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CONFERENCE PROCEEDINGS 46

Women's Issues in Transportation

Summary of the 4th International Conference

VOLUME 1: CONFERENCE OVERVIEW AND PLENARY PAPERS

SUSAN HERBEL and DANENA GAINES, Cambridge Systematics, Inc.
Rapporteurs

September 27–30, 2009
Irvine, California

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This report has been reviewed by a group other than the authors according to the procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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Preface

The Transportation Research Board (TRB) convened the 4th International Conference on Women's Issues in Transportation on October 27 to 30, 2009, at the Arnold and Mabel Beckman Center in Irvine, California. The contributions of the following organizations enabled this important conference to come to fruition: TRB and the Standing Committee on Women's Issues in Transportation; the Federal Highway Administration; the United Kingdom Department for Transport; the University of California Transportation Center; the Swedish Government Agency for Innovation Systems (VINNOVA); METRANS Transportation Center; the New Mexico Department of Transportation; the University of California, Davis; the Federal Transit Administration; and the Women's Transportation Seminar.

Some 140 international transportation researchers and practitioners from Africa, Asia, Europe, and the United States gathered to exchange information on a variety of factors and emerging issues affecting women's access to mobility, safety, personal security, and travel needs and patterns.

Background

This event marks the fourth in a series of conferences on women's issues in transportation, the first of which was sponsored by the U.S. Department of Transportation in 1978. Attendees of this groundbreaking conference were predominantly researchers and scholars. The second conference, held in 1996, was sponsored by the Drachman Institute of the University of Arizona and by Morgan State University. The program addressed concerns beyond the research community and expanded into policy-making issues and planning and engineering processes. The third conference, held in 2004, aimed to advance the understanding of women's issues in transportation and attracted a diverse audience of professionals from the national, state, regional, and local levels and from the public and private sectors and academia. This fourth international conference included researchers, academicians, practitioners, and students from more than a dozen countries. The program addressed longstanding issues relating to gender concerns in transportation that merit ongoing attention. It highlighted the latest research on changing demographics that affect transportation planning, programming, and policy making as well as the latest research on crash and injury prevention for different segments of the female population. Special attention was given to pregnant and elderly transportation users, efforts to better address and increase women's personal security when using various modes of transportation, and the impacts of extreme events such as hurricanes and earthquakes on women's mobility and that of those for whom they are responsible.

Conference Planning

TRB assembled a conference planning committee appointed by the National Research Council to organize and develop the conference program. Susan Hanson of Clark University served as the committee chair. The members of the committee, who are listed on page ii, brought expertise in a variety of areas, including data analysis, traffic engineering, demographics, travel behavior, and transportation and mobility planning.

The conference's primary objective was to stimulate new research on women's issues in transportation to add to the existing body of literature and to increase awareness of safety, personal security, and mobility issues affecting female travelers as the population ages.

The committee selected five conference tracks: changing demographics and women's travel behavior, transportation policy considerations for female travelers, protecting the safety and personal security of female transportation users, and studying the impacts of extreme events on female travelers. These conference tracks were led by the following committee members:

- Demographics and Travel Behavior, Sandra Rosenbloom;
- Transportation Policy, Gloria Jeff;

- Safety, Lidia Kostyniuk;
- Personal Security, Jeanne Krieg; and
- Extreme Events, Marsha Anderson Bomar.

The conference program featured commissioned resource papers to address four of these topic areas. In addition, both keynote speakers in the conference's opening session produced resource papers, for a total of six papers, which are included in this volume together with an overview of the conference proceedings.

The committee issued a call for abstracts to attract additional research on these topic areas. Following a peer review of the abstracts submitted, the authors of approved abstracts were invited to submit papers for consideration for presentation at the conference. The submitted papers were then peer-reviewed, and those approved were included in the conference program.

Conference Format

The conference program was designed to showcase the latest international research to support the topic areas selected by the planning committee. The conference included a preconference workshop on the history of women in transportation followed by a poster session where 14 peer-reviewed papers were presented.

The following day, the conference's opening session included keynote presentations by Martin Wachs, the RAND Corporation, and Ananya Roy, University of California, Berkeley. The subsequent plenary sessions featured the remaining four commissioned resource papers. A choice of three breakout sessions was offered following each of the plenary sessions. The breakout sessions featured the presentation of 32 peer-reviewed research papers and were structured to allow more time for interaction and exchange of information between the presenters and participants.

Plenary Sessions

The plenary sessions featured presentations by the author of each resource paper. These commissioned resource papers were designed to frame the issues within the respective subject area, gauge the degree to which progress had been achieved since the previous TRB conference, introduce any new research findings or information, and identify topics for continued or further research.

Breakout Sessions

Following each plenary session, a choice of three breakout sessions was offered, each of which included the presentation of three or four research papers. These sessions were designed to encourage the authors to interact with the attendees and to discuss specific research and policy implications arising from the information presented. The breakout sessions allowed for a comparison and contrast of issues affecting female travelers on different continents.

Poster Session

The conference program included a poster session featuring 14 peer-reviewed papers. This format enabled authors and attendees to interface and exchange ideas and information in a more informal way.

Conference Proceedings Format

Volume 1: Conference Overview and Plenary Papers

This volume includes the conference overview prepared by Susan Herbel and Danena Gaines, Cambridge Systematics, and the six commissioned resource papers, including the two keynote presentations delivered by Wachs and Roy. The views presented reflect the opinions of the individual participants and not those of a TRB committee or the conference participants as a group.

This volume has been reviewed in draft form by individuals chosen for their technical expertise and diverse perspectives, in accordance with procedures approved by the National Research Council's Report Review Committee. The purposes of this independent review are to provide candid and critical comments to assist the institution in making the published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the project charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

TRB thanks the following individuals for their review of this report: Kelly J. Clifton, Portland State University; Susan Hanson, Clark University; Michael D. Meyer, Georgia Institute of Technology; and Joann K. Wells, Insurance Institute for Highway Safety. Although these reviewers provided many constructive comments and suggestions, they did not see the final draft of the report before its release. The review of this report was overseen by C. Michael Walton, University of Texas at Austin. Appointed by the National Research Council, he was responsible for making certain that an independent examination of this report was carried out in accordance with institu-

tional procedures and that all review comments were carefully considered.

The contributions of the chair and members of the conference planning committee were innumerable and led to the success of the conference. The hard work of the chair and topic leaders ensured the quality of the conference program and research papers presented. The keynote speakers provided inspiration and motivation for continuing work on women's issues in transportation to improve the safety, security, and accessibility of all female travelers.

Additional support was provided by Susan Herbel and Danena Gaines (Cambridge Systematics, Inc.), who served as consultants to the committee, and graduate student facilitators Kristin Lovejoy, Jamie Kang, and Iris So Young.

Of course, the most important contributors to the success of the conference were the authors, the presenters, and the participants themselves.

Volume 2: Technical Papers

Volume 2 includes 27 full peer-reviewed papers that were presented in the breakout sessions of the conference or in the poster session and approved for publication.

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PART 1

Conference Overview

Introduction

Susan Herbel and Danena Gaines, *Cambridge Systematics, Inc., Rapporteurs*

The first International Conference on Women's Issues in Transportation was held in 1978. It was followed by a second and third conference in 1996 and 2004, respectively. These proceedings document the fourth International Conference, held on October 28 through 30, 2009, at the Arnold and Mabel Beckman Conference Center of the National Academy of Sciences in Irvine, California.

The purpose of these conferences is to stimulate thinking and research on transportation issues central to women's quality of life around the world. The idea is to look backward, take stock of what has been accomplished, and explore methods for translating research into practice. In addition, the conference was designed to look forward and identify the important questions needing attention from research communities. Transportation research remains a male-dominated field, but gender is not just about differences between men and women; it is about how these differences get translated into practice and power sharing. The goal of the conference was to generate positive change in women's quality of life through research.

Martin Wachs of the RAND Corporation set the stage by pointing out that the first conference on women's transportation issues was ridiculed. Many thought it was frivolous and exclaimed that it was just another wasteful public expenditure. The researchers, however, were not deterred by the criticism. Along the way, the Women's Issues in Transportation Committee of the Transportation Research Board (TRB) was established and continues to serve as a stimulus to further research on the issues. The conferences featured excellent presentations and discussions. The published proceedings were, and still are, widely cited. The second and third conferences helped "women's travel issues" enter the mainstream of scholarly and policy discourse.

A community of interest was nurtured by these events. People compared notes and exchanged data, studies were replicated, data collection gradually became institutionalized, and trends were tracked over time. These are all important accomplishments that mark the maturing of an intellectual enterprise. The enterprise has progressed from an anomalous set of inquiries at the edge of the mainstream 30 years ago to graduate seminars, a stream of journal articles and books, and policy innovations all over the world addressing the theme of gender in transport.

