are variations in the gender gap, the difference between women and men's travel patterns, across racial/ethnic groups with African American women and men having the narrowest difference (Crane, 2007). However, with some exceptions (Crane & Takahashi, 2009; McLafferty & Preston, 1991), women tend to commute shorter distances and have shorter travel times than men even controlling for race and ethnicity (Crane, 2007; Mauch & Taylor, 1997). Data from the American Housing Survey show that although gender differences in commute mode and commute times by race/ethnicity remain, these differences appear to be waning over time (Crane & Takahashi, 2009).

Income. Income is a strong determinant of travel behavior. Data from the 2012-2016 American Community Survey shows that 80 percent of adults in poverty live in households with at least one automobile (Ruggles et al., 2018). However, adults in low-income households are less likely to own and drive automobiles than adults in higher-income households (Blumenberg & Pierce, 2012) and, are, therefore, more likely to use other modes such as public transit. In most neighborhoods in the U.S., automobiles provide far greater access to opportunities within a reasonable commute time than public transit (Shen, 2001). Consequently, low-income adults in households without cars can be at a disadvantage in the labor market (Gautier & Zenou, 2010; Raphael & Stoll, 2001).

What is the relationship between gender, income and travel? Within two-parent households, theory suggests that the spouse most responsible for the household's financial

wellbeing—generally, the spouse earning the highest wage—has the upper hand in automobile allocation decisions (Becker, 1981). Due to a persistent gender gap in wages and women’s restricted access to labor markets (Nunn & Mumford, 2017), men often have greater economic power and, historically, have had higher levels of household car access (Matthies, Kuhn, & Klöckner, 2002; Pickup, 1984). However, recent evidence suggests that this is no longer the case. Studies find vehicle priority goes to the household member whose travel needs are the least likely to be met by modes other than the automobile (Scheiner & Holz-Rau, 2012). Since women tend to engage in more complicated trip patterns than men, they tend to get priority use of the household car.

Among all family types, female-headed households have the lowest median incomes, 63 percent lower than married households and 31 percent lower than male-headed households (no spouse present) (U.S. Census Bureau, 2018).² The need for convenient transportation is even greater in female-headed households in which the woman has ultimate responsibility for all aspects of household maintenance. Data from the 2012-2015 American Community Survey show that among single mothers with incomes below \$15,000, 77 percent live in households with automobiles (Ruggles et al., 2018). Like the broader literature on low-income households to which we refer above, the research on female-headed households suggests that those without cars can have trouble finding and keeping jobs. A growing number of studies on welfare recipients (largely female-headed households with children) find a strong positive relationship between auto ownership and employment (Baum, 2009; Cervero, Sandoval, & Landis, 2002; Ong, 2002; Sandoval, Cervero, & Landis, 2011). A few studies show that transit can help connect low-income, carless women to employment, although in all cases the effect of transit on employment is far less than that of the automobile (Cervero et al., 2002; Kawabata, 2003; Ong & Houston, 2002).

Age. Among children, boys appear to have more independent mobility than young girls. Boys are more likely to walk to and from school than girls (McDonald, 2012; McMillan, Day, Boarnet, Alfonzo, & Anderson, 2006). While these differences remain, they have narrowed over time and are no longer statistically significant (McDonald, 2012). However, boys remain much more likely than girls to bike to school (McDonald, 2012; McMillan et al., 2006). The relationship between sex and travel behavior for young children is complicated since their travel choices are mediated by the behavior of their caregivers (McMillan et al., 2006).

At the opposite end of the age distribution—among seniors—women again are far less mobile than men. Older women are significantly less likely to have driver’s licenses compared to older men (Rosenbloom & Herbel, 2009). This disparity reflects two issues: women’s lower rates of driving in years past (Rosenbloom, 2012) and the fact that older women are more likely than older men to give up driving as they age (Choi, Mezuk, Lohman, Edwards, & Rebok, 2012). Despite lower licensing rates, most older women still travel by automobile. However, they are more likely to self-regulate their driving compared to older men (D’Ambrosio, Donorfio, Coughlin, Mohyde, & Meyer, 2008). Women who do not drive are more likely to rely on others to drive them, and are more likely to use public transit than older men and are less likely to walk (Rosenbloom & Herbel, 2009).

² Female- and male-headed family households have at least one other family member but no spouse.

