Gender Differences in the Commute to School and Work through Time and Space in the Greater Toronto and Hamilton Area, Canada

by

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A thesis submitted in conformity with the requirements for the degree of Master of Arts
Department of Geography
University of Toronto

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Abstract

Previous research on gender and mobility has pointed to differences between male and female travel patterns, but little attention has been paid in transportation planning practice to gender differences in travel demand. This thesis explores gender differences in the school and work commute through the life cycle and over time and space in effort to inform policies that begin to address the needs of a diverse population. The results suggest that school-aged males use active modes more than females, but females use active modes more than males during the years of labour force participation. Adult men continue to use the automobile to travel to work, while females make up a greater proportion of transit riders than males. Mode share differences increase with age, but have decreased since the 1980s. The relationship between male and female travel mode also differs depending on many factors including distance, time, and place.
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# Table of Contents

Acknowledgments...........................................................................................................iii

Table of Contents..........................................................................................................iv

List of Tables...................................................................................................................vii

List of Figures..................................................................................................................viii

## 1 INTRODUCTION

1.1 Background..............................................................................................................1

1.1.1 Transport Conditions in the Greater Toronto and Hamilton Area.....................1

1.1.2 Defining Gender...................................................................................................3

1.1.3 Why Include Gender in Transport Planning?.......................................................4

1.1.4 Gender in Transport Policy....................................................................................5

  Ontario Professional Planners Institute.......................................................................5

  Metrolinx’s *The Big Move*.......................................................................................6

  Toronto Transit Commission.......................................................................................7

  Transit Authorities in the Outer Suburbs of the GTHA..........................................8

1.1.5 Policy Conclusions..............................................................................................9

1.2 Thesis Outline and Objectives..................................................................................9

## 2 REVIEW OF THE LITERATURE

2.1 Introduction..............................................................................................................11

2.1.1 Literature Search Methods..................................................................................12

2.2 School Travel: From Grade School to High School..............................................13

  2.2.1 Active School Transport (AST).........................................................................13

  2.2.2 Factors Influencing AST...................................................................................14

  2.2.3 Gender and AST...............................................................................................19

2.3 Post-Secondary School Travel................................................................................20

  2.3.1 Gender and Post-Secondary Travel.................................................................20

  2.3.2 Gender and Licensing.....................................................................................21

2.4 Travel to Paid Work Outside the Home.................................................................22

  2.4.1 Gendered Parenting.........................................................................................23
2.4.2 Gender, Income, and Ethnicity .................................................................26
2.4.3 Gender and Carpool Formation ..............................................................28
2.4.4 Gender and Old Age ..............................................................................29

2.5 Gender, Mobility, Time, and Space ..........................................................30

2.6 Gender and Transport Policy ...................................................................32

2.7 Conclusion .................................................................................................33

3 GENDER DIFFERENCES IN SCHOOL AND WORK COMMUTING MODE THROUGH THE LIFE CYCLE

3.1 Introduction ...............................................................................................35

3.2 Methods ......................................................................................................38
  3.2.1 Study Area and Data ...........................................................................38
  3.2.2 Exploratory Statistical Approach ..........................................................38
  3.2.3 Age and Gender ..................................................................................39
  3.2.4 School and Employment Status ............................................................40

3.3 Results ........................................................................................................40
  3.3.1 Gender and Age ..................................................................................41
    GTHA .......................................................................................................41
    Intra-Regional Differences in Transport Use across the GTHA .................47
  3.3.2 Gender and Household Characteristics ................................................54
  3.3.3 Gender and Distance .........................................................................56
    GTHA .......................................................................................................56
    Intra-Regional Differences across the GTHA ..............................................57
  3.3.4 Gender and Licensing ........................................................................59
    GTHA .......................................................................................................59
    Intra-Regional Differences across the GTHA ..............................................60

3.4 Discussion ..................................................................................................62
  3.4.1 Gender and Age ..................................................................................62
  3.4.2 Gender and Household Characteristics ................................................63

3.5 Conclusion ..................................................................................................65
4 GENDER DIFFERENCES IN THE WORK COMMUTE OVER TIME AND SPACE IN THE CITY OF TORONTO

4.1 Introduction........................................................................................................66

4.2 Methods...............................................................................................................67
  4.2.1 Study Area and Data.................................................................................67
  4.2.2 Statistical Analysis......................................................................................69
  4.2.3 Exploratory Mapping..................................................................................70

4.3 Results..................................................................................................................70

4.4 Discussion............................................................................................................76

4.5 Conclusion..........................................................................................................77

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Main Findings...............................................................................79
  5.1.1 Gender Differences in School and Work Commuting Mode through the Life Cycle.................................................................79
  5.1.2 Gender Differences in the Work Commute over Time and Space in the City of Toronto.................................................................81

5.2 Policy Implications..............................................................................................82

5.3 Areas of Future Research....................................................................................83

References................................................................................................................86
List of Tables

1 Summary of correlates of AST for a sample of reviewed papers by study location and participant age. The direction of the relationship between correlates and AST is indicated by a positive or negative sign in brackets.

2 Driving Mode Share (% of Daily Work Trips) by Gender and Household Characteristics
List of Figures

1 Daily school and work travel mode share (% of trips) in the GTHA (1986-2011) by age, year, and gender.

2 Difference between female and male active transport mode share (% of daily school and work trips taken by walking or cycling) in the GTHA by age. Calculated as: female AT mode share (%) - male AT mode share (%).

3 Difference between female and male public transit mode share (% of daily school and work trips taken by local or regional transit) in the GTHA by age. Calculated as: female transit mode share (%) - male transit mode share (%).

4 Difference between female and male automobile mode share (% of daily school and work trips taken as an automobile driver or passenger) in the GTHA by age. Calculated as: female auto mode share (%) - male auto mode share (%).

5 Daily school and work travel mode share (% of trips) in the outer suburbs (1986-2011) by age, year, and gender.

6 Difference between female and male active transport mode share (% of daily school and work trips taken by walking or cycling) in the GTHA by age and regional municipality. Calculated as: female AT mode share (%) - male AT mode share (%).

7 Daily school and work travel mode share (% of trips) in the Toronto (1986-2011) by age, year, and gender.

8 Difference between female and male public transit mode share (% of daily school and work trips taken by local or regional transit) in the GTHA by age and regional municipality. Calculated as: female transit mode share (%) - male transit mode share (%).

9 Difference between female and male automobile mode share (% of daily school and work trips taken as an automobile driver or passenger) in the GTHA by age and regional municipality. Calculated as: female auto mode share (%) - male auto mode share (%).

10 Straight-line trip distances between home and work for males and females with full-time employment in the GTHA

11 Straight-line trip distances between home and work for males and females with full-time employment by regional municipality in the GTHA

12 Females with driver’s licenses as a percent of total licensed population by age in the GTHA, 1986-2011
13 Females with driver’s licenses as a percent of total licensed population by age and regional municipality in the GTHA, 1986-2011

14 Map of the City of Toronto showing pre-amalgamation borders of Toronto, including the inner suburbs and downtown area

15 Map of Urban Growth Areas in the Greater Golden Horseshoe, from Places to Grow, source: (Ministry of Municipal Affairs and Housing, 2008)

16 Female and male driver mode share (%) in the City of Toronto, 1986

17 Female and male driver mode share (%) in the City of Toronto, 2011

18 Relationship between male and female driving mode share and distance to Downtown UGC, 1986 and 2011

19 Difference between female and male driver mode share (%) in the City of Toronto, 1986 and 2011, calculated as female driver (%) – male driver (%)

20 Regression lines depicting relationship between gender difference in driving mode share (calculated as female mode share – male mode share), 1986-2011
Chapter 1
Introduction

1.1 Background

1.1.1 Transport Conditions in the Greater Toronto and Hamilton Area (GTHA)

An efficient transportation system is fundamental to the economic prosperity and overall well-being of a city or region. In the Greater Toronto and Hamilton Area (GTHA), Canada, congestion is a barrier to economic productivity, health, mobility, sustainability and quality of life. Commuters in the GTHA currently face longer commute times, congested roads and highways, unreliable transit, and unsafe cycling and pedestrian pathways (Metrolinx, 2008a). In addition to the issues faced by commuters daily, other challenges, such as the direct and indirect costs of congestion borne out by families, businesses, and the region, are less visible. For example, the direct and indirect costs associated with motor vehicle injuries in Ontario alone were an estimated $599 million in 2004 (SmartRisk, 2009), not to mention productivity costs of time lost to long commutes. According to the Organization for Economic Co-operation and Development (OECD) and many other estimates, the region’s traffic congestion problem measures in the billions of dollars in lost productivity annually (OECD, 2010). Some examples of costs caused by congestion and longer commute times during working hours include: less productive paid labour hours of truck drivers, paid time spent travelling to business meetings, and indirectly, time used on the commute that could be more productively applied to other working or personal pursuits (Metrolinx, 2008b). With a rapidly growing population in the GTHA, these financial costs of congestion will only worsen unless significant changes are made to our demand for transportation and the supply of transport systems.

Another cost of congestion in the GTHA is the environmental consequence of vehicle emissions. Of the estimated 2.7 billion dollar excess cost of congestion in 2006, 29 million is
attributed to vehicle emissions due to the stop-and-go nature of congestion (Metrolinx, 2008b). As mentioned previously, the cost of congestion in the GTHA exceeds 2 billion dollars and is expected to reach 3 billion by 2031 (Metrolinx, 2008b). Broken down by regional municipality, the greatest annual excess cost of congestion is experienced by Toronto commuters, with approximately 1.4 billion dollars lost in 2006, followed by Peel with 845 million dollars lost (Metrolinx, 2008b). Despite the high costs of congestion in Toronto, some of the largest contributors to greenhouse gas emissions in the region are located in the lower-density suburbs, largely due to the auto-dependent nature of the built landscape (City of Mississauga, 2009). After World War II, there was rapid expansion out of the centre of Toronto into low density areas that were designed and built with the automobile in mind. The rise of the region’s automobile suburbs has contributed to the greenhouse gas emissions of today and is a reason for the current state of congestion in the GTHA.

The issues associated with congestion in the GTHA mentioned above are well-known and understood and have contributed to the increase in funding for large-scale transit projects across the region. The 2016 Ontario budget outlines the use of significant funds for infrastructure projects, many of which are dedicated to transportation projects within the GTHA. Funding includes 13.5 billion dollars to implement GO Regional Express Rail (GO RER), which services the entire region, and 1.4 and 1 billion dollars for the Hurontario and Hamilton LRT respectively (Ministry of Finance, 2016). In addition to transit projects, plans to widen major highways and add new high-occupancy vehicle (HOV) lanes are also underway. Cycling infrastructure is also mentioned as a commitment the province has made to building a more sustainable province (Ministry of Finance, 2016). These large potential projects represent an opportunity to make sure that all members of the population will gain improved access and mobility from the proposed changes. During the early phases of these plans, intersections between “gender” as a sociological construct, and transport supply and demand, should be considered, to partially ensure that our systems are built to support a diverse population with different needs.
1.1.2 Defining Gender

Before describing the need for gendered discourse in transportation planning, it is important to define gender. Gender is understood as a social construct that transcends and is more complex than the male/female binary. Although gender is understood as binary in much of the literature, there are consequences to this rigid categorization for the transgender and gender variant populations. Doan (2010) argues that a tyranny of gender emerges for those who transgress gender norms and subsequently shapes the spaces in which they live and the behaviours they display. Individuals who do not conform to a narrow gender dichotomy are marginalized in spaces by individuals who feel the need to act as gender enforcers. Lived experiences of the gender non-conforming, such as harassment in public spaces and ‘gender policing’, influence mobility decisions and the ways in which gender variant individuals interact with public and private spaces. Exclusion of this already marginalized population from gender and mobility discourse is problematic as it reproduces the gender binary and fails to recognize diversity within and between categories and how this diversity manifests itself in the use of our transportation systems.

In the context of this thesis, and due to limitations in survey options pertaining to gender (i.e. restricted to “male” and “female” categories), discussion of gender is limited to socially constructed roles associated with males and females. Although diversity and fluidity is recognized within and across these labels, the terms boy/girl, male/female, and men/women are used as a matter of literary convenience to connect to research where gender has been similarly categorized. The ways in which gender fluidity and sexuality may impact individual travel behaviour and household decision-making, though meaningful, cannot be addressed using the secondary data studied in this thesis.
1.1.3 Why Include Gender in Transport Planning?

The role of planners and policy makers is to serve the needs and interests of the public. A problem arises when discussing ‘public interest’ as there is not one uniform ‘public,’ but many different people and experiences operating within society (Fainstein & Servon, 2005). The amount of power held in decision-making processes differs by group, and there is a need to make decisions that create spaces for groups who may have historically had less of a voice in the planning process (Fainstein & Servon, 2005). The universal tone in planning does not account for the myriad experiences of a diverse population, but typically reflects that of a white middle-class male (Fainstein & Servon, 2005). The socially constructed nature of gender means that power dynamics and gender roles change over time as society changes. Adding gender to planning discourse can begin to account for differences that occur within populations not only between different groups of people, but over time as well.

The dynamic nature of women’s role in society makes gender important for transport planning in particular. An increase in working women during the post-World War II period and onwards radically increased the number of commuters (e.g. cars on roads, people in buses, etc.) and drastically changed the transportation demand landscape. It is important to note that interactions between individuals and transport systems differ by gender and have changed as women’s roles have changed in history. Despite an increase in men’s household involvement, data from the 2010 General Household Survey reveal that women spend 1 hour and 13 minutes more time on unpaid labour than men; unpaid work includes responsibilities such as household work, childcare and civic/volunteer activities (Statistics Canada, 2010). Women have also been shown to be more likely than men to want to engage in sustainable commuting, including carpooling, instead of using a single-occupant vehicle (SOV) (Tischer & Dobson, 1979). Planning transit and active transport infrastructure in a way that serves women’s needs could potentially improve issues of congestion seen today. For example, allowing individuals to enter and exit a transit system for a certain period of time without paying an additional fare could be particularly beneficial for women who must make stops on their way to or from destinations to complete domestic duties.
Despite the fact that men and women’s travel patterns are sometimes considerably different due to the patriarchal constructed or reinforced norms about household responsibilities, labour force participation, automobile ownership, and the concept of ‘good parenting’, gender is largely absent from transportation planning discourse and policy documents at all levels in Canada – from the national, to provincial, to municipal scale. In the next section, transport policy at the national to local level are explored to identify the presence or absence of gender-related policies and programs, or policies and programs that would be of specific benefit to women.