The 2009 conference agenda was built around themes considered central to women's transportation issues in today's society:

- Demographics and travel behavior (e.g., gender differences in travel behavior, attitudes, and preferences; citizen participation; the relationship of travel to household size and composition; and the impact of income disparities, immigration, age, ethnicity, race, and disability);
- Safety and personal security (e.g., gender differences in driving patterns, crash patterns, and self-regulation; patterns across generations; women's vulnerability in crashes; safety of pregnant drivers; women's ergonomic needs in relation to design features of the different modes; gender differences in response to actual and perceived crime, harassment, and security in various

travel modes; and the impact of design features on crime prevention and reduction);

- Transportation planning (e.g., differential responses to land use and community design features; implications of gender differences for travel demand modeling and transportation planning; social justice; and transportation and public health concerns); and
- Extreme events (e.g., gender differences in preparedness for and response to hurricanes, earthquakes, or terrorist attacks; emergency response; and risk management).

PLENARY SESSION 1

Framing the Issues

Susan Hanson, *Clark University, Presiding*
Martin Wachs, *RAND Corporation*
Ananya Roy, *University of California, Berkeley*

The first plenary session explored the history and future of research on women's travel issues and the relationship between poverty, spatial disadvantages, and women's transportation issues.

Women's Travel Issues: Creating Knowledge, Improving Policy, and Making Change

Martin Wachs

Martin Wachs provided an overview of existing research on women's transportation issues and identified some gaps.

1. A great deal has been learned during recent decades about gender differences in travel patterns in developed urban societies. Women's travel patterns are more complex, and the range is shorter. Even though women make more trips, they are likely to be closer to home, which probably reflects women's great responsibility for the home and children.

2. Knowledge in developed nations is uneven. Research is needed about gender and mobility in rural areas (e.g., small towns and Indian tribal areas) and with respect to long distance (intercity) travel, non-work-related travel, and air travel.

3. Although more has been learned about traffic safety and gender, knowledge has not advanced nearly as much as knowledge about travel patterns and choices. It is known that women tend to be more safety conscious and less likely to exhibit risky behavior when traveling, but women are likely to live longer than men, so their safety and mobility needs are likely different among the older population. Some evidence supports the finding that given comparable crashes, women are more likely to be injured than men, but more work is needed in this area.

4. Understanding of the historical evolution of relationships between gender and transportation remains rudimentary. Research that takes a long look within a historical context is much more difficult.

5. Sufficient research on gender issues associated with employment and status advancement within the transportation industry is lacking. Scholarship is needed on the implications for men and women of shifts in employment patterns. Issues such as unionization trends and salary and wage differentials need to be addressed.

6. An understanding of the impact of information technology and electronic connectivity on the relationship between gender and mobility is needed. For example, it is reasonable to expect that the increasing integration of information with mobility will affect women and men differently.

7. Broad syntheses that link different thematic areas together are lacking, as are studies that integrate social science analysis with broader theories of social change and gender. The future must solidify the place of gender studies in transportation by developing theory.

8. Knowledge about travel, traffic safety, and security is greater in developed economies than in poor or rapidly developing societies. Ananya Roy, whose research focuses on gender and development in the broader con-

text of social justice, investigated this area of research and reported on her findings in the opening plenary session.

Gender, Poverty, and Transportation in the Developing World

Ananya Roy

Despite increasing globalization, the world's poor are concentrated in developing nations. The effects of poverty are often more pronounced for women than men. Even though the *Millennium Development Goals Report*[1] included promotion of gender equality and improvement in maternal health, women continue to be disadvantaged. These women are spatially disadvantaged because of forced migration and displacement or because of limited access to transportation, which means they often lack access to health-care facilities, employment, and so forth. For example, in Calcutta, poor women working in the informal sector (e.g., domestic service) rely on trains to get to work. Sometimes they refuse to buy tickets because they view subsidized transportation as a basic right. Transportation brings these women together, which empowers them to some extent; however, their political influence is limited, and they have no access to upward social mobility.

India is working to build globally competitive, "world-class" cities such as Delhi, Mumbai, Bangalore, and Calcutta. For poor women, this often means their homes are demolished as the urban poor are pushed to remote peripheries unconnected to the city core. A gender, poverty, and transportation nexus is necessary in the context of transportation justice. Developed nations regularly audit the nexus, but it is uncommon in developing nations. Transportation justice is paramount to expanding opportunities and providing access to transportation as well as to jobs and shelter. Roy observed that a vigorous research agenda on women's transportation issues must include a focus on the world's poor and transportation justice for the world's "bottom billion."

[1] *The Millennium Development Goals Report*. United Nations Department of Social and Economic Affairs, New York, 2008.

PLENARY SESSION 2

Changing Demographics, Women's Travel Patterns, and Transportation Policy

Elaine Murakami, *Federal Highway Administration, Presiding*
Sandra Rosenbloom, *University of Arizona*
Maryvonne Plessis-Fraissard, *World Bank*
Genevieve Giuliano, *University of Southern California*
Lisa A. Schweitzer, *University of Southern California*

The session on changing demographics, women's travel patterns, and transportation policy, moderated by Elaine Murakami, included discussions on demographic trends affecting the travel patterns of women and men in developed and developing countries and the implications of transportation policy shifts on women's access to transportation. The session raised several research questions regarding the implications for women's travel behaviors of transportation strategies such as value pricing and reduced vehicle miles traveled.

Women's Travel in Developed and Developing Countries: Two Versions of the Same Story?

Sandra Rosenbloom and Maryvonne Plessis-Fraissard

This paper analyzed societal trends that affect men's and women's travel patterns, described research approaches and methods in developed and developing countries, reviewed travel patterns of women in developed and developing countries, and identified research gaps in women's transportation issues. The discussion reflected several common themes and diverse situations related to women's transportation issues. Travel patterns reflect the process of economic development, and access to transport resources is dependent on one's economic and social standing. Cultures and customs also structure women's travel patterns. Women have less access to better transport modes and new technology, their travel patterns are complicated and different from men's because their household and childcare roles differ, and they face personal safety and security issues. In richer countries, their distance traveled comes closer to that of men, yet they continuously renegotiate travel decisions in view of little-changed household management roles and mothering norms.

The research approach to women's travel issues in developing countries is characterized by a growing rejection of "Eurocentric" quantitative research and planning models that fail to represent how poor households make decisions and ignore constraints under which women operate. Women's travel patterns in the Global South are characterized by accelerating changes in mobility and patterns and gender gaps that decrease as income increases. Women in developed countries have substantial auto mobility, but gender gaps in licensing and vehicle use remain. Concerns about personal security affect women's travel decisions more than men's in all countries. Women's travel issues are recognized to greater or lesser extent around the world, but they have limited policy traction. Researchers understand the gendered nature of travel, but gender-specific policies, programs, and mandates have been ineffective.

Her Money or Her Time? A Gendered View of Contemporary Transportation Policy

Genevieve Giuliano and Lisa Schweitzer

This paper reports on key findings of recent research on trends for women's transportation policy and planning in

the United States. Although a wide range of factors influences outcomes for women in cities, the study focuses on two key areas of major contemporary change in transportation policy: public transit and transportation finance. Both of these forces of change have responded to policy goals including energy, health, the environment, and climate change. In doing so, policy and planning have converged on one major goal: reducing vehicle miles traveled (VMT). However socially laudable in other dimensions VMT reduction may be, policy and planning based on this goal have gone forward largely without addressing or allowing for the related equity consequences derived from social norms and institutions that contribute to gender inequality, including wage discrimination, gender labor market segregation, and household roles and labor divisions.

Climate change, sustainability, obesity, livability, environmental justice, and energy are emerging policy issues in transportation that have received enormous traction in transportation planning. VMT reduction has been identified as a solution for each of these issues. Most new transportation fees and taxes, such as parking charges and congestion tolls, are designed to ration and reduce auto usage in some manner. Many policies designed to reduce VMT do not explicitly consider differences in the value of travel time and the value of reliability across gender and care-giving status. The presentation looked at the "nudging" toward public transit and the gap between investment and quality as a case study. The study concludes that value of travel time and reliability differ across genders, modes, and trip purposes. A higher value of travel time is often a result of child-related travel pressures.

Topics for Further Research

1. Explore methods to translate gender research findings into policy.
2. Develop effective methods to train, monitor, and assess compliance with gender mandates.
3. Explore how and why travel patterns differ by hours of employment and work schedules in combination with gender and other sociodemographic variables.
4. Improve data quality by including gender, race, and ethnicity so analysis by gender can be done on policy impacts.
5. Examine how transport policies and expenditures address impacts on women.
6. Research motivations for women and men's transportation choices to better understand how people respond to "nudges."
7. Explore how gender differences in the value of time and the value of reliability affect travel purposes, location choices, and travel modes.
8. Explore the effects of VMT reduction on women and other groups.

BREAKOUT SESSION

Women's Travel Patterns and Behavior

Sandra Rosenbloom, *University of Arizona*
Jane Gould, *University of California, Los Angeles*
Peter Jorritsma, *KiM Institute for Transport Policy Analysis*

The session on women's travel patterns and behavior, moderated by Sandra Rosenbloom, included discussions on an experiment in changing people's behavior with respect to transit use and evolutionary changes in women's travel behavior in the Netherlands.