Principal Factors Shaping the Travel Behavior of Women

There are numerous underlying factors that help to explain the travel behavior of women. We group them into five categories—economic, cultural, sexual harassment, psychological, and factors relating to the physical environment. (See Table 2 for a summary of these factors.)

Economic factors. Gender influences the spatial location of employment opportunities, shapes women's access to the labor market, and, accordingly, influences women's transportation needs. Although occupational sex segregation has declined in recent years, it is still a fundamental characteristic of the labor market and remains quite high (del Río & Alonso-Villar, 2015). Research shows a relationship between occupational 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). Some scholars attribute this relationship to the spatial dispersion of feminized occupations (Gordon et al., 1989; Hanson & Johnston, 1985). In other words, it may be easier for women to find local jobs compared to men. Others argue that the relationship can be explained by employers who locate in particular neighborhoods to take advantage of the available supply of female labor (England, 1993; Hanson & Pratt, 1992; Nelson, 1986). In other words, employers' locational decisions thereby create highly localized female labor markets and enable women's short commutes.

Wyly (1996, 1998) shows that, while women seek to minimize their work trips, employment in feminized secondary-sector jobs has no independent effect on travel time. He argues that the important connection between transportation and the labor market extends from the relationship between women's disproportionate (though diminishing) reliance on bus transportation and labor market segmentation. Among women who travel by bus, 49 percent are employed in female-dominated secondary occupations compared to 38 percent of solo commuters. These differences persist even when controlling for the characteristics of women using this mode of travel; travel by bus is associated with an 8 percent increase in segmentation (Wyly, 1998).

Among low-income women, short commutes also may be due to a reliance on place-based information networks. Social networks are an integral part of the job search process for most workers (Granovetter, 1995). Some studies show that women, particularly low-income women with children, rely on informal, neighborhood-level networks to connect them to employment (Chapple, 2001; Gilbert, 1998; Hanson & Pratt, 1995). Many low-income women engage in localized job searches to minimize the high costs associated with learning of and traveling to distant and dispersed job vacancies (Holzer & Reaser, 2000).

Cultural factors. One potential explanation for women's more limited spatial range is the need to balance their primary responsibility for the household and paid work (Hanson & Johnston, 1985; MacDonald, 1999). While men are slowly increasing the number of hours that they devote to household responsibilities, data from the American Time Use Survey shows that women still shoulder a far greater burden for home-related chores than men. On average, US women spend 27 hours per week doing unpaid household work, compared to 16 hours per week for men (Krantz-Kent, 2009). In other words, women invest approximately 11 additional hours per week taking care of the home; these activities include caring for family members, preparing food, doing laundry and shopping. Among parents in households with children, gender disparities in the number of hours dedicated to household chores are even more pronounced. Women in households with children spend 38 hours per week on unpaid household work compared to 21 hours among men (Krantz-Kent, 2009). Such responsibilities affect women's

mobility (Turner & Niemeier, 1997), potentially leaving them less time for discretionary activities, increasing the need to be hypermobile and trip chain, and influencing women's access to well-paid jobs far from home.

The complexity of women's trip making also shapes their travel mode. Auto use is higher for individuals who trip chain as part of their work commute than for those who travel directly between home and work (McGuckin et al., 2005). Hensher and Reyes (2000) find that trip chaining is a barrier to transit use. Drawing on data from a Sydney Travel Survey, they show that supporting the activities of children (child care, school, extracurricular activities) greatly increases trip complexity. The increased complexity of trip chains is associated with the utility of car use and, conversely, the disutility of transit.

Sexual Harassment. Sexual harassment (verbal or physical conduct of sexual nature) is widespread (Fenster, 2005), including in transit settings and affects women's travel patterns and behavior. Such behavior against women is pervasive around the world. Fear of harassment cuts across the experiences of women in cities. A 2007 survey of subway riders in New York City found that 63 percent of respondents had been sexually harassed in the subway. Nevertheless, 96 percent of those harassed did not contact the NYPD and/or the MTA to file a report (Stringer, 2007). While the #MeToo movement seems to be slowly altering women's willingness to report harassment, women have historically often been embarrassed and reluctant to report sexual offenses against them, in a public culture that often blames the victim (Hall, 1985).