1.1.4 Gender in Transport Policy

Ontario Professional Planners Institute

At the provincial level, the Ontario Professional Planners Institute (OPPI) provides guidance and sets standards of practice for planning professionals (OPPI, 2012). The OPPI recently acknowledged an article by Toronto Women’s City Alliance (TWCA) that brings gender to the forefront of community planning. This article calls for ‘gender sensitive planning’ and identifies the importance of planning for people who may experience spaces differently depending on their identities (TWCA, 2016). An example from Vienna, where on-site kindergartens, pharmacies, and doctors’ offices were located close to public transit showed how gendered planning is possible (TWCA, 2016). While the organization of a neighbourhood in this way may benefit men and women alike, time use data continue to show that women spend more time on household-related activities than men (Statistics Canada, 2010). Thoughtful inclusion of gender in planning could enable women to integrate their household responsibilities and errands into their work commute. That is not to say that these roles/responsibilities should not be shared equally, between partners, but that given that women continue to shoulder the burden of household duties, some thinking and planning for transport that includes issues of gender and labour, makes sense. This piece posted by the OPPI will hopefully spark conversation among professional planners about how communities may look with gender built into the planning process. This importantly accounts for
one aspect of diversity in planning and acknowledges that there is not ‘one public’, but many experiences and interests to consider in the planning process.

**Metrolinx’s *The Big Move***

*The Big Move* is the GTHA planning document created in 2008 to govern transportation projects over the next 25 years by Metrolinx, the regional planning authority in the GTHA. Examples of goals and objectives from this document include: a wider range of transportation options and accessibility, improved experience and reliability, increased walking and cycling, safe/secure mobility, improved connections and multi-modal integration, and a more environmentally and fiscally sustainable transportation system (Metrolinx, 2008a). *The Big Move* seeks to increase active travel to school to 60%, see one-third of work trips taken by transit and one-fifth of work trips taken by active modes (e.g. walking, cycling) (Metrolinx, 2008a). Other than mention of women in the objective to improve traveller safety, gender is absent from discourse on transportation designs and services. More broadly though, *The Big Move* does outline objectives to improve the GTHA’s transportation system for a diverse population. It discusses the public health benefits of increased active travel to school, considers the issues associated with a shift towards an aging population, and provides a plan for improving mobility options for persons with disabilities (consistent with the Accessibility for Ontarians with Disabilities Act to be adopted by 2025) (Metrolinx, 2008a). In addition to these populations, consideration of gender, ethnicity, and income is necessary in planning future transportation infrastructure and services. While Metrolinx’s *The Big Move* governs transportation at the regional scale, across the GTHA, local transit authorities also have their own goals, agendas, and plans that should, but seldom do, include discourse on women’s mobility needs. Although public transit is not the only mode for which gender must be considered, large-scale transit projects and policy changes will have significant impacts on the mobility of women, who currently constitute a larger share of transit ridership than men.
Toronto Transit Commission

The Toronto Transit Commission (TTC) provides transit in the form of buses, streetcars, paratransit and rapid transit to the City of Toronto and serves over 1.6 million passengers (fares collected) daily (TTC, 2015a). From the mid-1980s to mid-1990s, the TTC had been identified as a transport provider that responded to demands for gender planning and had made attempts to increase female employees and improve service equity for disadvantaged groups through equal opportunity programs (Wekerle, 2005). Through collaboration with representatives from nine women’s groups, feminist discourse on violence against women and women staff was incorporated into transportation planning initiatives and included the implementation of safety measures that would meet the demands of women and make these heavy transit users feel more comfortable (Wekerle, 2005). The Request Stop Program, for example, allowed women travelling alone to disembark from buses between designated bus stops, a program that today allows all passengers travelling alone between 9:00pm and 5:00am to stop closer to their destination (TTC, 2015b). In 1997, the Equal Opportunity Department was disbanded and funding cuts led to a shift away from social justice issues and a reduction in collaborative planning efforts with women’s advocacy groups (Wekerle, 2005). Since this time, very little has been done to plan equitable transit infrastructure and services that fulfill the needs of women.

Despite women comprising 57% of TTC ridership, only 15% of the transit agency’s workforce is female (Human Resources and Labour Relations Committee, 2015). The TTC is far from meeting the Toronto/Ontario benchmark and the Federally Regulated Transportation Sector Benchmark of 48.7% and 26.9% respectively (HRLRC, 2015). The TTC could also improve transit services by allowing passengers to enter and exit transit systems for indirect, short trips that are necessary to complete household-related errands (e.g. grocery shopping, picking up children from school, etc.). Currently, all passengers must pay an additional fare if they exit a transit vehicle to make a quick stop. The cost associated with trip-chaining (i.e. making multiple stops during a single trip) applies another burden on women who may already face social, environment, physical, or financial challenges accessing public transit. Although the TTC has importantly made improvements to safety features on transit vehicles and in stations, such as emergency alarms,
designated waiting areas (DWAs), and the Request Stop Program, there is a need to more effectively integrate women’s perspectives, responsibilities, and non-obligatory interests into transit planning at the TTC.

Transit Authorities in the Outer Suburbs of the GTHA

The Mississauga, Brampton, and Hamilton transit systems represent an opportunity to meet the transportation needs of a large female population, as they constitute the three census subdivisions in the GTHA with the greatest population following the City of Toronto (Statistics Canada, 2011). Similar to the TTC, safety measures on transit vehicles or at stations is the primary way in which gender is included in their systems. Mississauga Transit (MiWay), Brampton Transit, and Hamilton Street Railway (HSR) all have emergency alarms to help make women (and others) feel comfortable waiting for or riding buses. In addition, MiWay also has a request stop program similar to the TTC, where passengers can exit buses between regular MiWay bus stops (MiWay, n.d.).

Another feature that MiWay, Brampton Transit, and HSR have in common is a time-based transfer, where passengers can use a transfer for two hours from the point of paying the fare, regardless of route or direction of travel. Allowing two hours for transit use on a single fare makes it possible to complete quick trips to run errands related to caregiving and household responsibilities. Time-based transfers are not currently implemented by the TTC; however, a time-based transfer pilot program has existed on the 512 St. Clair streetcar route since 2005 (TTC, 2005). Expanding this program to the rest of the TTC in the future appears unlikely due to the loss in revenue of an estimated 20 million dollars (TTC, 2005). This policy in other regional municipalities in the GTHA, does however provide a necessary service to trip-chaining women in the outer suburbs.
1.1.5 Policy Conclusions

Women make up a large portion of transit ridership in Toronto as 57% of riders are female (HRLRC, 2015); however, current transportation planning policies do not include sufficient treatment of diversity, particularly with respect to gender. In the policy documents considered above, emphasis has been rightfully placed on safety measures in transit vehicles and stations. Moving forward, it is important to consider other ways in which gender is important to transportation, how men and women require and experience trips to work and elsewhere differently, and what those trips look like over space. Careful consideration of gender differences in all modes, not just public transit, is also required to provide policy recommendations that can help facilitate greater use of active and sustainable modes and reduce auto-dependence. It is also important to note that gendered perspectives in demand management discourse could help create communities and transportation systems that not only benefit women, but the rest of the population as well.

1.2 Thesis Outline and Objectives

Research into gender differences in travel behaviour dates back over a century and continues to be of interest to transport scholars, urban planners, sociologists, and geographers today. Despite over a century of research on the topic, little attention has been paid in practice to gender differences in travel demand and how gender affects mobility patterns and decisions. Gender dynamics within and between age categories are also not well understood in existing literature, but are imperative to the gender and mobility discussion. Travel patterns are generational and gendered; parents or household decision-makers influence mode of travel to school for children (e.g. preventing young females from walking to/from school due to the fear of stranger abductions), while the presence of children affects travel patterns to work for parents (e.g. women travel shorter distances to work due to household responsibilities). These school and work trips act as important proxies for broader transportation patterns as they constitute the largest portion of daily trips. This thesis focuses on
school and work commuting patterns through various stages of life to assess how gender’s influence on mobility changes as individuals age.

The main objectives of this thesis are to explore the following questions: (1) How does the gender difference in commuting change throughout the life cycle? (2) How has gendered mobility changed since the post-war era (i.e. when women’s labour participation increased)? And (3) What does this gender difference in commuting look like over space? This thesis explores gender differences in active transportation, public transit, and automobile use through the life cycle and examines geographical and temporal changes in gendered transport over the last 25 years in the GTHA and the City of Toronto.

There are 5 thesis chapters; chapter 1 presents background information on the increasing challenges associated with auto-dependence in the GTHA and sheds some light on the limited attention given to gender in policy at all levels of government. Chapter 2 reviews the literature on gender and transport through the life cycle (i.e., from childhood to adulthood), with a focus on geographical themes related to gender differences in commuting. This literature review examines research on child and youth travel to school as well as for adults to paid work outside the home, with a view to understanding the complex relationship between gender, mobility, time and space. Chapter 3 discusses and presents data on the temporal (i.e. from 1986 to 2011) and spatial (across the GTHA and Toronto) variation in gendered commuting through the life cycle (i.e. from childhood to adulthood). Using the school and work commute, it is possible to identify daily travel patterns across the GTHA to better understand how commuting during peak hours differs by gender, age, household/work location, and time. The experiences of children travelling to school in the 1980s differs from the experiences of children today and relates to the changes that have been seen in the work commute during this time as well. Gender differences in commuting, therefore, ebb and flow through the life cycle, but are also largely influenced by place and time. A closer look at gender differences in work commuting in the City of Toronto is the focus of Chapter 4. The thesis concludes in chapter 5 with a summary and discussion of the main findings and a discussion of potential policy recommendations.
Chapter 2
Review of the Literature

2.1 Introduction

There is an extensive literature on travel patterns to work and the factors that influence mobility and transportation mode choice. Gender is identified in the literature as a key factor associated with mode of travel, commute distance, trip purpose, and other travel behaviour indicators (Lang, 1992). Reflecting on a travel behaviour and gender literature that is now more than a century old, Susan Hanson (2010) developed a recursive approach to conceptualizing the relationship between gender and mobility, a relationship that poses two fundamental questions: (1) How does gender shape/produce mobility? and (2) how does mobility shape/produce gender? Hanson (2010) argues that the majority of the literature focuses on the former. Beginning with Pratt’s 1911 study of gender commuting in New York, the thread of the literature that documents and attempts to explain (often relying on quantitative analysis based on classical statistical theory) gender differences in commuting falls into Hanson’s first conceptual category.

The relationship between gender and mobility is described by Hanson (2010) in the context of sustainable mobility, but can be used to frame broader thinking about gendered mobility and inform research on a range of topics. The principal focus of this literature review is the exploration of gender differences in the mobility of children, youth, and adults during school and work travel. Many studies have examined differences in commuting to school for girls and boys (Ham, Martin, & Kohl, 2008; McDonald, 2012; Buliung, Mitra, & Faulkner, 2009a) and have identified differences in the adult work commute by gender as well (see reviews by Lang, 1992; Law, 1999). Any changes in gendered travel throughout the transition from school commuting to paid out of the home work commuting (i.e. as a young adult during post-secondary school years) have not been well-documented. Instead, and rather than taking a life cycle or life course approach, most studies focus on discrete life stages (i.e. childhood and adulthood) rather than how gender differences change with age.
This literature review responds to the question: What do gender differences in transport and travel behaviour look like across the life cycle? The review also considers a second question: what are the geographical themes to be drawn out from a century’s worth of publishing on gendered transport? The review also proposes remaining or nascent questions to be asked, particularly by Transportation Geographers. Most of the included works are concerned with the influence of gender on mobility, i.e., gender differences in transport and travel behaviour, rather than the ways in which mobility and transport contribute to the social, political, and economic construction of gender. While research into gendered transport and travel behaviour has been produced from across the globe, this review focuses primarily on journey-to-work and school travel research conducted in the Global North.

2.1.1 Literature Search Methods

This narrative literature review describes the gender and transport literature dating from a century ago to today. The review also looks across age categories, exploring the gender and transport theme from childhood to old age. Unlike a systematic literature review, this review chapter does not use a rigorous methodological approach to identify, select and evaluate literature. Instead, historically significant texts (see Pratt, 1911) and conceptual pieces (see Hanson, 2010; de Madariaga, 2013, for example) are used to recount how gender and mobility debates have evolved over time in the literature.

Database searches were used to identify significant texts in each of the age categories (i.e. childhood school travel, post-secondary school travel, and adulthood). Initial searches were performed from November 2015 to December 2015, and additional searches were performed in May 2016 to include recent and relevant publications. Searches were conducted primarily using databases such as Scopus, ProQuest, and PubMed. PubMed was used in particular to identify research that had been conducted on physical activity and health benefits of active school travel among children. Search terms included “physical activity,” “gender,” “mobility,” “mode choice,” “school travel,” “work commute,” “transportation” and “women.” A backward snowballing method from reference lists was then used to identify certain legacy pieces that were frequently cited in gender and mobility research. These pieces were foundational in shaping conceptual
frameworks for gender and transport research that are also reviewed in this chapter. The remainder of this review is organized into three sections that represent the stages of life where work on gender and travel behaviour has been conducted. These include: childhood and school travel, post-secondary school travel, and the adult work commute.

2.2 School Travel: From Grade School to High School
2.2.1 Active School Transport (AST)

Active school transport (AST), such as walking or cycling to school, has been the focus of published school travel literature due to the potential health, transport and environmental benefits associated with use of active modes for travel to and/or from school. AST provides a consistent form of physical activity for children and youth, which may reduce the risk of obesity and protect against the onset of chronic disease later in life (DHHS, 1996; Faulkner, Richichi, Buliung, Fusco, & Moola, 2009; Saris et al., 2003; Transportation Research Board, 2005). In addition to the potential health benefits associated with physical activity, AST and independent mobility (i.e., a child moving about a neighbourhood or city without adult supervision) provide opportunities for childhood cognitive development through increased environmental knowledge and the acquisition and practice of way-finding capabilities (Rissotto & Tonucci, 2002). Despite these benefits, North American studies have found a decline in AST and an increase in automobile mode share for school transport in recent decades (Ham et al., 2008; McDonald, 2012; Buliung et al., 2009a).

In the United States, research indicates a decrease in walking mode share for children ages 5 to 14 from 47.7% to 12.7% from 1969 to 2009 (McDonald at al., 2011). Similarly, research from Europe, Australia, and Canada also identified a decline in walking and cycling to school in the last few decades (Buliung et al., 2009; Grize et al., van der Ploeg et al., 2008). A study of AST trends in the GTHA found that the walking mode share for trips to school declined from 53.0% to 42.5% for 11-13 year olds and 38.6% to 30.7% for 14-17 year olds from 1986 to 2006 (Buliung et al., 2009). Differences in travel mode share by age, and time of day have also been reported in studies conducted in Australia and the United Kingdom (Booth et al., 2007; Pooley, Turnbull &
Adams, 2004). Older children typically use active modes less, and more walking occurs in the afternoon travel period, from school to home.