A Commitment to Continue? Comparing Women and Men Commuters Who Choose Transit over Driving Alone

Jane Gould and Jiangping Zhou

A decline in the number of women taking transit to work has occurred because transit does not easily accommodate the multiple demands and household responsibilities women fulfill. With this perspective, this study asked whether opportunities are available to reverse the trend. This study was a 3-month experiment in promoting transit use through a program called "Try Transit." The study required people to give up their parking passes in return for a free transit pass. Respondents were very carefully self-selected into this trial. Women were interested in taking transit to the extent that they did not have family responsibilities limiting their participation.

The study was deemed successful because 70% of the men and women involved agreed after the experiment to continue not driving alone on the commute to work. One important outcome or focus in changing behavior is to change people's impressions of transit. The researchers recognized the importance of public education as a component of the experiment. They used a hybrid communications method that included both a website with initial information and a trip-planning calculator and face-to-face education when people came in to relinquish their parking passes.

Travel distance, household size, number of vehicles, and age were used as control variables. The only difference found between women and men pertained to age. The men's ages fit a normal bell curve, but in the case of women, the curve was more of a U shape, with those ages 26 through 35 and age 55 or greater more likely to use transit. These women were found to be less time starved and had smaller families. The decision to continue using transit after the experiment did not appear to be gender related. Positive comments associated with the experiment included the following: transit was less stressful than driving alone; participants got more exercise; and participants were able to multitask while commuting to work on transit (e.g., answer e-mail).

Changing Travel Patterns of Women in the Netherlands

Marie-José Olde Kalter, Peter Jorritsma, and Lucas Harms

In this study, the KiM researchers used data from the Dutch National Travel Survey, which is conducted every year, and the National Time Budget Survey, which is conducted every 5 years. The Dutch National Survey enabled researchers to study annual developments and changes in women's travel behavior for the period 1985

to 2007, while the National Time Budget Survey provided data on some factors, such as time spent on activities, over a 5-year period.

The survey results show the differences between men's and women's travel are shrinking, largely because women are traveling more often and greater distances. Women increasingly prefer traveling by car as opposed to biking, walking, or using transit. Men spend slightly more time (6%) on work-related travel. Attending to household and care-providing responsibilities increased 35.5% (10 hours) for men, while decreasing by 18.4% (22 hours) for women; however, a large gap remains, with women still shouldering the largest portion of these activities.

The changes in women's travel behavior can be attributed to several related developments in the Netherlands. First, the number of women in the population has increased by 10%. Also, women are more likely to be educated than in past years, and those with an education are far more likely to be employed. Between 1985 and 2007, women's employment increased by 32%. Additional characteristics that contribute to the increase in women's travel by car include the following:

- Women are more likely to marry at a later age; wait until later in life to have children; and have smaller families (i.e., fewer children), all of which contributes to increased workforce participation.
- Driver licensing and car ownership have increased dramatically among women.
- A very large percentage (75%) of women in the workforce hold part-time jobs.
- Women are traveling more frequently and greater distances to pursue leisure activities.

The study suggests several approaches for addressing the increase in car use and decrease in the use of walking, biking, or using transit, including educational campaigns, pricing policies, spatial policies, and telecommuting.

Topics for Further Research

1. Develop a better understanding of the decrease in walking, biking, and using public transport.
2. Continue to study the development of more equitable sharing of household responsibilities and its impact on women's travel by car.
3. Develop a methodology for counting multimodal trips such as walking to the bus stop, taking the bus, biking from the bus to work, and so forth.
4. Study the mobility patterns of women who do not work and women who work full time or part time.
5. Implement the methodology of the University of California, Los Angeles, study "Comparing Women and Men Commuters Who Choose Transit over Driving Alone" in other cities to determine the appropriate length of time necessary to unfreeze the habit of driving alone. If possible, provide options in addition to driving or taking the bus.
6. Develop education campaigns to encourage a more equitable distribution of household and care-giving work among men and women.
7. Study the gender-specific needs of transit passengers.
8. Develop an educational campaign on the relationship between transit and multitasking (e.g., transit provides more time to attend to household tasks, leisure, etc., and it is much safer).
9. Explore how and if flexible, multimodal commuter packages attract more working women to use transit some days and drive on others.
10. Identify what factors women weight when determining whether transit suits their lifestyle and travel patterns.

BREAKOUT SESSION

Mobility and Safety Issues for Youth and Young Adults

Tonya Holland, *Federal Transit Administration, Presiding*
Piyushimita (Vonu) Thakuriah, *University of Illinois, Chicago*
E. Owen D. Waygood, *Kyoto University, Japan*

Tonya Holland presided over the session on mobility and safety issues for youth and young adults, which explored young women's transportation and labor market experiences and the role of mothers in transit-oriented development.

Young Women's Transportation and Labor Market Experiences

Piyushimita (Vonu) Thakuriah, Lei Tang, and Shashi Menchu

The purpose of this research is to examine the mobility, transportation, and labor market conditions of young adults from a gendered perspective and develop policy recommendations regarding the mobility needs of young women to facilitate improved labor market outcomes. The primary research questions addressed are (*a*) How do the transportation and labor market experiences of young women compare with those of young men? and (*b*) What factors are likely to contribute to the transportation experiences of young women?

The study used the National Longitudinal Survey of Youth (NLSY), which is a panel data set of a large sample of respondents. Gender differences are examined in several labor market indicators, including age at entry into the labor force, number of jobs, number of weeks worked per year, and average earnings. The transportation indicators analyzed are perceptions of young women regarding difficulties associated with transportation, job search distance, and the duration of time they remain without a car after entering the labor force. Young women are more likely to restrict job searches geographically if they perceive difficulties with travel and transportation conditions. Marital status often determines the timing for young women to gain access to vehicles. They are less likely than men to have a vehicle when single.

What Is the Role of Mothers in Transit-Oriented Development? The Case of Osaka–Kyoto–Kobe, Japan

E. Owen D. Waygood

This research focuses on the role that parents, in particular mothers, play in children's travel in Japan. The majority of mothers in Japan are not employed outside the home, but their role in chauffeuring and accompanying children on their trips is much less than in Western societies. This paper discusses how cultural expectation and the built environment in the Osaka region of Japan contribute to children as young as 10 and 11 years of age traveling independently without adult accompaniment for the majority of trips. This independent travel in turn reduces the chauffeuring burden on parents. Chauffeuring children in the United States and other Western countries is mostly conducted by mothers.

The study looks at surveys of children ages 10 to 11 from nine different schools in varying neighborhoods in the Osaka region. The child-friendly travel diaries show that parents accompanied children for less than

15% of their trips on weekdays, while data from the United States indicate that more than 65% of weekday trips made by American children are accompanied by a parent. Further, the average daily travel time was 40 minutes for children in Japan versus 72 minutes for their American counterparts, despite a similar number of trips per day.

Topics for Further Research

1. Conduct more research to better understand the mobility needs and travel patterns of young women ages 18 to 24 who are entering the work force.
2. Explore opportunities to increase car ownership and car sharing for young female professionals to facilitate their ability to gain employment and commute to their jobs.
3. Compare wages for males and females on the basis of access to an automobile.
4. Analyze parental chauffeuring trends on the basis of sociodemographic characteristics such as income and education, and for different built environments.
5. Explore how societal values and beliefs can affect travel patterns of parents and children and how that relates to impacts on independent travel, exercise, social interaction, and other important metrics of children's development.

BREAKOUT SESSION

Mobility Issues in Africa and Asia

Maryvonne Plessis-Fraissard, *World Bank, Presiding*
Julie Babinard, *World Bank*
Kinnon Scott, *World Bank*
Roselle Leah Kolipano Rivera, *University of the Philippines*
Purnima Parida, *Central Road Research Institute, New Delhi, India*
Manoranjan Parida, *Indian Institute of Technology, Roorkee, India*

The session on mobility issues in Africa and Asia, moderated by Maryvonne Plessis-Fraissard, included discussions on how existing surveys and other data sources can serve transportation research in developing countries. The speakers discussed known differences in travel behavior and perspectives on travel across gender lines in these places. They also discussed the continued importance of the pedestrian environment as part of the transportation infrastructure, even as (or perhaps especially as) some countries experience rapid increases in vehicular traffic.

What Do Existing Household Surveys Tell Us about Gender and Transportation in Developing Countries?

Julie Babinard and Kinnon Scott

Access to transport is critical for growth and poverty reduction in developing countries, but transport policies tend not to address gender differences. Surveys on travel in developing countries, especially longitudinal surveys or surveys conducted at the subhousehold unit of analysis, are needed. For this reason, it is worth exploring what sort of data existing survey efforts produce and what they tell us about gender and transportation in developing countries.

The authors reviewed four major surveys with more frequent implementation across countries and years, individual-level data, and potentially relevant content: (*a*) the Living Standard Measurement Study (LSMS) Surveys; (*b*) Household Budget–Income and Expenditure Surveys (HB–IES); (*c*) Demographic and Health Surveys (DHS); and (*d*) Multiple Indicator Cluster Surveys (MICS).