Indeed, the fear of harassment and victimization leads to behavioral adjustments and precautions by women travelers: not walking alone, avoiding travel in the evening, avoiding certain settings (such as crowded buses) completely, or not wearing certain types of clothing, etc. (Loukaitou-Sideris, 2014).

Psychological factors. Women also experience perceptual or psychological barriers that constrain their mobility. Parents are more likely to give their sons larger latitude for movement across city spaces, than their daughters who are perceived more susceptible to the threat of 'stranger-danger' (Loukaitou-Sideris & Sideris, 2009). As a result, girls tend to be more confined in a circumscribed use of spaces (Young, 1990). Such social attitudes transcend childhood into adulthood and result in women's underrepresentation in public spaces and their more limited use of cycling as compared to men (Rosenbloom & Fraissard, 2009).

Fear and anxiety over possible victimization in public spaces are barriers to women's unobstructed mobility. Researchers attribute women's fears to men's threatening sexual behaviour toward women displayed at times in public settings (Smith & Torstensson, 1997). Women's fears about possible victimization in public settings vary across groups; for example, older women feel less safe than younger women (St. John & Healdmoore, 1995). Low-income women and women of ethnic backgrounds often experience higher levels of fear walking in their neighborhoods than White women (Madriz, 1997; Ross, 2000). Similarly, women with physical or mental disabilities and lesbian women are more fearful of assault in public spaces (Morrell, 1996; Valentine, 1996).

Women without resources may respond by shifting how they use their usual mode of travel. For example, they may only travel during daylight hours or with others (Loukaitou-Sideris, 2015). For women with higher incomes and greater choices, safety fears may influence their preference for private automobiles or taxis relative to other modes (Loukaitou-Sideris, 2014; Stanko, 1990; Wekerle & Whitzman, 1995). In some instances, women may completely avoid using certain public spaces or visit them only if accompanied by boyfriends, spouses, or

friends (Loukaitou-Sideris & Sideris, 2009). As a result, research reveals an under-representation of women in public spaces (Cooper & Francis, 1990; Cranz, 1980).

Physical environment. Women's fears are closely linked to the characteristics of the physical environment. Researchers find that women and men respond to similar environmental conditions differently. Women are typically more fearful than men in public settings because they perceive higher risks. Some empirical studies also show that women tend to be more sensitive than men to signs of danger and social disorder, graffiti, and unkempt and abandoned buildings (Wekerle & Whitzman, 1995) that sometimes surround transit stops, especially in low-income neighborhoods.

The type of design, layout, and environmental conditions of the built environment can make walking or transit use uncomfortable or perceived as unsafe particularly for women. Women express more fear than men having to wait for the bus or having to walk along poorly lit routes in their travel to and from transit stops (Loukaitou-Sideris, 2014). Desolate transportation settings can generate anxiety that no one will be there to help if a crime occurs. This includes empty bus stops and train stations; parking lots and garages; dark walkways connecting station platforms to park-and-ride facilities, and situations where there is only one male passenger in a car (Lynch & Atkins, 1988). With respect to transit, women report feeling safer on the bus than waiting at the bus stop because the presence of a bus driver is more reassuring than the unpredictability of the more open bus stop setting (Loukaitou-Sideris & Sideris, 2009). Safety fears are elevated for low-income and minority women, who are more likely to live in high-crime neighborhoods, may return home from work in the late evening, and have fewer private transportation options than more affluent women.

Vehicle design. A second aspect of the physical environment also may influence women's ease of using particular modes of travel. In their household-supporting trips, women carry large shopping bags or push strollers, more often than men (McKnight, 1994). If transit vehicles do not have dedicated space to store bags or strollers, women may find transit travel too inconvenient and choose another mode. Some transit operators in Europe (such as Transport for London) allocate space on transit vehicles for strollers. However, U.S. buses typically do not have such dedicated space; strollers may be parked in seats but only if they are not in use (Coale, 2015). Many U.S. transit companies, such as New York City's MTA, allow only folded strollers on the bus, a decision that forces parents to fold strollers, while also handling their children. This is not an easy task, and doing so in a crowded bus is a potential safety hazard (Lowry, Furfaro, & Brown, 2017).

Policy and Practice to Address Women's Transportation Needs

While gendered differences in travel behavior are well-documented in the academic literature, policy and practice have been slower to respond to these differences. Much of the discussion around addressing women's mobility needs comes from "gender mainstreaming" initiatives in the United Nations and other global quasi- or non-governmental organizations. Gender mainstreaming is the concept and strategy of promoting and achieving gender equality across multiple disciplines. Transportation is a key component of these efforts (United Nations Economic and Social Council, 2009).