2.2.2 Factors Influencing AST

Table 1 introduces a summary of findings from research into the correlates of grade school and high school travel behaviour for a sample of papers included in this review. Studies were included if they had been published in the past 10 years and provided an example of social, environmental, or intrapersonal correlates of AST. The literature reveals diverse findings in studies from across the Global North. For example, being female was found to positively associate with AST in an Australian study of students in grades 5-7 (Giles-Corti et al., 2010) whereas North American studies suggest a positive correlation between being male and AST for similar age groups (Gropp et al., 2012; Larsen et al., 2009; McDonald, 2007). The remainder of this section takes a closer look into the correlates of AST for both younger children and high school age students.

Age acts as a determinant of AST as differences are found between young grade school students, older grade school students, and high school students. Youth traveling to high school (14-15 year olds) in the Greater Toronto and Hamilton Area used public transit, a mode that arguably requires more autonomous decision-making, more frequently than younger students, and grade school students (11-13 year olds) tended to use the school bus and active modes more often (Buliung et al., 2009a). It is not surprising that increased age may relate to an increase in independent travel and the use of alternative modes to school such as public transit. Additional studies have also found that active transportation increases as age increases; active transportation occurs as children and youth participate in independent travel (Aarts, Methijssen, van Oers, & Schuit, 2013; Su et al., 2013). With regard to cycling, however, high school student participants were observed to cycle less as they age (Emond & Handy, 2012).
**TABLE 1:** Summary of correlates of AST for a sample of reviewed papers by study location and participant age. The direction of the relationship between correlates and AST is indicated by a positive or negative sign in brackets.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Location</th>
<th>Participant Age</th>
<th>Correlates of AT (walking or cycling)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aarts et al.</td>
<td>2013</td>
<td>Netherlands</td>
<td>4-12 years</td>
<td>increased distance (-); increased age (+); low SES (-); perceived social safety (+); perceived social cohesion (+); living in the city centre (+); living in a city green neighbourhood (-); school board perceived traffic safety (+)</td>
</tr>
<tr>
<td>Buliung et al.</td>
<td>2009</td>
<td>Greater Toronto and Hamilton Area, Canada</td>
<td>11-13, 14-15 years</td>
<td>increased age (-); time of day: afternoon trips (+)</td>
</tr>
<tr>
<td>Dessing et al.</td>
<td>2014</td>
<td>Netherlands (Amersfoort, Rotterdam, Hengelo, Haarlem, Vlaardingen)</td>
<td>5-11 years</td>
<td>increased distance (-)</td>
</tr>
<tr>
<td>Emond &amp; Handy</td>
<td>2012</td>
<td>Davis, CA, USA (Grade 10-12)</td>
<td>15-18 years</td>
<td>Cycling: male (+); increased age (-); possess driver's license (-); access to a car (-)</td>
</tr>
<tr>
<td>Giles-Corti et al.</td>
<td>2010</td>
<td>Perth, Western Australia (Grades 5-7)</td>
<td>10-13 years</td>
<td>high traffic volumes around schools (-); female gender (+); living in highly walkable areas (Pedshed score) (+)</td>
</tr>
<tr>
<td>Grize et al.</td>
<td>2010</td>
<td>Switzerland</td>
<td>6-14 years</td>
<td>Cycling: increased age (+);</td>
</tr>
<tr>
<td>Study/Reference</td>
<td>Year</td>
<td>Location</td>
<td>Age Range</td>
<td>Additional Factors</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------</td>
<td>-------------------</td>
<td>-----------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Gropp et al.</td>
<td>2012</td>
<td>Canada</td>
<td>11-16 years</td>
<td>Streets with sidewalks (+); length of streets (+); male gender (+); perception of neighbourhood safety (+)</td>
</tr>
<tr>
<td>Larsen et al.</td>
<td>2009</td>
<td>London, Ontario, Canada</td>
<td>11-13 years</td>
<td>Increased distance (-); male gender (+); higher land use mix (+); presence of street trees (+); time of day: afternoon trips (+)</td>
</tr>
<tr>
<td>McDonald</td>
<td>2007</td>
<td>USA</td>
<td>5-18 years</td>
<td>Increased distance (+); male gender (+); low income (+); living in rural area (-)</td>
</tr>
<tr>
<td>McMillan, T.</td>
<td>2007</td>
<td>California, USA</td>
<td>8-11 years</td>
<td>Increased distance (+); perceived unsafe neighbourhood (-); high traffic speeds (-)</td>
</tr>
<tr>
<td>Mitra et al.</td>
<td>2010</td>
<td>Toronto, Canada</td>
<td>11-13 years</td>
<td>Increased distance (-); living in low-income areas (+); increased age (+); small block &amp; far from CBD (-)</td>
</tr>
<tr>
<td>Pabayo et al.</td>
<td>2012</td>
<td>Quebec, Canada</td>
<td>6-8 years</td>
<td>Low income (+); presence of older sibling (+); perception of neighbourhood quality as unfavorable (+)</td>
</tr>
<tr>
<td>Su et al.</td>
<td>2013</td>
<td>Southern California, USA</td>
<td>5-7 years</td>
<td>Increased distance (-); increased age (+); parents with more education (-); asthma (-);</td>
</tr>
</tbody>
</table>
Recent studies have found that a consistent predictor of active travel in children and youth is trip distance between home and school, identifying that active transportation decreases as distance increases (Aarts et al., 2013; Dessing, de Vries, Graham, & Pierik, 2014; Emond & Handy, 2012; Mitra, Buliung, & Roorda, 2010; Su et al., 2013; Wong, Faulkner, & Buliung, 2011). The proportion of walking school trips decreased as distance to school increased for Dutch elementary students, where an average active commuting distance of 422 metres was identified (Dessing et al., 2014). In addition to distance, other built environment features of neighbourhoods were found to influence levels of AST. Living in a city centre was reportedly positively associated with walking to school in the Netherlands (Aarts et al., 2013) and land use mix around the school has also been shown to influence AST (McMillan, 2007; Larsen et al., 2009). A study in the City of Toronto revealed that the physical environment around the child’s home had a stronger influence on active travel practices than the built environment around the school (Mitra et al., 2010).

Mixed findings are reported on socio-economic status (SES) as a determinant of AST. One study in the Netherlands found that children in lower SES neighbourhoods were less likely to walk to school (Aarts et al., 2012), while a Canadian study found that children who lived in households with low SES were more likely to engage in AST (Gropp, Pickett, & Janssen, 2012). Individual and household characteristics such as ethnicity and number of vehicles per household have also been shown to affect walking and cycling mode shares (McDonald, 2007). In a somewhat
rare longitudinal study, minority students were reportedly twice as likely to walk to school as white students across all survey years, potentially due to lower levels of automobile ownership (McDonald, 2007). In addition, studies have shown that availability of parents and number of siblings in the household also influences the likelihood of walking to school (Pabayo, Gauvin, & Barnett, 2011; Pabayo et al., 2012).

Safety concerns appear prominent in school-based mode choice decisions, both with regard to a child’s experience with independent mobility and travel mode (Lee, Zhu, Yoon, & Varni, 2013, Buliung et al., 2015). Parental risk perceptions, including fear of abduction or traffic accidents, play a large role in the decision to walk or cycle to school for children and youth (Murray, 2009). Since parents typically make decisions regarding children’s mobility (McMillan, 2005), perceptions around neighbourhood and traffic safety, stranger danger, and sociability are found to correlate with children’s AST and independent mobility (Mitra, Faulkner, & Buliung, 2014). This is particularly apparent in studies that address gender differences in school travel, as parental fears of independent mobility appear greater for parents of “girls” than “boys” (Buliung et al., 2015). Child-parent differences in risk perception have also been noted. For example, Buliung et al. (2015) found that children expressed concerns about neighbourhood dogs and bullies while parents identified strangers and traffic environment features as primary concerns for independent school travel. Their study, set in Toronto, Canada, also exposed geographical variation in the landscape of child-parent fears across the city’s new and older, poorer and wealthier (measured there as socio-economic status) neighbourhoods.

A geography of difference with regard to risk perception emerges from their work, one that is generational and gendered, intersecting with issues related to class, economy, and the politics of mobility. Taking an adultist view on the fear issue is simply not enough. Such a position ignores the potential possibilities intrinsic to including children and youth as agentic subjects in discourse that affect, limit, encourage their mobilities. There are also potentially important differences in how generationally distinct fears or risk perceptions are produced with, for example, parents’ perceptions being more likely to be driven by the experts and media, while children’s perceptions are predominantly experientially constructed (Murray, 2009).
2.2.3 Gender and AST

Studies have shown that individuals who self-identify as girls are less likely to engage in AST than boys (Leslie, Kremer, Toumbourou, & Williams, 2010; McDonald, 2012). This difference could be related to parental perceptions of risk associated with female independent travel, and a contemporary model of good parenting in much of the Global North that is characterized by a high level of child supervision by adults (Faulkner et al., 2010; Hsu & Saphores, 2014; Mammen, Faulkner, Buliung, & Lay, 2012; Mitra et al., 2014; Murray, 2009). A qualitative study conducted in Toronto found that parents were twice as likely to mention fears surrounding stranger abductions when their child was a girl (Buliung et al., 2015). The heightened fear of strangers for parents of girls contributes to the gender gap in AST in childhood and reduces the opportunities for daily physical activity and cognitive development for young girls.

A Spanish study of trends in AST over a six-year period found that there had been no significant change in the percentage of active commuting in boys (from 44.4% to 49.0%), while there was a decrease in female active commuting (61.0% to 47.8%) from 2001/2002 to 2006/2007 (Chillón et al., 2012). The authors also reported a relationship between family size and AST as the girls belonging to average or small families were less likely to engage in AST than those in large families (Chillón et al., 2012). Other family influences, such as parental encouragement of walking, particularly by their mother, was shown to increase the likelihood of walking to school for adolescent girls in Scotland (Kirby & Inchley, 2012).

Household dynamics such as number of siblings, family size, parental perceptions of risk, and parental encouragement have all been shown to relate to gender differences in active travel to school. While there is considerable research on gender and AST, a limited number of studies have addressed the trends in AST over time and how gender differences ebb and flow with age. The age and context within which males and females become independent from their parents (e.g. begin a part-time job, commute independently, enter post-secondary education, move out, obtain a driver’s license, etc.) may also influence gender differences in travel behaviour. Life events that occur
during or between secondary school and post-secondary school are not well-understood in terms of their effect on gendered mobility.

2.3 Post-Secondary School Travel

While the literature on gender and school travel in childhood is abundant, surprisingly few studies have assessed gender differences in post-secondary school travel, and much of the literature focuses on travel demand management (TDM) strategies implemented to reduce automobile dependence for the entire student population (Akar, Flynn, & Namgung, 2012; Balsas, 2003; Meyer, 1999, Tolley, 1996). These studies assess the implementation and efficacy of TDM strategies including: increased parking prices, universal transit passes (U-Pass), car-sharing programs, and improved cycling infrastructure on campus. Akar et al. (2012) argue that the success of these initiatives is dependent on the ability for alternative modes to provide the same level of safety, travel time, and flexibility as single-occupant vehicles. In metropolitan areas with comprehensive active transportation and public transit networks, TDM strategies have the potential to provide alternative travel opportunities at lower costs without a significant increase in travel time. At the University of British Columbia, the implementation of a mandatory U-Pass resulted in a fifty percent increase in transit ridership and a twenty percent decrease in single occupancy vehicle travel (Senft, 2005). Travel demand management strategies have the potential to reduce traffic congestion around university campuses, promote the use of active and sustainable modes for young adults, and reduce requirements or demand for expansion of investment into parking which can be a key and contentious fiscal and space planning issue.

2.3.1 Gender and Post-Secondary Travel

Recent studies on TDM implementation and mode choice have incorporated gender into travel models to examine differences in commuting behaviour for female and male students (Delmelle & Delmelle, 2012; Proulx, Cavagnolo, & Torres-Montoya, 2014; Shannon et al, 2006; Sultana, 2015). Some studies show that females are more likely to possess a parking pass or drive to post-
secondary school than males (Delmelle & Delmelle, 2012; Proulx et al., 2014); however, other research does not identify a clear gender difference in the likelihood of owning a parking pass (Sultana, 2015). At the University of Idaho, female students were found to be more willing to pay for a parking pass than male students, and males were more willing to switch to alternative modes in the face of rising parking permit prices (Delmelle & Delmelle, 2012). Interestingly, this study did not observe significant differences between males and females for walking or transit use, but did report higher levels of car use for women and higher cycling rates for men (Delmelle & Delmelle, 2012). The cycling finding has been reproduced in other research, such as Proulx and colleagues study at the University of California, Berkely (Proulx et al., 2014). Post-secondary travel behaviour research findings appear to generally align with the childhood school travel literature where higher levels of female transport by car and male transport using active modes have been shown (Delmelle & Delmelle, 2012; Proulx, et al., 2014).

2.3.2 Gender and Licensing

Declining acquisition of driving licenses in the adolescent years has become a popular topic of conversation in the media and in academic research (Weissmann, 2012). What do we know about the interaction between gender and the processes that are producing declining licensure particularly in the United States? In a series of papers, Sivak and Schoettle (2011, 2012a, 2012b) reported a reduction in the percentage of young drivers in the United States, indicating that the reduction in licensing was greater for males than females. The most frequent response among young people for not obtaining a driver’s license was “too busy or not enough time to get a driver’s license.” (Schoettle & Sivak, 2014). In the same study, females were more likely than males to report being able to get transportation from others, that they had not yet learned to drive, and that they had a fear of driving (Schoettle & Sivak, 2014).

There is more work to be done to consider why, for example, gendered passenger travel occurs in adolescence, and also why females were more likely to fear or delay the acquisition of driving skills. The experiences of girls being driven to school as a child (i.e. girls are more likely to be driven to and from school than boys) may be associated with their reasons for not obtaining
a license. Generational transfer of risk perceptions regarding traffic safety and social dangers, coupled with an ongoing ability to continue as passengers, likely explain some of what is being observed. Simultaneously, it is perhaps useful to critically consider whether or not declining licensure is really a problem. After all, we seem to be firmly rooted in a planning paradigm that is beginning to place other forms of transport ahead of automobility. That is not to say that the underlying processes giving rise to gender inequality in licensure are not problematic and worthy of additional research.