Collectively, these surveys already provide a substantial amount of data, but with some limitations. For instance, while no overall measure of transport access can be constructed, the LSMS provides community-level data on transport access, and the HBS–IES provides data on expenditures on modes of transport (addressing affordability), though not number of trips taken, and modes requiring no expenditures are not measured. While often only collected at the household level, some HBS–IES expenditure data are collected at the individual level and allow for comparisons of affordability of transport by gender. The LSMS also provides use of transportation by gender for certain trip types, especially related to education and health care. DHS and some implementations of the MICS provide data on barriers to accessing health care or education, including transportation barriers. Transport quality and security are not well addressed in any of the surveys.

Although not a replacement for detailed transport studies, these surveys have the advantage of providing national-level data, the ability to link transport use with welfare status, and the ability to track changes over time and across countries for specific groups. In the long run, the authors observe, even better data can be generated by incorporating additional questions on gender and transport to existing surveys, when possible; by systematizing survey questions for better comparability; and by investigating existing data sources before launching a new survey.

Understood, Misunderstood, or Ignored: Poverty, Place, Gender, and Intracity Transportation in the Philippines

Roselle Leah Kolipano Rivera

The Philippines has one of the fastest urbanization rates in East Asia, and like many developing countries, it is also rapidly becoming more motorized. Conventional transportation planning, which relies on aggregate data and cost–benefit analysis, may not adequately address the needs of certain groups, such as women. In addition, international concern about climate change has focused much of the attention relating to transportation in developing countries on vehicle ownership and air quality rather than on issues of safety and access, which are especially relevant.

To examine travel experiences by income level and gender, the author conducted a multimethod study that included a survey of 360 employed men and women, a subsample of eight women, and key informant interviews of transport planners in Davao City in the Philippines. Women in the study reported longer travel times, more trips, and a greater share of their income spent on transport, though they spent less on transport overall. Significant differences in the modes men and women used occurred, with women being less likely to use private motorized transport, more likely to walk, and more likely to use formal public transport; however, significant differences were not found in the use of informal public transport by gender.

The author also gathered accident data in the city from hospital and police records, exploring a sometimes overlooked safety issue. Although the rate of vehicle accidents in Davao City has declined over the past decade, with the number of accidents remaining constant as the number of vehicles has increased, the number of physical injuries resulting from vehicle accidents has more than doubled. In one hospital, 95% of the emergency room cases were related to vehicle accidents. About 90% of the patients seen for vehicle-related accidents were male, and their accidents mostly involved motorcycles. This unique data source can be further explored for trends by vehicle type and to identify vulnerable user groups.

Appreciation of Gender Difference in Development of Qualitative Level of Service for Sidewalks

Purnima Parida and Manoranjan Parida

The needs and requirements of pedestrians are seldom given importance in the planning and design of road infrastructure in metropolitan cities in developing countries. Yet walking is important. First, with rapidly increasing vehicular traffic, about half of road fatalities in India are pedestrians. Second, walking should be promoted as a healthy and more sustainable transportation mode and one that is a necessary companion to public transit. Design metrics for pedestrian facilities generally only take capacity into account, while many other dimensions of the quality of the pedestrian environment may affect the pedestrian experience. Furthermore, with a growing number of women on the streets with their increased participation in the labor force, it is worth evaluating women's perspectives on the pedestrian environment.

An intercept survey was conducted at various locations in Delhi, India, with a total sample size of 600 men and women who were asked to give both importance and satisfaction ratings for five different aspects of the sidewalk: its width, surface quality, presence of obstructions, sense of security, and comfort. On average, ratings were similar across gender except for security, for which women gave higher importance ratings and lower satisfaction ratings. Women also seemed more willing to compromise physical factors in favor of security and comfort. For instance, while men might consider sidewalk vendors as an inconvenient obstruction, women might feel that they help establish a sense of vibrancy and security. The authors propose a method for incorporating ratings of these qualitative elements into a single composite score, which can then be used as the basis for five qualitative level of service (LOS) grades. This method offers a simplified approach for evaluating sidewalks and for identifying the types of improvements necessary for achieving a higher LOS rating in a given location. Differences in perceptions by gender underscore the importance of incorporating female perspectives in the development of design criteria.

Topics for Further Research

1. Collect more individual-level data so that experiences of different household members can be captured and gender trends can be examined.
2. Improve measurement of nonmotorized trip making in developing countries. (One major data source is expenditure surveys, which inherently exclude any modes that incur no cost.)
3. Provide more research to support policy recommendations focused on walking because it remains the prevalent mode for the poor, is especially vulnerable as vehicular traffic increases, and is an important companion mode to public transportation, which many countries would like to foster in the long run.
4. Continue exploration by gender of the qualitative elements of the pedestrian environment that make a difference in decisions to walk and in route selection in different parts of the world.
5. Examine safety by different types of vehicles, especially the great diversity of motorized and nonmotorized vehicles used in developing countries. In addition, identify the most vulnerable users, strategies for improving safety, and whether specific considerations are gender specific.

BREAKOUT SESSION

Attitudes and Preferences

Konstadinos Goulias, *University of California, Santa Barbara, Presiding*
Emmy Dahl, *Linköping University, Sweden*
Kandice Kreamer Fults, *Royal Institute of Technology, Sweden*

Konstadinos Goulias presided over the session on attitudes and preferences, which focused on gender-related differences in travel and environmental issues such as the value of commuting time and travel effects on the sustainable environment. The discussion explored how men and women view the purpose of daily travel and factors that influence the value of commuting time.

Creatively Committed or Burdened with Worry? Talking About Travel and Environmental Issues as a Way of "Doing Gender"

Emmy Dahl

This work is based on a pilot study that is part of a larger research project on gender and sustainable travel. The purpose is to explore the attitudes of women and men on the environmental implications of their personal travel.

In April 2009, three focus groups of 14 participants were conducted in Sweden. The first group consisted solely of women, the second group was all male, and the third group was mixed. Some participants were highly dedicated to environmental issues while others were not particularly interested in sustainability.

Participants were asked about the type of travel they make in their daily lives and their attitudes about the impact of their travel on the environment. The small sample size limited the findings to an exploration of the gender differences between travel patterns, mobility needs, and traveler attitudes.

Gender Differences in the Value of Commuting Time: Evidence from a Household Model of Subjective Life Satisfaction in Sweden

Kandice Kreamer Fults, Gunnar Isacsson, and Anders Karlstrom

Aristotle proposed that happiness is found by following most closely that which they have reasoned for themselves and that only individuals can truly measure happiness. This paper presents estimates of the value of commuting time obtained from a model of subjective life satisfaction in the context of a household. The model is estimated using Swedish data containing information on subjective life satisfaction for cohabitating persons. The data set also contains information on individuals' and partners' commuting time and socioeconomic characteristics. The model uses a correlated error structure for the household dimension in the data, and it is estimated as an ordered probit model. Separate models are estimated for households with and without young children.

The main results suggest that men's subjective life satisfaction is strongly influenced by income, while women's subjective life satisfaction is less influenced by their own income and strongly influenced by their partner's income. The results also indicate that the presence of young children in a household has a significant effect on the influences of commuting time for partnered men and women. These findings suggest that the value of commuting time based on subjective life satisfaction is higher for women, particularly in households with young children.

Topics for Further Research

1. Explore power relations produced in positions toward the environmental implications of travel.
2. Investigate constructs of sustainability.
3. Develop constructs of "family life," "family care," and differences between spouses.
4. Investigate new models considering nonparametric distribution to estimate the value of commuting time.

BREAKOUT SESSION

Gender Equality and Equity Issues

Cheryl Calloway, *Consultant, Presiding*
Wanna Svedberg, *University of Göthenburg, Sweden*
Merritt Polk, *University of Göthenburg, Sweden*

Cheryl Calloway presided over the session on gender equality and equity issues, which examined a Swedish law requiring a gender-equal transportation system and the efficacy of laws to bring about effective change.

Gender-Equal Transportation System: Legal Study for Implementation of Gender Equality Responsibility in the Transportation Sector

Wanna Svedberg

The primary research question in this study is: Can regulation (laws) support implementation of gender equality in transportation policy? The focus is on legislation, which consists of rules that have an impact on the decision-making process concerning the establishment, design, and administration of the transport sector.

The theoretical and methodological approaches used in the study are feminist legal studies and sociology of law. A model for understanding the findings and implications was adapted to these constructs. The model approaches the legal system as a system of norms containing an internal and external structure. The internal structure contains three types of legislative rules: rules of competence, which indicate who is responsible for taking actions; rules of process, which provide rules for the decision-making process; and rules of action, which outline what has to be done to achieve the goal). The model assumes all three types must be used to achieve the goal of gender equality in the transport sector.

Swedish transport policy serves to ensure the economically efficient and sustainable provision of transport services for people and business throughout the country. Six subgoals support the overall objective: an accessible transport system, high transport quality standards, safe traffic, a good environment, favorable regional development, and a gender-equal transport system. The sixth goal has as its objective an equal transportation system designed to fulfill both women's and men's travel needs. Women's and men's values must be accorded the same weight and must be given the same potential to influence the establishment, design, and administration of the transport sector.