Despite the growing global attention to gender differences in travel behavior, (Blomstrom, Gauthier, & Jang, 2018; Hasson & Polveoy, 2011; Maffii, Malgieri, & De Bartolo, 2016; Peters, 2013), very few transportation agencies have adopted programs and services to address these issues. There are some notable exceptions; transit agencies in the U.K, Sweden,

Canada, and a few other countries have enacted policies to respond to the transportation needs of women. However, these types of initiatives have been slow to appear in the U.S.

U.S. transit agencies have focused on safety and security, issues uniquely pertinent to women. Moreover, in a survey of representatives from 131 U.S. transit operators, respondents acknowledged that women have distinct safety and security needs; however, they did not think that their agencies should adopt programs to address women's unique needs. Further, only a handful of agencies had initiated programs to improve the safety and security needs of women. The survey also suggests that there is a significant mismatch between the safety and security needs and desires of female passengers and the types and locations of strategies that transit agencies have implemented. The security strategies of transit agencies tend to focus on the transit vehicle and, to a certain extent, the railway platform, while ignoring bus stops, the location that elicits the most fear among female passengers (Loukaitou-Sideris & Fink, 2009). Transit agencies also privilege technological (e.g. surveillance cameras, CCTV, alarm buttons) over human security measures (police officers or staff) (Loukaitou-Sideris & Fink, 2009). The findings from this survey of transit operators mirror those from a study of the Chicago Transit Authority. In Chicago, security cameras had a smaller effect on women's feelings of safety compared to men, even as safety-related issues affected women significantly more than their male counterparts (Yavuz & Welch, 2010).

In recent years, some transit operators have begun to address sexual harassment issues; such efforts are particularly timely given the increased attention to sexual harassment in the #MeToo era. In this section, we highlight two examples from outside the United States, one from London and a second from Toronto. London is leading all global cities in both understanding and operationalizing gendered mobility differences and launching major anti-harassment initiatives. Over the last 30 years, Toronto also has implemented a number of gender-oriented transportation efforts, which include anti-harassment programs and women's safety efforts. We present a brief description of these undertakings below.

London

The origin of London's efforts to improve women's transportation experience began with the London Mayor's 2010 Transport Strategy. The Mayor presented his overarching vision that London's transport system should be "providing access to opportunities for all its people and enterprises (Greater London Authority, 2010)." Transport for London, the city's transportation agency, was charged with delivering on this vision; outlining their equality approach in, what they called, the "Single Equality Scheme" or SES. The 2010 Equality Act for England, Scotland, and Wales requires public agencies to outline and publish objectives to eliminate discrimination and advance equality. A key component of the SES is to develop strategies to advance equality across varying population groups including women, minority communities, older people, younger people, low-income households, and disabled people. Transport for London used the SES to support and deliver the Mayor's Transportation Strategy and meet the requirements of the Equality Act.

Through their SES efforts, Transport for London published *Travel in London: Understanding our Diverse Communities* in 2015 (Transport for London, 2015b). The report highlights the gendered travel patterns and preferences of women in London, with findings that largely mirror the findings outlined in this review. The similarities include:

- Women take more weekday trips than men (2.8 for women and 2.6 for men).

- Women are more likely to travel with strollers or travel for shopping purposes and this affects their transportation choices.
- Women are more concerned than men with the ease of making their travel journey.
- Women experience more worry while travelling and this is more likely to affect their travel frequency than men.

As follow up to the SES, Transport for London next adopted the “Action for Equality” which outlines the continued equality commitments 2016-2020 (Transport for London, 2016). Both of these efforts include yearly progress reports on the adoption of specific policies and programs to address equality (Transport for London, 2015a, n.d.). The progress reports outline numerous programs and policies that are currently in progress including the following efforts to address gender issues related to transit use:

- **Safer Travel at Night** - a communication campaign targeted at women to discourage using illegal minicabs.
- **Safe Travel for All Initiative** - an educational program to grow confidence in travel among vulnerable adults.
- **Project Guardian** - a long-term program to reduce sexual assaults and unwanted sexual behavior on public transportation. This program includes the “Report it to Stop it” reporting campaign that offers a 5-digit number that people can text or call to report behavior that makes them feel uncomfortable on public transit. Reporters are also “guaranteed a reply.” (Transport for London, 2015a). In addition, “Project Guardian” trains community support officers and revenue inspectors to spot offender behavior.
- **Installing wide-aisle gates in 2/3rds of Underground stations** - design interventions to make gate use easier for people traveling with strollers and shopping bags.
- **Fear of crime profiles** - crime profiles for all London boroughs to help support plans to address safety and security.
- **Targeted programs on select bus lines to combat antisocial behavior and crime** - a pilot program on one bus line that resulted in a crime reduction and fear of crime. Lessons are expected to be applied to at least two new routes.
- **Improved Tube design** - new Tube carriages have wider doors and walkways helping both disabled travelers and women traveling with strollers and shopping bags.
- **Fit for the Future** - a program that increases the visibility and availability of staff in Underground stations.
- **Making all new stations step-free** - design intervention outlined in the 2016/17 actions that declares all planned new stations will be step-free to enhance accessibility for disabled people.

Many of these efforts are still underway and their overall effect on gendered transportation outcomes has not yet been comprehensively evaluated. Regardless, the efforts in London to address women’s transportation differences are notably intentional, multi-faceted, and serve as an example for other local agencies to follow.

Toronto

Toronto's efforts to address women's mobility mostly center around improving safety and security. Nearly 30 years ago, the Toronto Transit Commission (TTC) partnered with METRAC (Metropolitan Action Committee on Violence Against Women and Children) to address and improve women's safety on public transit. Using a safety audit tool created by METRAC, the TTC sought to better understand and then address the safety concerns of women transit riders. Their efforts led to two major project outcomes, the request stop program and designated waiting areas (METRAC, n.d.).

Implemented in the early 1990's, the request stop program allows women traveling alone to ask bus drivers to stop in between stops at night, minimizing the distance that women have to walk alone. The program was so successful that in 2011, the effort was extended to allow any transit passengers traveling alone to request a stop between the hours of 9:00 p.m. and 5:00 a.m. (Toronto Transit Commission, n.d.).

Designated waiting areas (DWA) are a design intervention for subway stations. In every station, the DWA is a place on the platform with prominent lighting and a bold "DWA" sign. These areas are also equipped with a two-way voice intercom so that riders can speak directly to a staff member on duty (Toronto Transit Commission, n.d.) should they need assistance.

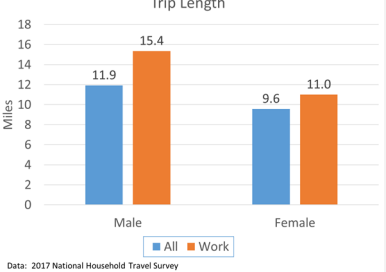
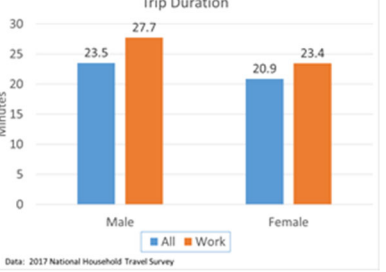

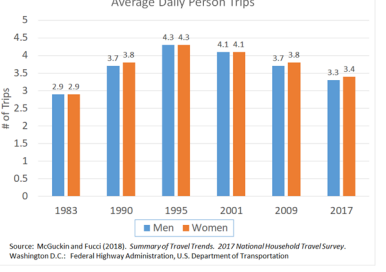
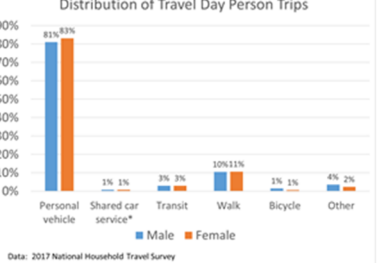
In summer 2018, the Toronto City Council passed a motion to develop a framework for a Gender Equity Strategy and a Gender Equity office for the City of Toronto (City of Toronto, n.d.). The City Council explicitly included gendered transportation concerns in the motion (Wong-Tam, 2018). While Toronto has a history of addressing some of the challenges women experience on transit, the development of a gender equity strategy is an opportunity for the region to renew and update their efforts.