2.4 Travel to Paid Work Outside the Home

Research focusing on commuting mode choice for adults also indicates differences in the travel behaviour of men and women. Research on gender and transport dates back over a century to Pratt (1911) and has been preceded by a large body of work on differences in mode choice, commute time, trip distance, trip purpose, and other factors. The term mode choice implies that there is an option for women and men to make decisions about their travel patterns, but historically women have had reduced access to certain modes of transportation and lower daily mobility when compared to men; arguably, less choice! Early work on gender and mobility was concerned with identifying gendered patterns of commuting, but recent work has attempted to unpack these differences and understand the influence of gender on mobility and mobility on gender (Hanson 2010). While some argue that gender disparities have decreased since the early twentieth century (Crane, 2007; Crane & Takahashi, 2009), women’s use of the automobile has remained lower than men’s (Polk, 2004). Men’s access to private cars increases their freedom and flexibility, facilitates potentially efficient and time-sensitive travel, and creates opportunities to travel to new, and often farther, destinations. Women, however, are more likely to rely on alternative modes of travel that limit their mobility, reproducing or reinforcing gendered spaces and responsibilities, located close to or within the home, i.e., gender constructed mobility and mobility constructed gender (see Hanson, 2010).

One could also argue that employed women unfairly subsidize development and operation of public transit systems, through taxation (income, property, etc.), that fall short of delivering the
flexible services required to support an everyday life that, despite increased labour force participation, remains populated by heavy time use related to all manner of household tasks. For example, time use data from 2010 version of the Canadian General Social Survey indicate that on a daily basis, women spend nearly 1.5 hours more than men on household work and related activities (Statistics Canada, 2010). These activities are often scattered throughout the day and across space, women are more likely to engage in trip chains than men and have intermediate destinations between home and work, at locations related to household responsibilities (de Madriaga, 2013, Statistics Canada, 2007). Transit service policies that for example disallow repeat boarding on a single fare, to accommodate short stops for errands, unfairly discriminate against female riders. In this sense, women with paid employment are paying into a system that does not meet their daily transport needs.

### 2.4.1 Gendered Parenting

Research shows that women’s mobility is affected by the household responsibilities that are often associated with motherhood. Despite increased labour force participation for women, the activities and travel related to child care, shopping, and other household errands remain largely carried out by women. Data from Canada, for example, indicate that the average time per day spent on child care duties is between one and three hours longer for women than men (depending on the age of the youngest child) (Statistics Canada, 2010). Journey-to-work studies found that women typically travelled shorter distances to employment than men (Hanson & Johnson, 1985; Johnson-Anunonwo, 1992; Madden, 1981; Rosenbloom, 2006). Women also tend to make more trips for a wider variety of purposes, and more multimodal trips (i.e. the use of more than one mode of travel for one trip) (de Madriaga, 2013).

Further evidence that women complete more household responsibilities than men is provided by studies that find increased trip-chaining for women (Grengs, 2010; McGuckin, Zmud, & Nakamoto, 2005). One study from the United States used the 1995 Nationwide Personal Transportation Survey (NPTS) and the 2001 National Household Travel Survey (NHTS) to
explore trends in trip-chaining for men and women and found an increase in trip-chaining for men during this time (McGuckin et al., 2005). The increased number of stops for men was due in large part to more frequent stops for coffee, whereas women in a two-parent household were more likely to incorporate stops related to bringing children to and from school into their commute (McGuckin et al., 2005). The greater likelihood that women will trip-chain to meet household needs during the work commute can create challenges for women who are also faced with lower wages than their male counterparts with the same employment, and long distances to work.

Women who rely on trip-chaining to complete household tasks, particularly those in low wage households dispersed over space, may not be well served by public transit and may face additional transportation barriers than men (Grengs, 2010). Low household income and lack of vehicle ownership have been found to correspond with multipurpose, multi-stop transit work trips, while more affluent respondents have simpler work trip tours (Bernardin, Swenson, Jiang, & Grovak, 2011). Household and work locations are influenced by trip-chaining as mothers will work closer to home to carry out a wider variety of tasks. This subsequently affects income potential as job opportunities are restricted to those that are geographically close to home.

Parenthood can therefore influence household location and alter distances between home and work, affecting mode choice (Crane & Takahashi, 2009; MacDonald, 1999; Rosenbloom, 2006). Longer average commute distances can be the result of compromises made in dual career households in an attempt to minimize travel distance for both members (Green, 1997). Although household location seemingly affects women and men alike, studies have continuously shown that women typically work closer to home than men (Turner & Niemeier, 1997; Sermons & Koppelman, 2001; Rosenbloom, 2006; Shearmur 2006; Sullivan, 1997).

Patriarchal inspired norms about work and promotion can reproduce traditional gender roles of men as breadwinners and women as caregivers. Women may be limited in employment opportunities due to commute times and the need to live closer to home to meet the gendered expectations of household responsibilities. Longer commute times, which are most often carried out by men, are sometimes required to obtain a high-quality job, but may not be an option for women with disproportionate household duties (Haley-Lock, Berman, & Timberlake, 2013).
Women may therefore end up battling between messages about gendered ‘good parenting’ and motherhood and messages about being a “good” or “productive” labourer in capitalist economies, without the ability to balance both. In addition to household responsibilities restricting distance between home and work, occupations that have been historically held by women in retail, education, and health sectors tend to be more evenly distributed across cities and regions (MacDonald, 1999; Rosenbloom, 2006). The availability of job opportunities nearby, paired with family tasks associated with motherhood contribute to shorter commute distances between home and work for women than men.

The idea of the ‘good parent’ produces and associates with differences in mobility due in part to gendered and generational communication about risk and social and gendered norms about parenting and the protection of children (Murray, 2009). For example, entering into motherhood produces new risk landscapes and mobility decisions that affect the way they and their children move across space (Murray, 2009). As mentioned previously, fear of stranger abductions and unsafe traffic environments may cause mothers to chauffeur their children (particularly their daughters) to school rather than allowing them to commute independently (Buliung et al., 2015).

It can be seen that this culture of good parenting and what it means for travel decisions varies across space. Dowling (1999) states that in a suburban environment, mothers who drive their children to school are considered ‘good’ parents, whereas in other contexts, driving children to school may be considered ‘bad’. These ideas of good parenting may arise from media or expert opinions, the workplace, or social networks.

Part-time employment status is also related to gender differences in distance to work and trip purpose as all female part-time workers are found to have shorter work commutes than all part-time working men, regardless of whether they have children or not (McQuaid & Chen, 2012). This provides evidence that household responsibilities associated with parenthood are not the only factors producing shorter average distances between home and work for women than for men. Women with part-time jobs, however, still appear to complete numerous domestic duties and are observed to complete more non-work trips than full-time female workers (Aguiléra, Massot, & Proulhac, 2009). A study in Paris, France found that women who work part-time make 1.64 non-work trips on working days and women who work full-time make 1.34 trips, which is likely due
to a higher number of domestic responsibilities and more time available to carry out non-work duties for part-time women (Aguiléra et al., 2009). Similarly, Wen and Koppelman (2000) found that an unemployed person or part-time employee is more likely to be assigned stops related to household maintenance than full-time workers.

The literature clearly points to parenthood and household responsibilities as contributing factors producing gender differences in commute distance, time, and trip purpose. While this comprehensive body of work indicates that differences do exist, further research is needed to identify how these differences change over time and through various stages of life. Another limitation is the literature’s heteronormative positionality at a time where we are seeing increasing awareness and acceptance, not to mention legal recognition of new ways of being a family and/or a parent. Some work has been done to observe single-parent families in the context of low-income households, but little has been done to address travel behaviour of family structures that do not fit within the heteronormative idea of family. Looking beyond the gender binary of male and female would complicate the ideas surrounding gender, parenthood, and commuting, and would provide a more nuanced approach to this topic.

2.4.2 Gender, Income, and Ethnicity

Journey-to-work research has sought to understand commute trips as they relate to socioeconomic characteristics (Ma & Banister, 2007; Prashker, Shiftan, & Hershkovitch-Sarusi, 2008). Commuting is a space-related process that is influenced by different spatial settings such as job and housing locations (Kim, Sang, Chun, & Lee, 2012) and can therefore provide information about the labour market, income, and housing. Research on income and the commute to work has found that low-wage jobs are more evenly distributed over space and individuals therefore have greater access to lower paying jobs at shorter distances than high-paying skilled employment (Manaugh, Miranda-Moreno, & El-Geneidy, 2010). The average distance to work is greater for high-income households as income is positively related with automobility and the freedom to choose a residence that is relatively distant from the workplace (Aguiléra, Wenghenski & Proulhac, 2007).
The intersection of gender and income or economy has been widely studied in relation to work commuting. Low-income women are arguably more affected by household responsibilities, trip-chaining, and multimodal trips than the more affluent population. Wage inequality is a persistent and unjust issue still and yet well into the 21st century, research has shown that women with children earn less money than other women, while fathers earn more money than men without children (Booth & van Ours, 2008). Women’s lower wages have influenced their decision to select jobs close to their residence, creating ‘pink collar’ ghettos and disparities between the earnings of men and women (Pratt & Hanson, 1991). Employment opportunities for women tend to be spatially distributed across metropolitan areas at shorter trip distances and it is not feasible for women to travel long travel distances to employment sites based on the wages received (Madden, 1981). While gender plays a role in commuting behaviour of low income individuals, limited skills and low wages are seen to have a greater effect on the commuting patterns of welfare households in the USA (Ong & Blumenberg, 1998).

Numerous studies have been conducted on the spatial mismatch hypothesis, which was developed in the 1960s by John Kain to explain increasing poverty in African American central-city neighbourhoods across America (Kain, 1968). Though widely debated, proponents of this hypothesis contend that demand for labour has shifted towards the suburbs; racial discrimination in housing markets has reduced housing mobility for minority groups; and African Americans in poor central neighbourhoods are increasingly segregated by insufficient transportation linkages between the city and suburbs (Blumenberg, 2004). Although a lot of work has been done on the isolation of African Americans from labour and housing markets, little has been done to address gender as it relates to the spatial mismatch hypothesis. For welfare participants who may face a spatial mismatch between employment opportunities and home, particularly for single mothers, longer commute times are not possible due to the need to balance home and work responsibilities (Blumenberg, 2004). This makes it difficult for effective integration of policy solutions that promote long-distance reverse commuting to the suburbs for improved job opportunities.

Using the American Household Survey, one study found that over a 20-year period from 1985 to 2005, there did not appear to be a convergence in commute times by gender; however,
when race/ethnicity was considered, there was some convergence in commute times by car for Black men and women and by bus for Black and Hispanic women and men (Crane & Takahashi, 2009). Other findings demonstrate that ethnicity and foreign-born status are indicators of increased likelihood of using public transit or other non-single occupancy vehicles (Blumenberg & Shiki, 2006). Immigrant or newcomer populations require greater attention in this mismatch work, with some attempt taken to intersection the themes of immigration, gender and mobility. Findings of a California study suggest that immigrants face longer commutes, particularly using transit, and therefore have less opportunity to walk to work than non-immigrants (Beckman & Goulias, 2008). Current geopolitical tensions are producing waves of internal migration and immigration and we really have little understanding about what this means for transport planning and service provision. Questions abound concerning what services to provide, how will or do newcomer communities respond to existing or planning for the future services, and what does the intersection between gender, class, culture and immigration look like, and how does that intersectional complexity relate to or produce transport systems and challenges?

2.4.3 Gender and Carpool Formation

Shared mobility has also become a very popular topic in our major cities – a conversation that spans the scope from traditional forms of public transit, and the inclusion of private jitney services, to carpooling and ridesharing, to the rising tension between disruptive and just in time forms of shared mobility like Uber and Taxi services. Gender has been considered in some of the literature on ridematching and carpooling. Research shows that women are more likely than men to want to engage in sustainable commuting, including carpooling, instead of using a single-occupant vehicle (SOV) (Tischer & Dobson, 1979). For service workers in the Greater Golden Horseshoe, Canada, females were more likely to utilize Emergency Ride Home (ERH) carpooling services offered by their firms than men (Buliung, Bui, & Lanyon, 2012). While evidence suggests that women participate in carpool formation more often than men (Buliung, Soltys, Habel, & Lanyon, 2009b; Buliung, Soltys, Bui, Lanyon, & Habel, 2010), more research is needed to identify why these differences exist, but Buliung and colleagues speculate that some of the differences in motivating
factors again are produced by patriarchal norms driving the division of labour within and outside the home.

2.4.4 Gender and Old Age

Many countries in the Global North are seeing a substantial increase in their aging populations, a trend that is expected to continue over the next several decades. In 2011, five million Canadians were estimated to be 65 years or older, a number that is expected to double in the next 25 years due to fertility rates below replacement levels, an increase in life expectancy, and aging of the baby boom population (Statistics Canada, 2011). In addition to the implications this has on the provision of healthcare services, this demographic shift impacts the mobility of our cities’ populations, making it critical to understand how age, mobility, and aging in place are connected. Aging in place is a situation whereby older adults prefer to remain at home or in a similar familiar environment for as long as possible (Benefield & Holtzclaw, 2014). Older adults therefore have distinct mobility patterns that are rooted in many years of travel experiences and their relationships to existing and well-developed social, family, and professional communities. It is important to consider the intersection of age and mobility in the presence of a very large proportion of our population exceeding age 65.

Older adults have shown a preference towards car use and car ownership (Dejoux, Bussiere, Madre, & Armoogum, 2010; Li, Raeside, Chen, & McQuaid, 2012; Unsworth, Wells, Browning, Thomas, & Kendig, 2007) and research has shown that quality of life and mobility is reduced for those who cease driving (Whelan, Langford, Oxley, Koppel, & Charlton, 2006). Auto-dependency and mobility patterns for older adults may have impacts on traffic congestion and future transportation planning as the population ages and continues to participate in the workforce beyond age 65. In terms of gender differences in older adult mobility, evidence suggest that older women make fewer trips than older men and are more likely to be auto passengers (Hi et al., 2012). Number of trips during old age differs from those under age 60, where women typically make more trips than their male counterparts (Hi et al., 2012). Older women were also found to be three times more likely to relinquish driving than older men (Unsworth et al., 2007). Lower number of
trips and reduced car use reveals restricted mobility for women when compared to men and higher use of alternative modes than men despite car use being the preferred mode of transport for both sexes (Whelan et al., 2006).

2.5 Gender, Mobility, Time, and Space

The relationship between gender and mobility differs today from in the past and varies across geographic contexts. Hanson (2010) argues that many studies attempt to make claims that reach beyond the place and time in which they are situated. For this reason, it is important to make context central to work on gender and mobility to increase understanding of the relationship between gender, mobility, and elements of social, cultural, and geographic contexts (Hanson, 2010). Hanson (2010) provides an example using her own research in Worcester, Massachusetts, a city with a population that has lived there ‘forever’ and exhibits strong ties and rootedness to their residential location. Instead of conducting a study of descriptive mobility patterns in Worcester that can only be understood in this relatively unique geographical context, she seeks to determine the extent to which the idea of rootedness relates to gendered mobility (Hanson, 2010). Additional studies that make context central and attempt to unpack the forces driving gender differences are imperative moving forward with gender and mobility research.