The intention of the goal is not clear; therefore, the study interprets the policies in terms of what a gender-equal transportation system is supposed to be. At the least, it must include women's participation and representation in decision making as a whole, at all levels, especially in political decision making. It is assumed equal participation of both women and men in decision making will provide a gender-equal transportation system. In addition to balanced representation, women's access to the transportation system is emphasized as a quality of a gender-equal transportation system.

The study analyzes the use of legislation as a tool for governance regarding the key elements, namely, representation and accessibility. Although the paper does not explicitly define a gender-neutral system, it points out the objective has not been defined and no processes have been implemented to move toward the goal.

Gender Equality: A Key Tool for Reaching Sustainable Development in the Transport Sector

Merritt Polk

For many years, both sustainable development and gender equality have been prominent political goals in Sweden. Gender equality has also been an explicit goal of transportation policy and planning since 2001; however, limited success in reaching a more gender-equal transport system has occurred. Therefore, Sweden has not taken full advantage of the benefits gender equality could contribute to sustainable development in the transport sector.

One of the reasons for the gap between political goals and practice is gender blindness to differences in women's and men's choice of travel modes, driving behavior, environmental and social impacts, and attitudes and power. Gender blindness is exacerbated by the lack of a coherent and applicable framework for integrating gender issues, sustainable development, and transport.

This study discusses key issues from a literature review including gender and technology studies, geography, environmental psychology, sustainable transport, and urban planning as well as qualitative and quantitative research on mobility gender differences. The implications for sustainable development within the transport sector are discussed, and the paper explores how gender equality can be more effectively used as an analytical and theoretical tool in research and policy to further the attainment of sustainable development within the transport sector.

A recent review of transport research in general showed the transport sector is a male-dominated work space. Paradigms and the worldviews regarding professional, public, and media perceptions and representations of transport are linked to a masculine identity. Men dominate public participation, decision making, and planning. One consequence is the dominance of technical approaches and exclusion of a wide number of skills, scientific paradigms, and knowledge bases crucial for sustainable mobility. This approach does not question the promotion of certain types of travel patterns and mode use, such as the car, the high number of deaths and injury, driving under the influence, the social exclusion of different groups of individuals, local and global environmental degradation, the wasteful and unsustainable use of resources, and degraded and inaccessible urban environments.

Topics for Further Research

1. Consider how a gender-neutral transportation system can be defined.
2. Identify the gender issues in transportation as they relate to climate change.
3. Determine whether gender differences in travel patterns are the result of choice or constraint.
4. Examine how the gender composition of transportation decision makers, researchers, and practitioners affects the outcome.
5. Determine whether legislation is an effective way to create gender equality in transportation.

BREAKOUT SESSION

Gender Equality in Transportation in Sweden

Gloria J. Jeff, *Consultant, Presiding*
Åsa Vagland, *Swedish Government Agency for Innovation Systems (VINNOVA)*
Malin Henriksson, *Linköping University, Sweden*
Eva Wittbom, *Stockholm University and Blekinge Institute of Technology, Sweden*

The session on gender equality in transportation in Sweden, moderated by Gloria Jeff, included discussions on the evolving policy context in Sweden, where gender equality had been made an explicit priority for transport policy, at least nominally. The discussions focused on how the implementation of this goal has faired in recent years, including how the policy context has evolved and how gender mainstreaming has percolated into the practices, goals, composition, and institutional culture of specific transport agencies.

Gender Equality as Subsidiary Objective of Swedish Transport Policy: What Has Happened Since 2004?

Åsa Vagland

Vagland provided an overview of the recent political history of Sweden as it relates to gender equality in the transport sector. She then evaluated the progress of gender mainstreaming in Sweden as reflected in policies, reports, and agency management during this period. In particular, national-level highlights include the following events:

- December 2001: Sixth subsidiary objective on gender equality in the transport sector is adopted.
- May 2006: Government bill on transport policy is adopted that requires all subsidiary objectives to be analyzed through a gendered perspective and all transport agency steering committees to be at least 40% women (or men) by 2010.
- May 2006: Government bill on gender equality is adopted, stating women and men shall have equal power to shape society and their own lives and identifying gender mainstreaming as a strategy to be used to achieve national gender equality objectives.
- Fall 2006: New government consisting of representatives from the Alliance for Sweden coalition is elected, replacing the Social Democrats, who had been in office for 65 of the past 74 years.
- June 2009: Government bill on transport policy is adopted. The overall objective is kept the same, but the subsidiary objectives are replaced with a functional objective relating to accessibility that declares the transport system will be "gender equal" and with an impact objective relating to health.
- 2009: Government guidelines for transport agencies are reduced, omitting policy objectives (and their gender equality component), leaving only the requirement that committees be at least 40% women (or men).
- 2010: Transport sector to be reorganized into new transport agency whose policies relating to gender mainstreaming are yet unknown.

In reviewing government and agency reports over this period, Vagland observes increased awareness and discussion about gender equality in the planning processes in both the National Rail Administration and the Swedish Road Administration. Female representation on steering committees has also increased. While 80% of committee members were male in 2004, all committees meet the 40% to 60% requirement today, although agency managers are still predominantly male; however,

the reorganization of the transport sector under a more conservative political leadership, along with weakened government guidelines, leaves unclear the future trajectory of gender mainstreaming.

Vision Meets Practice: Planning for a Gender-Equal Transportation System in Sweden

Malin Henriksson

Although gender equality in the transport system has been an explicit part of Swedish policy since 2001, gender equality is not fully integrated into daily activities and planning practices, and the concept of what constitutes a gender-equal transport system is undefined, leaving the implementation of gender mainstreaming to the interpretation of individual professionals.

To better understand the state of the thinking among these professionals, Henriksson conducted a pilot study of in-depth interviews with six planners, four public agency representatives, and two gender equality experts. She asked each to envision a city characterized by equality focusing on transport. She characterized perspectives on the role of gender equality in transport policy in the following three categories:

- Gender equality as a safety issue: Making transport systems and streetscapes that are more secure for women is a means of attaining gender equality.
- Gender equality as a matter of saving time: Because women are more likely to juggle work with household errands and child-care duties, sparing women from making fragmented trips (e.g., by implementing more centralized urban design) is a means of attaining gender equality.
- Gender equality synchronized with new planning ideals (with the implicit assumption that single-occupant vehicles are masculine): In light of new sustainability goals, advancing gender equality is one means for advancing sustainability.

In addition, Henriksson reports hearing two main views on how gender equality relates to transport planning. One is that ideals of gender equality do not affect planning because planning is a gender-neutral process and what is good for one person is good for everyone. Another view is that planning does not affect gender equality (i.e., issues of gender inequity cannot be solved through the transport sector). Overall, the results reveal how gender equality may be framed in different ways, raising important questions about the extent that the gendered perspectives of planners may affect planning outcomes.

Gender Mainstreaming in Transportation: The Impact of Management Control

Eva Wittbom

The focus of this study was to evaluate how the macroscopic goal of attaining a gender-equal transport system is implemented on a micro level through specific management control systems at individual transport agencies. The researchers conducted interviews, attended strategic planning meetings, and reviewed documents from the Swedish Road Administration and the Swedish National Rail Administration.

They found agencies tend to rely on "SMART" (specific, measurable, attainable, realistic, and timely) performance measures for evaluating gender mainstreaming, especially counts of the number of women and men participating in various activities. These measures are problematic because they say little about the distribution of power and do not distinguish between the different ways female perspectives might be incorporated into the core business.

A reliance on these measures is an indication that the concept of gender equality is somewhat misunderstood at the agency level. Wittbom suggests that for true gender mainstreaming to occur, better understanding is needed, with more internalized gender awareness, and the process will be transformative rather than additive.

Topics for Further Research

1. Develop a description of the transformation into a gender-equal transport system. What does such a process look like and how would we know if we had one?
2. Develop alternative performance measures for evaluating progress toward gender equality in transportation. How can performance measures be made more relevant and effective in bringing about true transformation?
3. Identify what sorts of planning processes are most effective in bringing about gender equality in transportation. What are the best practices for the process of planning, rather than the outcome of planning? How can we more equally involve both genders in the planning process?
4. Evaluate how, if at all, power relations have changed or need to change in Swedish transportation agencies, and conduct continued evaluation of progress made toward gender mainstreaming in Sweden as circumstances continue to evolve.
5. Identify what sorts of educational campaigns or other policies can be most effective in creating cultural shifts and truer understanding of gender mainstreaming among individuals and organizations that are underexposed to the concept.