Conclusion

A number of studies highlight the convergence in the travel patterns of men and women (Crane, 2007; Rosenbloom, 2004). Rosenbloom (2004) identifies three explanations for this convergence: 1) increasing numbers of women in the paid labor force; 2) changing household roles with more men assuming domestic and childcare responsibilities; and 3) changing household composition with more single-person and single-parent households. However, the research suggests that a substantial gender gap in travel patterns remains (Crane, 2007; Hanson, 2010; Rosenbloom, 2004). While some of the underlying gender disparities that help to explain women's travel behavior are slowly waning, they persist. Women still do more household-supporting work than men; women still earn lower wages than men; and women are still more likely than men to be sexually harassed, sexually assaulted, and resultantly fear for their safety in public spaces.

A growing number of organizations recognize the need to address the gender gap in travel and the barriers this gap presents for women (Coale, 2015; Cresswell & Uteng, 2008; Hasson & Polveoy, 2011; Kaufman, Polack, & Campbell, 2018; Peters, 2013; Transport for London, 2016; Wong-Tam, 2018). However, unfortunately, responses from local public agencies, especially in the United States, remain limited.

Table 1: National Summary: Sex Differences in Travel Behavior (U.S.)

Travel Characteristic	Sex Differences	National Data																					
Trip length (miles)	<ul style="list-style-type: none"> Women make shorter trips than men (even controlling for race, mode, and residential location) 	 <p>Trip Length</p> <table border="1"> <thead> <tr> <th>Sex</th> <th>All (Miles)</th> <th>Work (Miles)</th> </tr> </thead> <tbody> <tr> <td>Male</td> <td>11.9</td> <td>15.4</td> </tr> <tr> <td>Female</td> <td>9.6</td> <td>11.0</td> </tr> </tbody> </table> <p>Data: 2017 National Household Travel Survey</p>	Sex	All (Miles)	Work (Miles)	Male	11.9	15.4	Female	9.6	11.0												
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Trip Duration	<ul style="list-style-type: none"> Women have shorter average commutes than men 	 <p>Trip Duration</p> <table border="1"> <thead> <tr> <th>Sex</th> <th>All (Minutes)</th> <th>Work (Minutes)</th> </tr> </thead> <tbody> <tr> <td>Male</td> <td>23.5</td> <td>27.7</td> </tr> <tr> <td>Female</td> <td>20.9</td> <td>23.4</td> </tr> </tbody> </table> <p>Data: 2017 National Household Travel Survey</p>	Sex	All (Minutes)	Work (Minutes)	Male	23.5	27.7	Female	20.9	23.4												
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Trip purpose	<ul style="list-style-type: none"> Women make more household-serving trips than men and fewer work trips 	 <p>Trip Purpose</p> <table border="1"> <thead> <tr> <th>Purpose</th> <th>Men (%)</th> <th>Women (%)</th> </tr> </thead> <tbody> <tr> <td>Work</td> <td>22%</td> <td>16%</td> </tr> <tr> <td>Family/Personal Business</td> <td>11%</td> <td>19%</td> </tr> <tr> <td>School/Church</td> <td>16%</td> <td>20%</td> </tr> <tr> <td>Other</td> <td>13%</td> <td>13%</td> </tr> <tr> <td>Social/Recreational</td> <td>22%</td> <td>21%</td> </tr> <tr> <td>Shopping</td> <td>17%</td> <td>11%</td> </tr> </tbody> </table> <p>Data: 2017 National Household Travel Survey</p>	Purpose	Men (%)	Women (%)	Work	22%	16%	Family/Personal Business	11%	19%	School/Church	16%	20%	Other	13%	13%	Social/Recreational	22%	21%	Shopping	17%	11%
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# of daily trips	<ul style="list-style-type: none"> The number of daily trips declined since 1995 Women make about as many daily trips as men 	 <p>Average Daily Person Trips</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Men</th> <th>Women</th> </tr> </thead> <tbody> <tr> <td>1983</td> <td>2.9</td> <td>2.9</td> </tr> <tr> <td>1990</td> <td>3.7</td> <td>3.8</td> </tr> <tr> <td>1995</td> <td>4.3</td> <td>4.3</td> </tr> <tr> <td>2001</td> <td>4.1</td> <td>4.1</td> </tr> <tr> <td>2009</td> <td>3.7</td> <td>3.8</td> </tr> <tr> <td>2017</td> <td>3.3</td> <td>3.4</td> </tr> </tbody> </table> <p>Source: McGoickin and Fucci (2018), Summary of Travel Trends, 2017 National Household Travel Survey, Washington D.C.: Federal Highway Administration, U.S. Department of Transportation</p>	Year	Men	Women	1983	2.9	2.9	1990	3.7	3.8	1995	4.3	4.3	2001	4.1	4.1	2009	3.7	3.8	2017	3.3	3.4