Historical literature on gender and mobility reveals that several decades ago, women had reduced access to cars and lower mobility than men (Pickup, 1984). Despite the increase in women’s employment, there was little change in the distribution of domestic tasks and child care responsibilities between spouses, creating higher mobility needs for women to fulfill daily duties (Pickup, 1984). According to Oakley (1974), men and women preferred to preserve traditional gender roles even after women began entering the workforce. Retaining traditional gender roles meant that women’s travel demand was related to both work and domestic duties. Decades later, division of household labour and gender roles continue as prominent themes in transport literature. Commute time is one of the most widely used indicators of mobility differences for men and women and is consistently linked to household responsibilities (Hanson & Johnson, 1985; Johnson-Anumonwo, 1992; Lang, 1992; Madden, 1981; Rosenbloom, 2006). Recent work from
the National Study of the Changing Workforce (NSCW) in the U.S. found that marriage was statistically significant in differentiating between women and men’s commute times, but parenting was not significantly significant (Haley-Lock et al., 2012). This American study also found that women who favoured traditional gender roles had shorter commute times; however, men’s attitudes towards household roles did not result in statistically significant effects on commute times (Haley-Lock et al., 2012). The expectations surrounding gender roles may have changed over time, but these cultural and historical perspectives, rooted in 19th century capitalism and the rise of the automobile century appear to persist today in some capacity, in some places and within particular populations. Traditional gender norms can influence present mobility patterns as factors such as commute times and mode choice continue to differ between men and women.

Temporal variation in gendered commuting is also useful for understanding generational similarities and differences and the processes guiding these changes in order to understand future interactions between parents, children, colleagues, and peers. The relationship between gender and transport at a particular stage of life can influence the lives of others who participate in the same social networks at a particular moment in time. The gendered quality of work commuting (e.g. trip-chaining, trip distance, mode of transportation, etc.) may affect the gendered quality of school travel (e.g. chauffeuring a child on the way to work), and the gendered quality of child, or child-parent trips to non-school activities. Similar to the way in which colleagues may influence ideas of ‘good parenting’ in the workplace, school peers may shape and/or construct ideas about daily mobility for and with other children.

It is intuitive to believe that child mobility practices shape the travel experiences of young individuals and may translate into similar adult mobility practices; however, more research is needed to understand if this is the case. For example, children commuted to school using active modes of transportation more frequently decades ago than they do today (Buliung et al., 2009a; Ham et al., 2008; McDonald, 2012). Those children who were active commuters of the past now comprise part of the adult population driving their children to school several decades later. More research on the generational dimensions of mobility preferences, inter-generational relationships, and mobility differences through the life cycle would provide insight into the shifting nature of gendered mobility and parenting norms over time.
Travel demand management strategies are used in attempt to reduce traffic congestion, limit environmental pollution, and promote sustainable forms of mobility and increased traffic safety (Zaman & Habib, 2011). These strategies often provide incentives for switching modes from a single-occupancy vehicle to a more sustainable mode such as public transit, walking, or cycling. One study in Montreal, Canada found that a one dollar per hour increase in parking costs increases the probability of using public transit instead of a car by 5 percent (Zahabi, Miranda-Moreno, Patterson, & Barla, 2012). While these strategies are implemented for the entire commuter population, they may affect mode choice for men and women differently. Mokhtarian (1997) found that women were more likely to switch modes to avoid congestion than men, suggesting that TDM strategies may have greater effects on the travel behaviour of women. Women appear more willing to change commuting patterns for non-economic reasons than men, such as changes in family circumstances (Mokhtarian, 1997). A greater willingness of women to use sustainable modes is further supported by the carpooling literature (Buliung et al., 2009b; Buliung et al., 2010). In general, and based on experientially acquired knowledge, the second author’s observation from working with the transport planning community, is that the traveling public is often seen as “one public”. There is an urgent need to inculcate our policy and demand management discourse and practice with a thoughtful treatment of diversity and its myriad intersections with transportation demand and supply side issues.

Understanding gender differences in travel patterns can also help social assistance policy-makers create effective welfare programs and increase access to the labour market for participants, who are primarily women (Blumenberg, 2004). Policy-makers have identified transportation as a significant barrier to job opportunities for low-income individuals; however, simply providing better transportation services between the inner-city and the suburbs cannot solve the issues associated with the spatial mismatch hypothesis (Blumenberg, 2004). Simply adjusting the fare structure may contribute to greater access on paper, but if the services are not adequately and flexibly matched to the everyday lives and activities of trip-chaining female riders who require multiple stops along the way, then a fare pricing strategy will fall short of its intended goal. There
are more complex gender dynamics at play and women need to make stops related to household
duties during their commute to and from work, provide childcare, and work close to home in case
of family-related emergencies.

2.7 Conclusion

Within this review of the literature, it is apparent that family characteristics and household
dynamics have a substantial impact on the gender differences in mode choice and travel patterns
of individuals. In childhood, travel patterns are influenced by factors such as parental perceptions
of risk (Buliung et al., 2015; Faulkner et al., 2010; Mitra et al., 2014; Murray, 2009) and parental
encouragement (Kirby & Inchley, 2012). For the commute to work, household decisions about
domestic responsibilities influence travel behaviour (Lang, 1992). In both cases, parental decision-
making (i.e. either as a child or a parent) contributes to gender differences in commuting. Parents’
mobility decisions and past travel experiences, along with messages received from media,
colleagues, and social networks, work together to shape the mobility experiences of their children’s
commute to school. Future research should be informed by these complex relationships between
parental perceptions of risk, mobility patterns, and the social context of gender expectations in that
particular time and place.

Research is also needed on under-researched age groups such as post-secondary students,
and older adults. Post-secondary students are likely more independent than elementary and
secondary students, but may not yet have the same level of household responsibilities associated
with parenthood. A more in-depth study of gender and post-secondary travel is needed to
determine contributing factors to a gender gap during this stage of life, if a gender gap in fact
exists. The limited research on post-secondary school indicates that there is higher automobile
use for young women than men, but the reasons for this are unclear. It is also unclear whether a
gender gap in commuting persists for older adults ages 65 and above who continue to hold full-
time employment positions. As of 2006, the mandatory retirement policy was eliminated in the
province of Ontario (OHRC, 2006). There is no reason to conclude that an older workforce will
turn away from commuting patterns entrenched through decades of being an employed and
commuting member of the labour force. Information on the travel patterns of this older group
should be considered in future transportation planning spheres as the aging populations continue to grow. Including information on travel patterns for school and work commuting for all ages will provide insight into how gender differences converge and diverge by age and will address the gap in the literature pertaining to post-secondary school students and older adults.

Research opportunities in transportation geography abound with consideration of points of intersection between gender, life cycle, time, and space. In addition to researching how gender affects mobility (i.e. through studies on travel patterns of men and women), it is increasingly important to understand why these patterns exist and how changing mobility patterns may reproduce or change gender dynamics (Hanson 2010). Future work should attempt to connect the two strands of research outlined by Hanson (2010) and explore the circular relationship between gender and mobility. Including space and time in these analyses would also add depth to the analysis and make context central to the discussion.

The purpose of the remainder of this thesis is to study and understand the changing trends of gendered transportation across space, over time, and during various stages of life. It will also attempt to analyze factors influencing these changes through the life cycle as well as generationally. There is widespread evidence in school and work travel literature to suggest that gender differences in commuting exist, but there are also some limitations to this body of literature that an in-depth exploration of spatial and temporal travel trends in the GTHA will endeavour to address.
Chapter 3
Gender Differences in School and Work Commuting Mode through the Life Cycle

3.1 Introduction

The traffic congestion that plagues much of the urbanized Global North typically produces traffic environments that are unsafe and costly for individuals of all ages. Congestion during peak commuting hours creates a financial burden on cities and regions due to productivity costs of time lost to long commutes and direct and indirect costs associated with motor vehicle injuries and fatalities. To alleviate these issues, a reduction in automobile dependence and an increase in the use of active and sustainable modes of transportation such as walking, cycling, and public transit is required during daily school and work commutes. While there is growing interest in increasing levels of active transportation (AT) for school and work travel in transportation planning practice, inadequate attention has been given to gender differences in daily travel and how gender roles relate to mobility. The regional transportation plan for the Greater Toronto and Hamilton Area (GTHA), Canada, *The Big Move*, envisions that one third of work trips will be taken by transit and one in five trips will be taken by active modes of transportation (e.g. walking and cycling) by 2031 (*The Big Move, 2008*). This regional plan aims to facilitate an increase in sustainable modes for daily travel; however, mention of gender differences in mobility is largely absent.

In this chapter, gender is acknowledged as a social construct that transcends and is far more complex and interesting than the typical male/female gender binary. Measurement, however, due to the use of secondary data, is limited to the often used male/female, men/women, and boy/girl category labels. These terms will be used as a tool to connect this thesis to other research where gender has been similarly essentialized without nuanced consideration of its construction. The social construction of gender and the role of girls and women in society affect the mobility patterns of females through the life cycle, a process that arguably begins in childhood.

For children and youth, active school transport (AST), such as walking or cycling to school, provides an opportunity for daily physical activity that may help to reduce the risk of
overweight and obesity while protecting against the onset of chronic disease later in life (DHHS, 1996; Falkner et al., 2009; Saris et al., 2003; Transportation Research Board, 2005). Despite the potential health benefits, North American research suggests that AST has decreased in recent decades (Mammen et al., 2012; Mitra et al., 2010; Murray, 2009) with girls less likely to engage in AST than boys (Leslie et al., 2010; McDonald, 2010). This gender gap in school travel could be related to parental risk perceptions associated with female independent travel, and a contemporary model of good parenting, in much of the Global North, characterized by a high level of child supervision by adults (Buliung et al., 2009a; Faulkner et al., 2010; Ham et al., 2008; Hsu & Saphores, 2014; McDonald, 2010).

Research into commuting mode choice for adults also indicates differences in the travel behaviour of men and women. The term mode choice implies that there is an option for women and men to make decisions about their travel patterns, but historically women have had reduced access to certain modes of transportation and lower daily mobility when compared to men. Research on gender and transport reveals that gender and class norms dictate the level of mobility, or immobility, of women (Hanson, 2010). While some argue that gender disparities have decreased since the early twentieth century, women’s automobile use has remained lower than men’s (Polk, 2004). Men’s access to private cars increases their freedom and flexibility, facilitates efficient and time-sensitive travel, and creates opportunities to travel to new, and often farther away destinations. Women, however, often rely on alternative modes of travel that may limit their mobility contributing to a reproduction of gender inequalities with regard to employment and/or household responsibilities.

Research shows that women’s mobility is not only affected by male-dominated automobile use, but also by household responsibilities often associated with motherhood. By 1990, there were more families with two working parents than those with a working father and a stay-at-home mother (Lang, 1992). Many households had two parents who travelled to and from work each day, took children to and from school, and incorporated other activities and trips related to running a household into their schedules (Lang, 1992). Journey-to-work research indicates that women typically travelled shorter distances to employment than men (Hanson & Johnson, 1985; Johnston-Anumonwo, 1992; Lang, 1992; Madden, 1981; Rosenbloom, 2006; Singell & Lillydahl,
1986). Reasons for these shorter distances have been shown to include: income, domestic responsibilities that women conduct on a daily basis, access to transport, and labour market segmentation (Law, 1999). Women tend to make more trips for a wider variety of purposes, develop more trip chains (i.e., stop at one or more locations before arriving at a destination), have more multimodal trips (i.e., the use of two or more modes of travel for one trip), and shorter trips than men (de Madariaga, 2013). Despite increased labour force participation during and since World War Two, the activities and travel related to childcare, shopping, and other household errands remain largely carried out by women. Complex patterns of activity and travel demand exist for women as they enter and experience child-rearing stages of life and are associated with generally carrying out a wider range of unpaid labour.

The increased labour force participation of women during the last several decades may have affected the ways in which household responsibilities and transportation decisions are negotiated. This study examines gender differences in AT, public transit and automobile use through the life cycle, with a view to identifying changes in gendered mobility in recent decades. This descriptive piece explores four main research questions: 1) How does the gender gap in school and work travel change as individuals age? 2) How does the gender gap in school and work travel today differ from that of the past (i.e., from 1986 to 2011)?, 3) How does the gender gap in travel mode vary over space (i.e. in the City of Toronto and the outer suburbs of the GTHA) and 4) How do household characteristics and factors such as distance and licensing associate with gender differences in commuter mode share? The remainder of the chapter is organized into four sections. The first section outlines the study area, data, and methods employed. Research findings are then presented, with a focus on the interplay between gender and age, household characteristics, distance, and licensing. Findings are then discussed in terms of how they relate to the complex social construction of gender in society.
3.2 Methods

3.2.1 Study Area and Data

This study is situated in Canada’s largest metropolitan region, the Greater Toronto and Hamilton Area (GTHA), and uses data drawn from the Transportation Tomorrow Survey (TTS). The TTS is a repeat cross section household travel survey collected using a computer assisted telephone interview (CATI) procedure for one weekday in the fall of each survey year. The TTS has been conducted every five years since 1986 and includes questions related to school and work travel as well as personal and household characteristics. The survey represents a 5% random sample (4.2% in 1986) for the City of Toronto and surrounding region. This study uses elementary, secondary and post-secondary school trip data and full-time work trip data for five study years over a 25-year period (1986, 1996, 2001, 2006 and 2011) across six regional municipalities (Durham, Halton, Hamilton, Peel, York, and Toronto). The City of Toronto is fairly unique within the GTHA as it is characterized by a dense urban core, higher population density, and more comprehensive transportation infrastructure (e.g. a more connected transit system consisting of subways, streetcars, and buses; greater presence of cycling lanes and bicycle parking, etc.). Results are therefore presented at the regional level as well as the regional municipality level to explore the spatial differences in gendered transport. Survey year 1991 is excluded because in that year the survey only included areas with rapid growth since 1986. A census based expansion factor is used to produce population level travel data. Population weighted expansion numbers were used to calculate travel mode share.

3.2.2 Exploratory Statistical Approach

Exploratory data analysis was used to descriptively show mode share differences between males and females for the commute to school and work. Data were presented graphically to summarize main findings related to mode share, age, distance, and licensing. Mode share values were calculated using the following equation:

\[
\text{mode share} = \frac{\text{count of trips by particular mode}}{\text{count of trips by all modes}} \times 100
\]
The difference between female and male commuting mode share was calculated as:

\[
\text{difference in mode share} = \text{female mode share} (\%) - \text{male mode share} (\%)
\]

Mode share percentages and mode share gender differences were calculated using data disaggregated by age, year, and regional municipality of the household. Data were presented in bar and line graphs to explore gender differences through the life course from childhood (age 11-13) to old age (age 65+).