PLENARY SESSION 3

International Industry Leaders Panel

Martin Wachs, *RAND Corporation, Presiding*
Therese McMillan, *Federal Transit Administration*
Gina-Marie Lindsey, *Los Angeles International Airport*
Bonnie Nelson, *Nelson/Nygaard Consulting Associates*
Maria Mehranian, *Cordoba Corporation*

Martin Wachs introduced a panel of women recognized as transportation industry leaders. The panelists included the following:

- Theresa McMillan, who was recently appointed deputy administrator of the Federal Transit Administration. Previously, she was deputy director of the Metropolitan Transportation Commission in San Francisco. In that capacity, she managed the commission's financial and legislative interactions with legislators at state, regional, and national levels.
- Gina-Marie Lindsey, who was executive director of Los Angeles World Airways, a group of airports operated by the city of Los Angeles, California. She has 16 years of airport management experience, including Los Angeles; Anchorage, Alaska; and Seattle, Washington, and she is currently executive vice president of government relations for an aviation consulting firm.
- Bonnie Nelson, who has been a senior principal civil engineer with Nelson/Nygaard Consulting Associates since 1987. She has 30 years of experience specializing in the management and operation of transit systems.
- Maria Mehranian, who is a managing partner with Cordoba Corporation, which is a premier civil engineering and construction management consulting firm. She is an experienced urban planner who has worked in the Los Angeles region and elsewhere.

The format facilitated a lively discussion. Wachs asked a series of questions, the panelists responded, and the audience joined in the discussion. The questions and summary responses are outlined below.

1. Has being a woman influenced your career paths and choices?

Generally, the answer is no. To succeed, women need to examine their personal goals, become the best they can be, work to identify opportunities, find a mentor, and be ready to address challenges and opportunities as they arise.

2. Do women really have equal opportunity?

Generally, the answer is yes, but mentoring is the key. Women need to find allies in every assignment and use collaborative strategies to capture the opportunities.

3. Has anything from the body of research influenced your attitudes about this issue?

Using research in practice is important and helpful. It was suggested that more research is needed on (*a*) the mobility needs of children and youth, especially for the transit community; (*b*) the nexus between public health and transportation; and (*c*) the relationship between universality and individual needs.

4. What is the relationship between transportation and women in developing countries?

Transportation is a challenge for women in developing nations, but it is a challenge for everyone at the same time. Transportation professionals must be careful to take culture into account when designing transportation options in developing nations as well as in the United States.

5. Have you observed increased sensitivity to women's issues in design and operations?

Universal design should be the driving force, but market forces will influence specific decisions. While universal design is preferred, participants cautioned that

we must be careful not to design to the lowest common denominator or to the "middle," either of which may not serve anyone.

6. Do you think activist groups do, can, or should influence transportation design, operations, or other areas?

Activist groups are influential, but the problem lies in the risk of influence by "siloed" interests. Many felt that it is best not to add one more check box—for example, women—to the list of interests that must be taken into account.

PLENARY SESSION 4

Women's Transportation Safety and Personal Security

Jeanne Krieg, *Eastern Contra Costa County (California) Transit Authority, Presiding*
Lidia P. Kostyniuk, *University of Michigan*
Anastasia Loukaitou-Sideris, *University of California, Los Angeles*

Fear and anxiety about personal security impedes women's mobility. The session on women's transportation safety and personal security, presided over by Jeanne Krieg, explored gender differences in crash rates, injury severity, licensing, and personal security needs.

Road User Safety: Women's Issues

Lidia P. Kostyniuk

Lidia Kostyniuk presented a comprehensive statistical overview of motor vehicle crash trends in the United States for men and women. The presentation highlighted licensing, exposure, and fatal crash involvement of women as compared with men. The analysis determined that the rates of driver licensing among women and men are about equal, but women drive fewer miles per year than men. The number and per capita fatalities from vehicle crashes are also lower for women. Women's engagement in risky driving behaviors such as failing to use safety belts, driving while alcohol impaired, speeding (more than 15 miles per hour over the limit), and following too closely is also lower than men's. Women's injury patterns are different from men's, even in the same crash types. Women are more vulnerable in crashes and experience higher incidences of spine and leg injuries.

The presentation identified the need for more accurate crash dummies and computation models for occupant protection studies focused on pregnant women and older women. Naturalistic driving studies have the potential to address questions of driving behavior by gender.

What Is Blocking Her Path? Women, Mobility, and Security

Anastasia Loukaitou-Sideris

Initiatives tackling women's transportation safety needs must address how fear obstructs women's mobility and how factors such as societal norms and expectations affect women's spatial mobility. This study explores facts and fallacies about women's fear of public spaces and transportation environments. The primary research questions are as follows:

1. How is fear obstructing women's movement in the city?
2. How have research and practice responded to women's concerns about safety and security in travel?
3. What are some promising research and policy directions for addressing women's fear of transportation environments?

As part of the study, the author surveyed 131 U.S. transit agencies and interviewed leaders of 16 national women's groups. All representatives of the women's groups emphasized the distinct safety and security needs of women transit riders. Two-thirds of the agencies acknowledged female passengers have distinct safety and security needs. Only one-third of the agencies believed

they should put specific programs in place for women, however. Three agencies have initiated such programs. Some agencies were worried that they might be accused of reverse discrimination. The presentation discussed examples of initiatives and programs that address women's concerns for safe travel. The examples represent a variety in scope and means. Request-stop programs during late evening hours, taxicab vouchers for low-income women, real-time information on transit vehicle arrival times, and public signs denouncing sexual harassment are some of the policies implemented in the United Kingdom, Canada, and the United States.

Topics for Further Research

1. Develop research methodologies that provide better estimates of crime incidence (i.e., tackle underreporting).
2. Develop methodologies to better understand the fear and victimization concerns faced by different groups of women.
3. Examine safety and security needs for intracity and intercity travel.
4. Develop more research on the characteristics of various transportation settings and how they affect security.
5. Better evaluate the effectiveness of technological devices and Global Positioning System technology in reducing crime and fear of crime.
6. Trace the effect of design interventions, policies, and programs.
7. Develop more accurate crash test dummies and computation models to study occupant protection and injury prevention for pregnant women and older women.
8. Investigate gender differences in the use of in-vehicle driver assistance systems, in-vehicle crash avoidance systems, and various communication systems and in the risk of crashing when using such systems.

BREAKOUT SESSION

Older Women's Safe Mobility

Martin Wachs, *RAND Corporation, Presiding*
Nancy McGuckin, *Consultant*
Sherrilene Classen, *University of Florida*
Christopher Mitchell (for John Eberhard), *United Kingdom*
Heather Rothenberg, *National Highway Traffic Safety Administration, Discussant*

This session focused on older women's safe mobility and included presentations on older women as passengers, the use of traffic violation data to identify driver errors made by older women who are involved in crashes, and extending the driving experience of older women.

Driving Miss Daisy: Older Women as Passengers

Nancy McGuckin, Heather Contrino, Hikari (Yuki) Nakamoto, and Adella Santos

The study explored data from the 2009 National Household Travel Survey (NHTS) to identify travel patterns of older women. The results found a "perfect storm" on the horizon. The combination of increased suburbanization, the aging of the large baby boom generation, and the increase in the number of women 65 years of age and older presents a planning challenge of immense proportions.

Previous research on women's driving behavior has found older women drive fewer miles, make shorter trips, and are more likely to cease driving when older. This research focuses on older women, both those who can drive and those who cannot, as passengers in vehicles.

Because of longevity, efficacy issues, cultural norms, disability, and poverty, the number of women who cease driving is larger than the number of men. For every decade after the age of 65, the percentage of men and women who cease driving doubles, but women are always twice as likely to cease driving as men of the same age. Altogether, 75% of nondrivers over the age of 65 are women, and of nondriving women, 63% have given up driving, while the remainder never drove. In comparison, 90% of nondriving men over the age of 65 used to drive.

Older women are a very diverse group. Using race and ethnicity categories shows great variation in household size, income distribution, and access to transit for driving and nondriving older women. About half of nondriving women ages 65 and older do not travel at all. About half of those who do not drive would like to get out more. This is the first national measure of unmet mobility needs that begs for further exploration.

Importantly, the researchers found that when couples of all ages travel together, the man drives eight out of 10 times. This lack of driving during marriage could affect the efficacy women feel in driving as they age and leave them unprepared for assuming driving responsibilities when their husbands can no longer drive or pass away. In addition, nondriving women are heavily dependent on nonhousehold members for rides.

Suggested solutions to the growing problem of safe mobility for older women include

- Planning for nondrivers as part of the built environment;
- Providing transport to nondriving elders as part of high school community service hours;
- Expanding taxi voucher systems to help provide door-to-door service;
- Providing special demand-response 24-hour senior shuttles in suburban communities; and

• Extending driving years through in-vehicle and intelligent transportation system technology.

Traffic Violations Versus Driving Errors: Implications for Older Female Drivers

Sherrilene Classen, Orit Shechtman, Yongsung Joo, Kezia D. Awadzi, and Desiree Lanford

The authors point out that although most studies of older drivers are gender neutral, existing literature illustrates significant gender differences. Crash rates demonstrate a higher risk of injuries and fatalities in people age 65 and older. Previous research has shown that rates for motor-vehicle-related crashes are twice as high for older men as for older women, but that the proportion of fatalities is higher for older women. The purpose of this study is to examine driving errors related to crash experience and identify potentially effective prevention strategies. Data were drawn from the 2005 Florida Traffic Crash Records Database (N = 5,345 older drivers).