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Travel mode	<ul style="list-style-type: none"> Women use cars slightly more than men Women use transit about the same as men Women bike less than men Women use the family car more than men 	 <p>Distribution of Travel Day Person Trips</p> <table border="1"> <thead> <tr> <th>Mode</th> <th>Male (%)</th> <th>Female (%)</th> </tr> </thead> <tbody> <tr> <td>Personal vehicle</td> <td>81%</td> <td>83%</td> </tr> <tr> <td>Shared car service*</td> <td>1%</td> <td>1%</td> </tr> <tr> <td>Transit</td> <td>3%</td> <td>3%</td> </tr> <tr> <td>Walk</td> <td>10%</td> <td>11%</td> </tr> <tr> <td>Bicycle</td> <td>1%</td> <td>1%</td> </tr> <tr> <td>Other</td> <td>4%</td> <td>2%</td> </tr> </tbody> </table> <p>Data: 2017 National Household Travel Survey</p>	Mode	Male (%)	Female (%)	Personal vehicle	81%	83%	Shared car service*	1%	1%	Transit	3%	3%	Walk	10%	11%	Bicycle	1%	1%	Other	4%	2%
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<p>Driver's license</p>	<ul style="list-style-type: none"> ● Women are less likely to have a driver's license than men ● Sex differences in licensing represent a cohort effect, a sex gap in licensing among older adults ● Younger women are as or more likely to have driver's licenses than men 	<p>Licensed Drivers as % of Age Group (2016)</p> <p>Source: https://www.fhwa.dot.gov/policyinformation/statistics/2016/</p>
<p>Trip complexity</p>	<ul style="list-style-type: none"> ● Women are more likely than men to have complicated trip patterns 	<p>Worker Trip-Chaining by Sex and Year</p> <p>McGuckin, Nancy and Yukiko Nakamoto (2005). "Differences in Trip Chaining by Men and Women." <i>Research on Women's Issues in Transportation</i>, Volume 2. Technical Papers. Washington, DC: Transportation Research Board.</p> <p>Source: McGuckin and Nakamoto (2005)</p>
<p>Depart to work</p>	<ul style="list-style-type: none"> ● Women are less likely than men to leave for work before 7:00 ● Women are more likely than men to leave for work after 7:00 	<p>% of Workers by Time of Departure to Work and Sex</p> <p>Ruggles et al. (2018). Data from the 2012-2018 American Community Survey.</p>
<p>Trip Start Times (all unlinked trips)</p>	<ul style="list-style-type: none"> ● Women are less likely than men to start trips before 7:00 ● Women are more likely than men to start trips during the middle of the day 	<p>% of Travelers by Trip Start Time and Sex (All Unlinked Trips)</p> <p>Source: 2017 National Household Travel Survey</p>

Table 2. Underlying Determinants of Women’s Travel and Effect on Travel Behavior

Barriers	Barrier Type	Impact on Women’s Travel Behavior
Economic	<ul style="list-style-type: none"> ● Gender gap in earnings ● Occupational sex segregation 	<ul style="list-style-type: none"> ● Shorter commute distances than men
Cultural	<ul style="list-style-type: none"> ● Women as primary caregivers for children and parents ● Women primary responsibility for household-supporting work 	<ul style="list-style-type: none"> ● Trip chaining (trips on the way to and from work) ● Traveling with other family members and/or goods ● More likely to need and use car
Harassment	<ul style="list-style-type: none"> ● Physical and verbal abuse in public settings 	<ul style="list-style-type: none"> ● Avoid certain modes (transit, walk, bicycles, ride hailing) ● Avoid certain routes ● Travel during daytime hours ● Travel with others
Psychological	<ul style="list-style-type: none"> ● Fear of harassment and victimization ● Sex differences in self-regulation related to confidence in driving as women age 	
Physical	<ul style="list-style-type: none"> ● Hostile urban environments 	

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