### 3.2.3 Age and Gender

As the TTS only collects data for household members above age 11, 11-13 year olds are used to represent elementary school students and 14-17 year olds to represent secondary school adolescents. This age classification method is used to expose any differences in travel mode share among elementary and secondary students. The 18-24 year old age category is used for data related to both post-secondary school trips and full-time work trips. The Association of Universities and Colleges Canada considers 18-24 to be the key youth age range for enrollment in post-secondary education (AUCC, 2011). This age group marks the last school trip age category (i.e., post-secondary trips) and the first work age category (i.e., full-time work trips). The full-time work age categories are based on Census of Canada age groupings that divide the population into 5-year intervals. Gender is essentialized as male or female based on the response of the individual being surveyed or the member of the family who responded on behalf of all members of the household. For this reason, the gender indicated for children and youth may reflect the gender that has been ascribed to them by a parent or guardian rather than the gender they identify with.
3.2.4 School and Employment Status

School and work trip data were extracted to reflect the daily mobility patterns of children, youth, and adults. Children, youth, and young adults (11-17, and 18-24 years old) must be considered full-time students to be included in this thesis, and workers (18-24 years old and 25 years and older) must have full-time employment status. This enables comparisons between the travel patterns of females and males who have similar school and work circumstances. In this chapter, work is defined as full-time paid labour outside the home. Part-time workers were not included in this analysis due to the different activity, scheduling and travel context associated with part-time employment/hours, particularly the timing at which part-time commuting occurs. The focus on school and work trips allows for a greater understanding of gendered mobility patterns on a daily basis rather than for unique discretionary trips.

3.3 Results

School and work trip mode shares for all age categories by gender and year in the GTHA as a whole are shown in Figure 1. Findings are first presented at the regional level to provide an overview of gendered travel demand in the region and the changes that occur through the life cycle and over time. A closer look is then taken at the intra-regional differences across the GTHA, specifically comparing the trends in the City of Toronto to the region’s outer suburbs. In figures 1, 5 and 6, “GO Transit” refers to the use of the inter-regional transit system that offers bus and train services within and between regions of the GTHA. This differs from municipally focused “Local Transit” services. These two categories are combined for Figures 3 and 8 to represent total public transit use. Similarly, the automobile mode share used to explore gender differences includes trips where the respondent was either a driver or a passenger of a personal vehicle (Figures 4 & 9). The purpose of combining driver and passenger trip types was to trace changes in automobile use through life cycle stages beginning in childhood where children are passengers (e.g. of a parent, sibling, guardian, etc.). The gender gap in travel mode share in Figures 2-4 is expressed as the difference between female and male travel mode share. A positive value indicates greater female mode share than male. The gender gap in automobile use during working years therefore refers to the higher automobile mode share for men than women.
3.3.1 Gender and Age

GTHA

Over the past few decades, AST has declined for children and youth, but has decreased more for females than males. In 1986, 57.4% of females and 57.9% of males (11-13 years old) walked or cycled to school, whereas only 41.2% of females and 45.1% of males used active modes of transportation in 2011 (Figure 1). The more rapid decrease in walking and cycling for females than males indicates a widening of an AST gender gap. The most recent survey data reveals that boys are 3.9% more likely to travel using active modes, an increase from 0.5% in 1986 (Figure 2). Similar results are observed for 14-17 year old students who have also experienced a decline in walking and cycling since 1986, particularly for females. Public transit use for elementary and secondary school travel has decreased slightly for both males and females (Figure 1). There does not appear to be a substantial gender gap in public transit during these years (Figure 3).

For post-secondary students and full-time workers in the 18-24 year old age group, AT has decreased from 9.6% to 7.6% (Figure 1). The general trend in AT for the adult work commute suggests that women are more likely to travel to full-time employment using active modes than men. The gender gap in AT increases as commuters age, with the largest gap for the GTHA observed over age 65, where women used active modes of transportation 1.2% more than men in 2011 (Figure 2). However, this value has decreased from previous survey years indicating that the gender difference in active commuting has narrowed somewhat over time. There is a more substantial gender gap in public transit than in active transport. Women in the GTHA are approximately 5 to 10% more likely to use public transit for work trips than men (Figure 3). The gender gap in public transit also appears to have decreased over time and increases with age (Figure 3).

Between 1986 and 2011, the GTHA automobile mode share (drivers and passengers as % of total trips) increased for all age groups and for both females and males (Figure 1). During this 25-year period, the automobile mode share for females increased from 12.1% to 27.7% and from 14.0% to 31.3% for 11-13 and 14-17 year olds respectively. Male automobile use for these age
groups increased from 11.6% to 25.1% and from 12.7% to 25.1%. In the GTHA, driving has increased more for females than males; there is a wider gender gap in 2011 than 1986 for students 11-17 years of age (Figure 4). The most recent data indicate that female children and youth (11-17 years) are more likely to be driven or drive to school than males. However, as youth transition to post-secondary school or full-time work (18-24 years), males are more likely to drive or be driven to school and work. This effect is present in all survey years beginning in 1986, where 46.1% of females and 61.1% of males used the automobile to commute (Figure 1).

While the gender gap in automobile use increased from 1986 to 2011 for elementary and secondary students, it decreased for post-secondary and full-time work trips. In 2011, women ages 18-24 years travelled by automobile 6.8% less than men, whereas they drove 14.9% less than men in 1986 (Figure 4). Women also continue to have lower auto use for their commute than men throughout adulthood. Since 1986, women in the remaining age groups (≥ 25 years) have been less likely to drive or be driven to work than men. While a gender gap in automobile use persists into 2011, and increases with commuter age, the region’s gender gap is less prominent than it was 25 years ago (Figure 4).
FIGURE 1 Daily school and work travel mode share (% of trips) in the GTHA (1986-2011) by age, year, and gender.
FIGURE 2 Difference between female and male active transport mode share (% of daily school and work trips taken by walking or cycling) in the GTHA by age. Calculated as: female AT mode share (%) - male AT mode share (%).
FIGURE 3 Difference between female and male public transit mode share (% of daily school and work trips taken by local or regional transit) in the GTHA by age. Calculated as: female transit mode share (%) - male transit mode share (%).
FIGURE 4 Difference between female and male automobile mode share (% of daily school and work trips taken as an automobile driver or passenger) in the GTHA by age. Calculated as: female auto mode share (%) - male auto mode share (%).
Intra-Regional Differences in Transport Use across the GTHA

When looking across the region, active modes of travel are used less frequently in the outer suburbs than the City of Toronto, particularly for adult males commuting to work. In the outer suburbs, male walking mode share ranged from 0.67% to 0.97% in 2011 compared to a range of 1.42% to 1.84% for women (Figure 5). While walking and cycling are low for the adult work commute, there is still a substantial portion of the student population traveling using active modes. The gender gap in active transport during school years is lower in Toronto than many other areas of the outer suburbs (Figure 6). Gendered travel trends differ across the GTHA, with some regional municipalities experiencing an increase in the gender gap in AST over time. More specifically, the region of Peel has experienced an increase in the gender difference in active commuting from 1986 to 2011; boys ages 14-17 are over 10% more likely to commute using active modes than girls (Figure 6).
FIGURE 5 Daily school and work travel mode share (% of trips) in the outer suburbs (1986-2011) by age, year, and gender.
FIGURE 6 Difference between female and male active transport mode share (% of daily school and work trips taken by walking or cycling) in the GTHA by age and regional municipality. Calculated as: female AT mode share (%) - male AT mode share (%).
Similar findings are observed for public transit as lower levels of public transit are used in the outer suburbs compared to the City of Toronto. One main difference between Toronto and the rest of the GTHA is the higher use of the regional GO transit system in the outer suburbs for the work commute. In 2011, female and male workers ages 25-44 had a GO transit mode share of 7.5% and 6.5% respectively, a value that decreases as commuters age (Figure 5). Higher use of regional transit in the GTHA is likely due to the longer distances between home and work in the outer suburbs (Figure 11). In particular, many individuals who live in the outer suburbs may commute long distances to work in the City of Toronto or other larger cities that have greater employment opportunities. Local transit, on the other hand, is much higher in Toronto than elsewhere in the GTHA as the transit system in Toronto (i.e. TTC subway, streetcars, and buses) is more connected and comprehensive than in other parts of the region. Although a gender gap in public transit exists in all regional municipalities of the GTHA, a greater gender gap is found in Toronto, than all other regional municipalities (Figure 8).

School bus use is lower in Toronto than the outer suburbs, particularly for 14-17 year olds where school buses are not provided. Instead, the Toronto District School Board (TDSB) supplies student TTC bus tickets to those living 4.8 km or more from their school (TDSB, 2005). The data indicate that local transit comprises a large portion of commuter mode share from age 14 onwards (Figure 7).

As expected, auto use is more prevalent in the outer suburbs than in the City of Toronto. Males appear more likely to drive or be driven to school/work in all parts of the GTHA; however, the gender gap is more prominent in the City of Toronto (Figure 9). The gender gap has also decreased over time (i.e. since 1986) and increases with age (Figure 9). The difference between female and male driving is greater in Toronto, where overall lower levels of driving are observed than in other parts of the GTHA (Figure 9). Active and public transit infrastructure in Toronto may create more opportunities to use alternative modes of travel, whereas automobile use is high for both males and females in the outer suburbs.
FIGURE 7 Daily school and work travel mode share (% of trips) in the Toronto (1986-2011) by age, year, and gender.
FIGURE 8 Difference between female and male public transit mode share (% of daily school and work trips taken by local or regional transit) in the GTHA by age and regional municipality. Calculated as: female transit mode share (%) - male transit mode share (%).
FIGURE 9 Difference between female and male automobile mode share (% of daily school and work trips taken as an automobile driver or passenger) in the GTHA by age and regional municipality. Calculated as: female auto mode share (%) - male auto mode share (%).
3.3.2 Gender and Household Characteristics

Since 1986, women have been less likely to drive to work than men, a finding that remains when accounting for the household characteristics selected in this chapter. In 1986, in households where only one vehicle was present, men had a driving mode share that was 33.6% greater than women (Table 2). This effect is present in 2011, but has reduced to a difference of 22.5% (Table 2). The gender gap in driving to work decreases as the number of cars per household increases, but driving to work remains higher for men than women regardless of number of vehicles.

With an increase in household size, the gender gap in driving to work increases as well. In the 1986 survey, men drove to work 37.8% more than women in households with six or more members, but only drove 24.9% and 26.3% more often in households with 1-2 and 3-5 members respectively (Table 2). The 2011 survey results report similar findings of increased gender differences with household size increases, but the difference between female and male driving is lower than in 1986.

The distance between home and work may affect the gender gap in commuting. The smallest difference between female and male auto trip distance is observed at 0-2 km with a difference of 20.5% in 1986 and 7.7% in 2011 (Table 2). In 1986, the greatest difference was observed at distances of 7-10 km and 11-19 km; however, based on the 2011 survey, the gender gap appears to increase with trip length.

For work trips, the gender gap in driving appears largest for City of Toronto households. In 1986, the male automobile driver mode share was 31.2% higher than females and 21.6% higher in 2011 (Table 2). The work trip gender gap also appears largest for commuters traveling to workplaces located in the City of Toronto in both 1986 and 2011. In some of the other parts of the study area, and in the City of Hamilton, the gender gap in work travel appears to have narrowed somewhat by 2011. For example, and for both household and workplace location, Hamilton had a gender gap of approximately 21% in 1986 and only approximately 9% by 2011 (Table 2). Overall, the male driving mode share has remained relatively consistent, with increased driving by females appearing to narrow the gender gap over time.
TABLE 2 Driving Mode Share (% of Daily Work Trips) by Gender and Household Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>1986 Female (%)</th>
<th>1986 Male (%)</th>
<th>Difference (%)</th>
<th>2011 Female (%)</th>
<th>2011 Male (%)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of vehicles in household</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0.7</td>
<td>2.9</td>
<td>-2.2</td>
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3.3.3 Gender and Distance

GTHA

The distance between work and home differs between full-time employed men and women. In 1986 and 2011, females took more short trips than males (Figure 10). For both men and women in the GTHA, straight-line trip distances have increased since 1986, more commuters are making longer trips today than 25 years ago. The difference in trip length between women and men decreased between 1986 and 2011; however, women still appear to work closer to their home than men. The median straight-line trip distance to the nearest kilometre was 7 km for women and 10 km for men in 1986. In 2011, those distances increased to 10 km and 12 km for women and men.

FIGURE 10 Straight-line trip distances between home and work for males and females with full-time employment in the GTHA
Intra-Regional Differences across the GTHA

Similar findings are observed at the regional municipality level; distances between home and work have increased in all places and women continue to work closer to home than men (Figure 11). Men and women who live in York and Peel regions experience greater distances between home and work than in Durham, Halton, and Hamilton (Figure 11). The regional municipalities with the greatest work commute distances (i.e. York, Peel, and Durham) are the three regions that border the City of Toronto. It is likely, then, that these long distances are a function of commuting from the outer suburbs into the City for access to increased job opportunities, or lengthy cross-commutes in the outer suburbs. Halton and the City of Hamilton have the greatest frequency of short trips in the GTHA (Figure 11).

Since 1986, distances to work have increased in all regions and remain longer for female full-time workers than males (Figure 11). Although individuals living in York and Peel have the longest commutes, the gender difference in distance is less pronounced than in other parts of the GTHA. It appears that the further a household is from Toronto, the greater the gender gap in distance is likely to be, as evidenced by the much shorter trip distances experienced by women than men in Halton and Hamilton (Figure 11). Hamilton has seen the greatest increase in trip length from 1986 to 2011 and also appears to have the greatest gender difference in commute distances (Figure 11).

Figure 11 also shows that commuters who live in Toronto and Hamilton have higher percentages of work trips under 20 km in length, likely due to the number of job opportunities that are available within shorter distances in these higher density regional municipalities (Figure 11). Unlike other regions of the outer suburbs, workers in the City of Toronto experience very few long distance trips (i.e. over 20 km). Findings from Peel, York, and Halton, however, demonstrate a greater spread of trip frequencies across long distances (Figure 11). Similar to the rest of the GTHA, distances to work have increased since 1986, but the gender gap in work trip distances appears to have decreased as the 2011 difference is marginal.
FIGURE 11 Straight-line trip distances between home and work for males and females with full-time employment by regional municipality in the GTHA
3.3.4 Gender and Licensing

GTHA

Twenty-five years ago, women of all ages made up a smaller share of licensed drivers than men. In 1986, between 38.3% and 47.4% of licensed drivers were women and between 52.6% and 61.7% were men (Figure 12). A general upward trend in licensing for women is observed since this date for age cohorts above age 25; however, a downward trend in the share of females holding licenses is observed after 2001 for 16 to 24 year olds in the GTHA. In 2006 and 2011, women between the ages of 16 and 24 had a lower license share than in previous years, suggesting that females may be acquiring licenses later in life than men (or may be choosing not to acquire a license at all).