The study included 2,445 (45.7%) women drivers with a mean age of 76.08. The women drivers committed significantly more failure to yield violations, failure to obey required traffic controls, and speed-related violations.

The findings show older female drivers are at a greater risk for injuries from crash-related violations and driving errors compared with older male drivers. Older female drivers drive less, outlive male counterparts, and often resume driving without the necessary skill or practice.

Additional research is needed to identify the causes of women's driving errors and consequent injuries. Attention, perception, physical frailty, and cultural context are candidate research variables. Moreover, older women drivers need access to information on vehicle safety ratings, vehicles with smart features, person-vehicle fit to optimize seating comfort, in-vehicle technologies, in-vehicle emergency systems, and other technologies that can contribute to safe mobility.

Older Women's Safe Mobility: Extending the Amount Women Drive

Christopher Mitchell, presenting on behalf of John W. Eberhard

Women have lower fatality rates per licensed driver or population than men over the past decade; yet women age 65 and older reduce or cease driving earlier than men. They travel more frequently as passengers than drivers and are less likely to hold a driver's license; those who do drive travel fewer miles. Women begin reducing their number of trips at age 50. Men also reduce their driving, but not until they reach about age 70. Women who do not drive stay home more, are more dependent, are more likely to enter a nursing home, tend to be depressed, and have a lower quality of life.

Encouraging women to continue driving will enable them to have safer mobility later in life, could reduce the societal burden of providing for their mobility needs, and could possibly extend their lives. Keeping older women driving enables them to age in place, be less of a family burden, be less dependent on expensive specialized transportation services, and be able to work later in life if they choose. Also, older women who do not drive or have reduced their driving are an underutilized resource because they are unable to volunteer or provide mobility for others who are unable to drive.

According to the author, a new approach is needed to encourage older women to drive more and longer. Some tools already exist, such as driver assessments, driver training, and informational programs. These tools can be modified to include a new approach to change older women's thinking. Women need to understand the importance of continued driving as well as when and whether to drive. The approach should provide offices on aging, occupational therapists, physicians, social workers, older women, and others the information and tools needed to keep older women safely on the road.

Discussant

Heather Rothenberg

For the most part, the findings of these papers are well known among the research community. The key question seems to be: How do we bridge the gap between the research and policy making at the national or state level? The discussion identified several possibilities to address this and other issues:

• Educate the media. Inform them that older drivers may drive differently but not necessarily in an unsafe manner. Older drivers pose the least danger to other road users.

• Examine European models for addressing these issues, for example, more affordable older driver assessments, which have reduced injuries in some places by half.

• Insist government agencies pay attention to older women's needs and develop policies to help people drive longer and address their transport needs when they can no longer drive.

• Improve vehicle technology to protect older drivers, especially older women drivers.

• Develop a screening mechanism that older women can use to assess their driving skills without fear of having their driver's license revoked.

• Make medically at-risk drivers the target rather than older drivers.

- Make taxis more available and affordable.
- Build transportation costs into retirement planning.

Topics for Further Research

Several areas of further research were suggested during the presentations and discussions, such as developing

- A better self-test for analyzing one's own ability to drive safely;
- A deeper understanding of why women reduce and cease driving;
- Better methods for helping older women continue to drive safely;
- Better models for providing mobility when one can no longer drive; and, in general,
- Better methods for organizing what we know and educating researchers, the public, and elected officials to create a well-informed community to address the mobility and safety issues of older women.

BREAKOUT SESSION

Personal Security Issues

Jeanne Krieg, *Eastern Contra Costa County (California) Transit Authority, Presiding*
Sheila Mitra-Sarkar, *San Diego University*
Etsuko Tsunozaki, *SEEDS Asia*
Ned Levine, *Ned Levine and Associates*

Jeanne Krieg presided over the session on personal security issues, which focused on crimes committed against women on public transit and the crime travel of female offenders. Presenters discussed the pros and cons of women-only transit vehicles and the personal security challenges faced by women using public transportation.

Abandon All Hope, Ye Who Enter Here: Understanding the Problem of "Eve Teasing" in Chennai, India

Sheila Mitra-Sarkar and P. Partheeban

Fear of victimization and crime are important concerns for women in cities around the world. This fear is provoked through encounters with men in public space because they are unpredictable, potentially uncontrollable, and threatening. The objective of this study is to assess harassment faced by women commuters in Chennai, India. A survey was used to ask a set of questions on the nature, type, frequency, location, and societal and personal attitudes toward sexual harassment. For this study, 274 women were surveyed.

The study found 66% of the surveyed respondents had been sexually harassed while commuting. The adolescent years for many of the respondents were when they first encountered sexual harassment. Less than 5% found any of the modal choices to be best. The largest number of women (more than 40%) rated their worst harassment experience to be in buses and trains with no separate sections for women.

Women-Only Passenger Rail Cars in Japan

Etsuko Tsunozaki

This paper explores the history and purpose of women-only passenger rail cars in Japan. Women-only passenger cars are available on some Japanese train lines. The first operation of women-only cars in Japan started in 1912, mainly because of the Confucian value that girls should not be exposed to men. Since the end of the Second World War, there have been some trial operations of women-only cars for various reasons, such as protecting women from overcrowded cars, preventing the exchange of love letters between women and men, and protecting women from molester harassment. Currently, the main purpose of this service is to provide comforts to women or men traveling with children or disabled passengers, but some contradictory opinions exist.

This review of the literature on women-only passenger rail cars in Japan found there is mostly a positive reaction from most women (90%) and men (60%). No law legally forces men not to ride in "women-only cars" or punishes men for riding in them. Nearly 27% of women surveyed in a previous study reported they always use the women-only transit cars. Nearly 27% do not use trains that provide women-only cars. When the women were asked why they use women-only cars, 27% said they

use them because it is safe, and 16% said they use them because space is available.

Crime Travel of Female Offenders in Manchester, England

Ned Levine and Patsy Lee

This study examines the travel patterns of female offenders who committed crimes in Manchester, England. The data from 2006 report 97,429 crime trips in Manchester committed by 56,368 offenders. The majority of crimes were committed by males. Approximately one in six, however, were committed by women. The analysis showed gender differences in crime travel with interactions by age and by location of the crime. Juvenile males had the most frequent but the shortest crime trips. Female offenders, both juveniles and adults, made fewer crime trips than adult males, but of intermediate length; however, female offenders had a higher percentage of crimes committed in retail centers.

A regression model indicated multiple factors contribute to crime trips, including the location where crimes occurred, the type of crime, whether the crime was against a person, the land use associated with the crime, the presence of co-offenders, and the age and ethnicity of offenders. When these factors were controlled for, there was no difference in the distance traveled by female offenders compared with male offenders. This research expands knowledge on the travel patterns of female criminals, allowing both residential neighborhoods as well as crime locations to be targeted for crime prevention efforts.

Topics for Further Research

1. Conduct a systematic, comprehensive review of articles and reports on women-only transit cars.
2. Explore the application and feasibility of women-only transit cars in countries other than Japan.
3. Determine whether the application of gender-based planning can be used to prevent crime.
4. Investigate the community hazards faced by women and the types of policies that can be implemented to alleviate these problems.
5. Identify methods for estimating the magnitude of harassment on transit vehicles.
6. Conduct research to understand the protagonists of incidents committed against women as well as to understand the offenders who commit crimes against both women and men.
7. Conduct research to understand how preventive actions can be taken in the neighborhoods where offenders live, in the locations where crimes are committed, and on the routes in which offenders travel to commit crimes.

BREAKOUT SESSION

Driver Behavior and Crashes

Lidia P. Kostyniuk, *University of Michigan, Presiding*
Kerrie Livingstone, *Centre for Accident Research and Road Safety*
Ned Levine, *Ned Levine and Associates*
Eduardo Romano, *Pacific Institute for Research and Evaluation*
Amanda Dwelley, *University of North Carolina*

The session on driver behavior and crashes examined crash factors including fatigue, location, spatial variation, mediating and moderating factors in fatal crashes, and the relationship between the built environment and crash experience.

Investigation of Differences in Crash Characteristics Between Males and Females Involved in a Fatigue-Related Crash or Close-Call Event

Kerry Armstrong, Patricia Obst, Kerrie Livingstone, and Narelle Haworth

Driver fatigue is a serious road safety issue. It is well known that excessive fatigue is linked with an increased risk of a motor vehicle crash. The purpose of this investigation was to examine self-report data to identify differences in the prevalence, crash characteristics, and travel patterns of men and women involved in fatigue-related crashes or close-call events. Such research is important to understanding how fatigue-related incidents occur within the typical driving patterns of men and women, and it provides a starting point for exploring experiences from a gender perspective and for understanding the risk of driving when tired. A representative sample of residents living in the Australian Capital Territory and New South Wales were surveyed regarding fatigue experience and involvement in fatigue-related crashes and close-call incidents.