**FIGURE 12** Females with driver’s licenses as a percent of total licensed population by age in the GTHA, 1986-2011
Intra-Regional Differences across the GTHA

Over the past 25 years, female licensing has increased for most age categories except 16-24 year olds. Hamilton and Toronto appear to have the lowest licensing levels for young females over time, as the share of female license-holders exceeded 50% only in 2011 (Figure 13). This downward trend in licensing for women between the ages of 16 and 24 is consistent across the GTHA, with very little regional difference in licensing (Figure 13). Few differences exist between regional municipalities; however, Durham and Halton have slightly higher licensing levels for females over the age of 65 than the other regions of the GTHA (Figure 13).
FIGURE 13 Females with driver’s licenses as a percent of total licensed population by age and regional municipality in the GTHA, 1986-2011
3.4 Discussion

3.4.1 Gender and Age

Trips made between home and school shape a child’s travel experiences and may influence their future mobility patterns. A greater focus on active and sustainable transportation options for children and youth could potentially produce a transport future with less traffic congestion and auto-dependence than what is typical within today’s North American cities and regions. AST to elementary and secondary school has declined over time and has decreased more for girls than boys, producing a greater AST gender gap in 2011 than was present in 1986. The lower level of AST for females may be attributed to parental perceptions of risk surrounding stranger abductions and the idea that a child is protected when driven to school (Buliung et al., 2015). Qualitative research on school travel in the City of Toronto suggests that fear of abductions, strangers, and traffic safety may be primary reasons for driving children to school (Buliung et al., 2015). The sensationalism of stranger abductions in the media also likely produces and reinforces parental fears regarding female independent travel and may result in less participation in active travel among girls. Parents may believe they are reducing safety risks by driving their children (especially their daughters) to school (i.e., risk of abduction and injury from pedestrian collisions); however, automobile-occupant injury presents a much greater risk. The occupant fatality rate (ages 0-19) in Canada in 2005 was seven times greater than the pedestrian fatality rate (PHAC, 2009). Driving children to school, particularly females, has increased in recent decades and contributes to an overall increase in automobile dependence.

As adolescents age and transition into post-secondary school or full-time work, automobile use increases and the male automobile mode share surpasses females (18-24 year olds). One factor influencing the greater proportion of male drivers than female drivers is the age at which individuals obtain their driver’s license. In the GTHA, females may be acquiring their driver’s licenses later than males or may be deciding not to become licensed at all. In 1994, the province of Ontario introduced a graduated licensing system that requires two license levels before obtaining full license privileges. The licensing procedure requires completion of a written test and two road tests, a process lasting at a minimum, 20 months. While this system may prolong license
procurement for all young adults, it appears to have had a greater impact on females. Data from 2011 suggest that females acquire their licenses later in life and drive less to work than males.

The gender gap in AT, public transit, and auto use for full-time workers increases as individuals age, which may be related to a number of factors including household responsibilities, distance to work, and access to a personal vehicle. The lower levels of automobile use for women and higher levels of use of alternative modes (e.g. walking, public transit) is a finding consistent with literature (Pickup, 1985; Vance & Iovanna, 2007) Increased female labour force participation during and following World War Two and the rise of the two-worker (paid employment outside the home) household produced new decisions and new ways of negotiating mobility and transport in households. This chapter suggests that the gender gap in work trip travel mode has decreased over time.

3.4.2 Gender and Household Characteristics

Findings suggest that gender differences in school and work travel mode share change with factors including distance, location, and vehicle or license ownership. Research regarding the journey-to-work has pointed to a number of reasons for lower automobile use for women than men, typically related to the gendered quality of ‘good parenting,’ motherhood, income, and labour market participation. One limitation of the TTS is that it does not collect household or individual income data, which restricts arguments that can be made surrounding type of employment, income status, and travel patterns. A measure that may provide partial information about affluence is vehicle ownership as higher income households are shown to have higher levels of car ownership (Habib, 2014).

Although men are more likely to drive to work regardless of the number of vehicles per household, the difference between female and male driving is substantially greater in households with lower automobile ownership. However, these results support other studies that found lower car use for women than men in households where there were fewer automobiles than drivers (Vance & Iovanna, 2007). With only one vehicle present, 65.6% of full-time working men and
43% of full-time working women drove to work in 2011. Other research in the City of Toronto suggests that distance and income influence car allocation and that men and women living in higher income areas with long trip distances tend to have higher car ownership (Habib, 2014).

Household size can also provide information about household gender dynamics and transportation. In households with six or more members, women are less likely to drive to work than in smaller households. This is likely due to the larger amount of unpaid labour that women engage in and tasks associated with running a large household. To accomplish these tasks, women may work closer to home as a shorter distance between home and work enables ongoing maintenance of household responsibilities. The Household Responsibility Hypothesis (HRH) suggests that women have greater household responsibilities than men, causing them to choose shorter commutes to work (Johnston-Anumonwo, 1992). The 2011 TTS data suggest that the gender difference in driving based on household size has decreased, which could suggest that either (1) the HRH may be less prevalent today than in the past, or (2) that women are simply scheduling unpaid work into other times of the day and simply working longer hours inside and outside the home. As mentioned previously, the gender gap has decreased due to the increasing use of the automobile for women. Higher female automobile use has likely occurred because many regions of the GTHA have become increasingly suburban and car-oriented. Women with paid work outside the home could in many cases quite justifiably perceive that public transit will not provide the required level of service necessary to support the perfect storm of having paid work outside the home, while continuing to engage in the lion’s share of household maintenance and child related tasks (i.e., particularly transport and communication) (Statistics Canada, 2010).

The introduction of graduated licensing in Ontario may be associated with the lower number of women acquiring a driver’s license at a young age. The later age at which women obtain their driver’s license may also be a product of their travel experiences during childhood. Girls are chauffeured to school more than boys and may participate in independent travel later than males, which minimizes the need for a driver’s license at a young age. Women may obtain their license later in life than men, but the proportion of female drivers today is greater than in 1986 (Figure 12). This supports research in the United States that found an increase in female drivers as a percentage of total drivers from 1963-2010 (Sivak, 2013). This increase in licenses for women in
recent decades may translate into increased driving to work and represents a higher level of observed mobility potential for women than was observed in the past.

3.5 Conclusion

This chapter suggests a narrowing of the gender gap over time and a widening of the gender gap as individuals age. To alleviate issues of traffic congestion in the GTHA, it is important to determine what is driving the narrowing of the gap over time. Further research is required to unpack why this effect is present within specific parts of the life cycle and how societal changes in parenthood and labour force participation may have influenced such changes. *The Big Move*, the regional transportation plan for the GTHA, overlooks the complexities of gender in the conversation about transportation and travel demand. This major document, guiding transportation planning practices in the GTHA until 2031, makes no mention of gender as it relates to travel demand. A better understanding of why, where, and how this gender gap changes is required to determine ways in which the increased use of automobility for everyone can be addressed. Transportation policy makers who wish to develop policy to increase the use of active and sustainable modes should give more attention to the gendered qualities of transportation systems and travel demand.
Chapter 4
Gender Differences in the Work Commute over Time and Space in the City of Toronto

4.1 Introduction

Toronto is the fourth largest city in North America and has the third largest public transit system, preceded only by New York City and Mexico City (City of Toronto, 1998-2016). Its population is approximately 2.6 million people (Statistics Canada, 2011) and is continuing to grow, placing pressures on existing infrastructure. The City of Toronto differs from other cities and regional municipalities in the GTHA not only due to its population size, but also due to the presence of more comprehensive active and public transit infrastructure, and a higher density of residences and job opportunities. As the previous chapter has shown, the City of Toronto is also unique from all other areas of the GTHA in terms of gender differences in the school and work commute. While a slight gender difference in the childhood school travel exists, a greater gender gap is observed in the adult work commute, particularly with regard to public transit and automobile use. The gender gap in transit and auto use also separate Toronto from other regional municipalities. Availability of alternative modes (i.e. a more comprehensive transit system) in Toronto and the greater likelihood overall that women will use more sustainable transportation options (Tischer & Dobson, 1979) may play major roles in producing this gender gap, as the outer suburbs see much higher levels of driving for women. An additional explanation for the gender differences in commuting is that historically female-dominated jobs are typically more evenly dispersed over space (MacDonald, 1999; Rosenbloom, 2006), which produces shorter trip distances and subsequently the opportunity to use alternative modes. In the City of Toronto where the physical landscape is much denser than the outer suburbs, these job opportunities are likely available over even shorter distances.

It is clear that Toronto differs greatly from the outer suburbs in terms of built environment, population, and travel behaviour. Although the gender gap in driving is evident in the City of Toronto, not all areas of Toronto experience the same differences in commuting by gender. This
chapter explores the spatial distribution of gendered commuting in Toronto over time, with a view to identifying areas that have experienced the greatest changes in the past few decades (i.e. since 1986). This chapter focuses on driving mode share, which is an appropriate focus given the current condition of increased congestion, population growth, and related human health and climate change effects. This chapter addressed two main questions: 1) How do gender differences in travel mode share to work change with increasing distance from the Downtown Urban Growth Centre (UGC)? and 2) How has the relationship between gender and distance from the downtown area changed over time? These questions seek to further explore the dynamic relationship between gendered mobility, space and time in the context of a highly populated metropolitan area.

4.2 Methods

4.2.1 Study Area and Data

Data on female and male travel mode from 1986-2011 were obtained from the Transportation Tomorrow Survey (TTS) at the Traffic Analysis Zone (TAZ) level. Full-time employed workers living in each TAZ were surveyed by computer assisted telephone interviews on individual, household, and trip information. Data were extracted my mode, gender, and year for work trips in Toronto TAZs. TAZs in the City of Toronto were then further subdivided into the downtown Toronto area and the inner suburbs of Toronto (Figure 14). The boundaries depicted in Figure 14 represent the pre-amalgamation borders, where ‘Downtown Toronto’ is the original City of Toronto pre-1998. These boundaries represent the six boroughs that were politically combined in 1998 to create the City of Toronto as it exists today. This distinction is significant because prior to amalgamation, these boroughs functioned as independent municipalities. The municipalities that now compose the inner suburbs were largely developed after WWII for a predominantly auto-dependent population and typically have lower residential and population densities than the core. Data for this chapter spans before and after the political restructuring of Toronto and importantly considers differences between the inner suburbs and the pre-amalgamated city of Toronto.
Network trip distances were calculated between home TAZs and the Downtown Toronto UGC (Figure 15) to explore the distance decay of gender differences in travel mode as you move away from the downtown core area. The planning initiative for the Greater Golden Horseshoe (GGH), *Places to Grow*, outlines UGCs where development is to occur. These UGCs are primarily located near existing transit hubs, with a goal to intensify residential development and promote mixed-use, high-density development (Ministry of Municipal Affairs and Housing, 2016). The Downtown Toronto UGC includes two subway transit lines (i.e. Bloor-Yonge and Yonge-University lines) as well as Union Station, a major transit hub for both local transit (i.e. the TTC) and regional transit (i.e. GO Transit). This hub acts as an important area for commuters from Toronto and the GTHA, and residing near this hub arguably influences mode choice for the work commute.
4.2.2 Statistical Analysis

The shortest path network path distance from each TAZ to the Downtown UGC was calculated using the centroid of each TAZ as the origin and the centre of the UGC as the destination. Travel mode share values were assigned to TAZ centroids to represent the percent of male and female residents who drove to work in a given survey year. Results for the first and last survey year (i.e. 1986 and 2011) are shown in Figure 18. Simple linear regression was used to assess how well distance from the core explained the driving mode share for men versus women. Regression constants and coefficients were tested using gender as the categorical predictor.
4.2.3 Exploratory Mapping

Exploratory mapping of male and female driving and the gender gap in driving mode share to work was conducted to display patterns of gendered transport across the city. Male and female driving mode share is first mapped to show spatial differences in commuter automobile use between the inner suburbs and downtown of Toronto. Gender differences in driving are then displayed to explore how gender interacts with distance from the core of the city, and how this has changed over time.

4.3 Results

The general findings on gender differences in the City of Toronto are consistent with findings for the GTHA in the previous chapter; women drive to and from work less than men, and this gender gap in driving has existed for the past few decades (Figure 16). In 1986, it appears as though the inner suburbs of Toronto had consistently higher driving levels for males, whereas only certain areas of the inner suburbs have high levels of female driving. Areas of central Etobicoke, North York, and east Scarborough show the highest driver mode share values for women, while York, East York, and a large portion of North York have relatively low female driving (Figure 16). Overall, the spatial pattern of driving is similar between men and women (i.e. lowest driving in the centre of the downtown core and increased driving as the landscape becomes more suburban), with generally lower driving mode share values for women across the city.

Consistent with 1986 data, 2011 results show that males typically have higher driving values than females and there is more driving in the suburbs for both males and females than in the downtown core. However, some differences between 1986 and 2011 values are reported. Certain areas of Toronto have seen a decrease in driving for men (e.g. East York, southeast portion of North York), while the same areas have not experienced a similar decrease in female driving (Figures 16 & 17). Findings also suggest that driving levels in the Downtown area have remained the same or decreased slightly over the past few decades, particularly for men (Figures 16 & 17).
Figure 16 Female and male driver mode share (%) in the City of Toronto, 1986
Figure 17 Female and male driver mode share (%) in the City of Toronto, 2011
The distance between home and the Downtown Toronto UGC is shown to relate to the mode of transportation used to travel to work, even without considering workplace location or gender. Regardless of gender, there was a statistically significant relationship found between distance and driver mode share in 1986 ($p<0.001$, $R^2 = 0.6851$) and 2011 ($p<0.001$, $R^2 = 0.5327$). Distance to the urban growth area therefore correlates with the likelihood that an individual will drive to work, irrespective of workplace location.

A simple linear regression was calculated to predict driver mode share based on distance to the Downtown UGC (in km) under the condition that a participant is either female or male. Testing the regression constants revealed a statistically significant difference between males and females ($p<0.001$) in both 1986 and 2011. This indicates that men residing the same distance from the core as women have a higher driving mode share. Interestingly, though, is that no statistical significance in the regression coefficient was found in 1986 ($p = 0.126$), but was found in 2011 ($p = 0.000$). The effect of distance on mode share affected men and women at similar rates in 1986; however, it is evident that there is a stronger positive relationship between distance to the core and male driver mode share than female in 2011 (Figure 18), indicating that the distance effect has become stronger over time.

![Figure 18](image1.png)  
**Figure 18** Relationship between male and female driving mode share and distance to Downtown UGC, 1986 and 2011
Figure 19 emphasizes the greater percentage of male drivers than females, as most Traffic Analysis Zones (TAZs) display negative values for all survey years (using female mode share – male mode share). In 1986, a large gender gap in driving (i.e. males driving substantially more than females) is observed along the railway lines in the West, a finding that has decreased in the past few decades (Figure 19, box A). Some TAZs in the downtown core have the opposite finding (i.e. higher female driving than male driving to work), typically in areas where driving to work is low for both genders. Another area where female driving is shown to be higher than male driving is along the Bridle Path (Figure 19, box B), a high income neighbourhood where driving is high for both males and females. In neighbourhoods where driving to work is the lowest or highest for males, it is likely that female driving will be similarly low and high as a product of the built environment (e.g. dense urban core that is walkable, comprehensive public transit network, etc.), income (e.g. number of vehicles per household), availability of jobs within short distances, etc.

The gender difference in driving is also shown to increase at longer distances (Figure 20). In 1986, it does not appear as though the distance to the core area had a great influence on the gender gap in driving. In 2011, however, the gender gap in driving is lower near the core areas than it is at further distances. It is probable that this occurs because of the more efficient transit options surrounding the core that make transit a more desirable options than the car for both men and women.
Figure 19 Difference between female and male driver mode share (%) in the City of Toronto, 1986 and 2011, calculated as female driver (%) – male driver (%); Box A: West Toronto Rail, Box B: The Bridle Path Neighbourhood
Figure 20 Regression lines depicting relationship between gender difference in driving mode share (calculated as female mode share – male mode share), 1986-2011

4.4 Discussion

Findings from the literature suggest that women typically travel shorter distances to work than men (Hanson & Johnson, 1985; Johnson-Anumonwo, 1992; Madden, 1981; Rosenbloom, 2006), which allows them to engage in active and sustainable transportation options to work. One key finding of this chapter is that women are more likely to use a sustainable transportation option (i.e. not drive an automobile) than men; this gender gap in driving was seen to persist at all distances
from the core (Figures 16 & 17). This is consistent with research that women are more likely to engage in sustainable commuting, including carpooling, than men (Tischer & Dobson, 1979).

The gender gap in driving to work persists across much of Toronto; however, there are areas where the difference between men and women drivers is marginal. One example provided is the Bridle Path, an affluent neighbourhood where it is likely that a personal vehicle is readily available (for both men and women). In Chapter 3, it was found that households with 0 vehicles or more than 3 vehicles had a much smaller gender gap than those with one or two vehicles per household.

The Downtown Toronto UGC is a great example of how the presence of a transit hub, high-density neighbourhoods, and high walkability may positively affect the travel behaviour of surrounding residents. Although workplace location is not considered in the regression models, population size and density (and therefore job opportunities) increase with closer proximity to the Downtown UGC. The lowest levels of driving were seen in closest proximity to the core, and the gender gap was the least pronounced in TAZs near the core UGC. Continuing to develop according to the model shown in Places to Grow, the planning initiative in the GGH, may attract the development of business and services into other transit-oriented areas that have been identified as UGCs. This would not only provide more job opportunities in closer proximity to home and more transit accessibility, but may make it possible to accomplish more tasks in a high-density area and reduce the financial and time cost of trip-chaining. This would be particularly valuable to women who continue to carry out a majority of the unpaid labour (Statistics Canada, 2010) and also travel long distances to work via transit.

4.5 Conclusion

With a focus on drivers in Toronto, this chapter shows how the gender gap in commuting changes over space and time across the City of Toronto. It appears as though the greatest gender gap in driving mode share is in the inner suburbs of Toronto. As residence location moves away from the Downtown UGC, higher levels of driving are observed for male and female workers, but are particularly high for men. This chapter confirms that women typically drive less than men, especially as distance from the downtown core increases. Active and public transit infrastructure
in Toronto should therefore better serve the needs of female commuters in terms of safety and availability of accessible services (i.e. services related to household responsibilities that are typically carried out by women) near transit stops and stations.
Chapter 5
Conclusion

5.1 Summary of Main Findings

This thesis was based on three main research questions: (1) How does the gender difference in commuting change throughout the life cycle? (2) How has gendered mobility changed since the post-war era (i.e. when women’s labour participation increased)? And (3) What does this gender difference in commuting look like over space and through time? The thesis contained an extensive literature review, and two empirical chapters focused on the three aforementioned research questions. This chapter presents the main findings from the two studies on gender differences in commuting in the GTHA and the City of Toronto as well as provides policy recommendations and areas for future research based on this thesis’s findings.

5.1.1 Gender Differences in School and Work Commuting Mode through the Life Cycle

This chapter explored gender differences in active transportation (AT), public transit, and automobile use through life cycle stages to assess temporal changes in gendered transport over the last 25 years in the Greater Toronto and Hamilton Area, Canada. Travel mode share data on the school commute (ages 11-24) and the work commute (ages 18-65+) were presented for each regional municipality and the cities of Toronto and Hamilton for 5 survey years from 1986-2011. The chapter also explored the effect of household characteristics (i.e. number of cars per household, number of persons per household, distance between home and work, and regional municipality of home/work) on female and male driving to work and the gender difference in auto licensing over time.

Findings suggest that female children and youth are driven to school more frequently than males; however, males drive more than females during the years of labour force participation. Differences between female and male automobile use increase with age but the gender gap has
declined since the mid-1980s. It was also found that differences in travel patterns exist between regional municipalities, where the outer suburbs have lower active transport mode share values than the City of Toronto. Of particular interest was the fact that the gender gap in travel mode was smaller in the City of Toronto than elsewhere for school travel; however, the City of Toronto had the greatest gender gap in public transit and automobile use for the adult work commute. How and why these changes in gendered travel occur through the life course remain important questions for future work.

This chapter also highlights the disparities in household car allocation as men were observed to drive to work more than females in household where only one car was available. There is an increase in the gender gap in driving as the number of vehicles decreases but men drive more than women in all cases, regardless of the number of vehicles. Similarly, the gender gap increases as the number of persons per household increases, but driving remains higher for men regardless of household size.

Distances between home and work have increased, particularly for women, and have increased in all regional municipalities in the GTHA. These greater distances may be a function of the increasingly suburban landscape of much of the GTHA. In addition to increased distances over time, this study found that the percentage of women with a driver’s license has increased. This is not true, however, of young females (ages 16-24), where a decline in licensing since 2001 was observed, potentially as a result of graduated licensing introduced in Ontario in 1994. Young females are chauffeured to school by their parents more than boys until a later age so it may not be necessary or desirable to acquire a license until an older age.

Findings from this chapter reflect the social construction of gender within society that places much of the household and caregiving load on women. Living close to work is more likely for females than males and aids in the ongoing maintenance of household tasks. The restriction of shorter work commute distances to complete domestic duties limits the number of job opportunities available to women and therefore their earning potential. This underlines the ongoing conflict between fulfilling ideas of “good parenting” or messages of being a “productive” member of the labour force as indicated through media and social networks. These messages of “good
“parenting” also may affect the mode of travel children take to school through perception of risk and gendered ideas about parenting and protection of children (Murray, 2009). The gendered and generational aspect of travel behaviour, particularly with respect to the life cycle stage of motherhood, is possibly expressed through a number of findings of this chapter.

5.1.2 Gender Differences in the Work Commute over Time and Space in the City of Toronto

In this second study the temporal and spatial patterns of gendered transport in the City of Toronto over the past 25 years at the TAZ level were explored. The purpose of conducting a case study on the City of Toronto was to understand where and how a large gender gap in commuting to work exists despite the small gender gap in childhood mode choice. In the previous chapter, Toronto was found to have the largest gender gap in driving out of all regional municipalities of the GTHA. This finer-scale analysis revealed that gendered transport is unevenly spread across Toronto and that there is a relationship between distance from Toronto’s downtown neighbourhoods and gendered commuting.

It is evident that overall driving to work is higher for males than females across Toronto and that driving for both males and females is higher in the inner and outer suburbs of Toronto than in the downtown core. What is less obvious, however, is the influence of distance from home to the core on household travel decisions. Findings suggest that the further from the core an individual lives, the more likely they are to drive to work. Men living further from the core are more likely to drive to work than females who live at the same distance. The relationship between distance to the core and driver mode share percent has also changed in the past few decades as male driving has a stronger correlation with distance to the core in 2011 than 1986.

Despite the small gender gap in childhood commuting in Toronto, long distances to the core may produce greater reliance on public transit and the automobile during the work commute. Elementary and secondary schools are dispersed throughout Toronto in the high density core and lower density inner suburbs, allowing many students (both boys and girls) to engage in active travel to school.
5.2 Policy Implications

One key finding of this research is that women use public transit substantially more frequently than men in all regional municipalities, but particularly in Toronto, and that this gender gap increases with age. Ideally, men would take transit at similar levels as women, but the reality is that more women take transit and our transportation systems and surrounding neighbourhoods should be planned with this in mind. Women continue to engage in a higher proportion of unpaid labour related to childcare and household responsibilities than men (Statistics Canada, 2010). Allowing women in Toronto to re-enter the transit network on a single fare would lighten the burden of stopping to pick up/drop off a child or complete other errands related to domestic responsibilities (e.g. grocery shopping, healthcare, etc.).

The inclusion of a time-based transfer system on the TTC would add a financial strain to the TTC budget in a time where the system is already under pressure due to a lack of new government revenue. The current mayor of Toronto, John Tory, has called for a 2.6% reduction in all city departments and agencies, including the TTC, for 2017 (Pagliaro, 2016). This goal will be difficult to reach with a recent increase in funding for large-scale transit projects across the city. The transit projects do, however, act as important tools for reducing auto-dependence in the inner suburbs of Toronto as the transit system expands further out of the core. This thesis showed that with increased distance from the core, there is increased automobile use, particularly for men. Providing access to the core from the inner suburbs is crucial to reducing the gender gap in public transit and automobile use in Toronto and reducing the overall impact on climate, health, and congestion from driving in the city.

As transit infrastructure expands into the inner and outer suburbs with increased local and regional transit routes, a restructuring of the fare system may occur. A transit zone-based system and hybrid fare scheme (i.e. using both fare-by-distance and flat fares) are under consideration for the GTHA in effort to strengthen the region’s transit offering (Metrolinx, 2016). At this stage of development, it is important to consider how various fare structures could affect women, particularly mothers, who may have lower access to job opportunities due to the financial and time costs of commuting longer distances using public transit. While the fare structure affects male and
female commuters alike, it disproportionately impacts the female population who have been shown to use public transit at higher proportions than males. Reducing financial barriers to public transit may contribute to a more equitable transportation system in our region that could improve mobility for women and low-income families.

The clustering of childcare services around transit stations and stops is another planning consideration that could relate to high levels of transit use for women and high levels of household responsibilities, is the clustering of childcare services around transit stations and stops. Following an example from Vienna (see TWCA, 2016), all areas of the GTHA would benefit from including services such as pharmacies, doctors’ offices, and on-site kindergartens near transit hub and/or UGC locations. There still remains a considerable difference between the childcare responsibilities of men and women and these differences are exacerbated when women must complete these tasks with lower accessibility to transportation options than men. Providing these services in close proximity to transit infrastructure could lessen the burden of already strained, not to mention longer, commutes.

Lastly, and in seeking some explanation for the apparent lack of consideration given to gendered mobility in transportation system planning, operation and use, it is worth noting that jobs in the transportation industry have been primarily filled by men; the Federally Regulated Transportation Sector Benchmark for 2014 was 26.9%, the lowest female benchmark of any other sector reported (Employment and Social Development Canada, 2014). The Toronto Transit Commission has failed to meet this benchmark, showing only 15% representation of female employees (HRLRC, 2015). The underrepresentation of women in transportation-related positions poses questions for the planning and operation of equitable transportation systems: Is a diverse population being considered in the provision of services by planners and employees that do not reflect this diverse population? and Who has the power to decide what our cities look like?

### 5.3 Areas of Future Research

Traffic congestion in the GTHA has been a major and very costly concern for decades, however little attention has been paid in transportation planning practice to the role of gender in transportation supply and
demand. This thesis provides an overview of the state of gendered transport in the GTHA and provides discussion of some driving forces behind these findings. That being said, questions remain about how any sort of gender gap is produced and maintained in society. The social construction of gender is dynamic and changes over time and in different places based on societal and environmental factors. Further information is needed about the influences of cultural norms and societal pressures on mode choice. A particular consideration in the GTHA context should be immigration, as gender norms and expectations may differ across ethno-cultural backgrounds. The following research questions may help guide future thought on gendered mobility in a North American context with growing immigrant and newcomer populations: How has the increase in immigration in recent decades influenced our transportation systems, and more specifically, the gender gap in commuting to school and work? How do cultural ideas about parenting influence the mode of travel to school and subsequently the work commute? And how can our current transit services and programs address the needs of immigrant women and children? Qualitative studies on the gendered and generational aspects of immigrant mobility could provide insight into the intersection of gender, class, culture, immigration, age and mobility to adequately serve this population’s transport needs.

Ideas surrounding gender roles are constantly changing. More information is needed to understand how these shifting gender ideas or norms affect the travel decisions of different generations and therefore our transportation systems. Further studies should seek to understand how the commuting patterns experienced in childhood and adolescence shape an individual’s adult mobility practices and commuting practices of their children. Future work may also endeavor to address how mobility shapes or reproduces gendered norms and ideas.

While this thesis found a shift in travel mode choice from childhood to adulthood (i.e. girls are driven/drive more than boys to school, but men drive more than women to work), it is unclear why, how, and when this particular shift occurs. If girls are experiencing automobility more often in childhood, why do their adult commuting patterns not reflect these experiences? When exactly do men surpass females in driving mode share and why does this occur? These questions also relate to the drastic reduction in young female drivers relative to males. Why exactly are females waiting to (or deciding not to) become licensed and what impact could this have on gendered commuting in the future? It is worth devoting some attention to college and university-aged students to promote sustainable travel practices for the future. TDM strategies on campuses (e.g. transit U-Pass, parking price increases) should be evaluated with a focus on gender to understand who changed their patterns in the face of changing policies and why they chose to do so.
A final research recommendation brings us back to Hanson’s (2010) paper on the relationship between gender and mobility. To date, most studies have focused on how gender shapes mobility rather than how mobility shapes gender. Literature on the latter also tends to focus on ideas of gender and power or identity, rather than mobility explicitly (Hanson, 2010). These studies have also emphasized the household, community, or family to the neglect of the spatial or built environment (Hanson, 2010). She argues that context must be central to the discussion of gender and mobility to better understand the complex intersections of gender, mobility, and other relevant elements of social, geographic and cultural context. This thesis has explored some of the ways in which gendered mobility is complicated across different temporal, spatial, and generational contexts. Future research should attempt to further complicate and problematize this picture in effort to get at the underlying ways in which gender shapes mobility and mobility shapes gender.
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