Some concern exists that sleepy or fatigued drivers do not understand the seriousness of driving when tired. It has been noted that drivers who continue to drive when sleepy or fatigued do so for various reasons, including work demands, pressure to reach a destination, and short journey length. This, together with a poor understanding of fatigue-related crash risk, can lead drivers to underestimate the shift from sleepiness to sleep. Interestingly, research suggests many drivers are aware they are sleepy when driving but do not act accordingly to lessen the risks associated with fatigued driving.

A similar proportion of males (68.9%) and females (64.9%) reported having felt sleepy while driving in the past 5 years. A significantly greater proportion of males (20.8%) than females (12.7%), however, reported having had a close call when driving tired. The majority of both females and males who had experienced a close call had experienced fewer than two such incidents, and about 20% of both genders had experienced three or more close calls. Females were slightly more likely to have experienced only one close call, whereas males were slightly more likely to have experienced five or more close calls.

Results from this research indicated no gender differences in the symptoms of tiredness experienced or in the types of countermeasures used to combat tiredness; however, key gender differences were observed in the purpose of the trip, time of driving, and trip distance away from home when the incident occurred. Currently, interventions targeting driving when tired focus on longer trips and monotonous stretches of road, whereas the results from this research suggest that females may be more likely to experience fatigue-related incidents closer to home. Given that the safest countermeasure is for a person to

stop driving, that half the sample continued driving indicates more education in this area is necessary.

Spatial Variation in Motor Vehicle Crashes by Gender in the Houston, Texas, Metropolitan Area

Ned Levine

This study examined spatial variations in motor vehicle crashes by gender within the Houston metropolitan area using data on 252,240 crashes that occurred in the Houston metropolitan area between 1999 and 2001. Crash risk varied throughout the metropolitan area and was much higher in the central city than in the suburbs. Because male drivers were more likely to be involved in crashes in the central city than female drivers, part of the gender differential in crashes appears to be the result of men driving in riskier locations. The general pattern of women making more frequent but shorter trips is associated with driving to less risky destinations, but lack of information on driver residences prevented a more detailed analysis of crash risk.

In the Houston region, men have more frequent and more severe crashes than women. They experience higher crash fatality rates for every age group and for every type of crash. Licensure is equal for both men and women, and the differential in vehicle miles traveled is decreasing, even though men continue to travel more miles than women.

Crash risk in the central city is double that of the outlying suburbs because traffic converges from all directions; volume is higher; the road network is older, with limited capacity; and there are more conflict points.

Female Involvement in U.S. Fatal Crashes Under a Three-Level Hierarchical Crash Model: Mediating and Moderating Factors

Eduardo Romano, Tara Kelley-Baker, and Pedro Torres

Men have long held the lead in motor vehicle crashes; however, research indicates women are closing the gap. Female involvement in fatal crashes has increased in the United States, but this phenomenon is mostly attributable to young drivers, and the reason for the increase is unclear.

The purpose of the study was to investigate the problem further. The study used a simplified version of the hierarchical levels of driving behavior (HLDB) model to study female involvement in fatal crashes in the United States. The HLDB model recognizes that decisions at higher levels affect decisions at lower levels. At the top level, the model assumes the driver's condition (e.g., inattention, fatigue, impairment) has an effect on the next level (e.g., speeding or failure to obey traffic laws), which subsequently affects basic maneuvering skills (the lowest level).

Data for this study were drawn from the 1982 to 2007 Fatality Analysis Reporting System. Single-vehicle crashes were used to indicate crash responsibility. Basic descriptive and multilevel analyses were applied to investigate female involvement at each level of the HLDB model.

Compared with males, female drivers were less likely to be involved in crashes associated with the highest HLDB level, but more likely to be involved in the lowest level. The relatively high prevalence of females in skill-related crashes occurred only when associated with speeding, however. Variations to this finding resulting from age and gender were also found. Findings from this study should help develop more efficient (better-targeted) traffic safety prevention policies.

Understanding the Role of Gender and the Built Environment in Teen Motor Vehicle Crashes: Analysis of 16- to 19-Year-Olds in North Carolina

Noreen McDonald and Amanda Dwelley

This study addresses a gap in the research by using data on licensure and motor vehicle crashes from 2001 to 2005 for 16- to 19-year-olds in North Carolina to assess the association between crash and injury rates and the demographic and built environment characteristics of the county of residence. The study examines differences in the patterns of association between driver motor vehicle crashes and county characteristics by sex.

A total of 213,093 crashes on North Carolina roads by North Carolina drivers between the ages of 16 and 19 were recorded from 2001 to 2005. A fatal or disabling injury to the driver was involved in 1,934 of these crashes. The number of licensed 16- to 19-year-olds increased from 270,025 in 2001 to 279,531 in 2005. The annual average rate of crashes per 1,000 licensed drivers was 154.3, the rate of injuries per 1,000 crashes was 240.8, and the rate of fatal or disabling injuries per 1,000 injury crashes was 39.1.

Correlation of the three crash rates with weighted population density suggests crashes per driver are positively associated with population density and injuries per crash are negatively correlated with density. The relationship between density and severe and fatal injury is weak. This suggests the exact location and design of exurban developments is important. If a new sprawl development requires residents to drive on unimproved rural roads, it

may increase their risk of motor vehicle injury; however, if new sprawl developments lead to road improvements (e.g., widening, curve straightening), the risk for residents may decrease.

Not enough is known about the interplay of risks to fully evaluate these factors. To gain clarity on the relationship between patterns of development, travel behavior, and crash risk, it will ultimately be necessary to analyze data at smaller geographic scales and look at changes over time. Males are more likely to crash and females more likely to be injured, but these relationships do not vary systematically with county-level factors.

Topics for Further Research

1. This session identified the need to learn more about how the learning process is different for men and women and to develop gender-sensitive transportation safety educational literature and programs.
2. States need to provide data on driver residence locations to allow a more accurate analysis of crash risk and the development of better preventative programs.

BREAKOUT SESSION

Extreme Events

Mobility and Safety Issues for Women and Children in Times of Crisis

Marsha Anderson Bomar, *Street Smarts, Inc., Presiding*
Pamela Murray-Tuite, *Virginia Polytechnic and State University*
Beverly Ward, *University of South Florida*
Evangeline Franklin, *New Orleans Health Department*

Marsha Anderson Bomar presided over the extreme events session, which focused on the impact of women's family responsibilities on evacuation in major extreme events. The discussion included lessons learned from Hurricane Katrina.

Impacts of Family Responsibilities and Car Availability on Households' No-Notice Evacuation Time

Pamela Murray-Tuite, Lisa A. Schweitzer, and Sirui Liu

The family gathering phenomenon is a critical evacuation consideration. Recently, researchers have placed greater emphasis on capturing household member interactions in emergencies, but most of these efforts have not specifically addressed associated gender issues. This paper examines the impact of gender-based family gathering responsibilities on family evacuation delay time from the optimal conditions for a hypothetical no-notice event during school hours. This study uses initial results of an original interview data-collection effort addressing home and work locations, pre-evacuation actions, and family gathering responsibilities, among other considerations.

Many of the women with school-aged children indicated responsibility for collecting them. The effect on household evacuation time of assigning gathering responsibilities to one parent is determined using a nonlinear integer program that assigns activity chains, meeting locations, and final destinations so as to minimize household evacuation time in a multimodal transportation network. The results indicated that gender-based responsibilities resulted in a different evacuation time when the household had one vehicle that was taken to work by the father. The increase in household evacuation time when the mother had the sole responsibility for gathering the children as compared with determining the responsibilities by the optimization model depended on the number of children and the mother's location. As expected, greater evacuation time was experienced when the mother was at work rather than home, and thus further from the children and more subject to multiple transit schedules. Consideration of gathering behavior, household responsibilities, and persons dependent on transit will lead to more accurate evacuation models that help emergency agencies make better decisions and potentially save lives.

Inequality of Impacts: Women's Experiences in Extreme Events

Beverly G. Ward and Margarethe Kusenbach

In any extreme event, the roles of women may be adversely affected by increased demands related to casework and information gathering. Of particular interest is the experience of women living in mobile home parks and their mobility and access needs during extreme events. This paper explores the vulnerability of mobile home residents and their ability to deal with natural disasters and other threats. Experiences of persons who live in mobile homes as places of permanent residence and consider-

ation of the use of mobile homes as temporary shelter after an extreme event are considered.

The study results indicate disability, income, and automobile ownership may have adverse influences on the ability of women in mobile home parks to self-evacuate. Most respondents relied on a network of family or friends for refuge. Few respondents evacuated to shelters, mostly because of the lack of "special needs" or pet-friendly shelters. These findings suggest community resources in the form of institutional refuges do not meet the needs of mobile home park residents. Overall, the findings suggest extreme event planning has not taken the multiple roles of women into account.

Women's Concerns in Extreme Events: A Call for Examination of Emergency Planning, Response, Recovery, and Mitigation

Evangeline Franklin

Evangeline Franklin, MD, Director of Emergency Preparedness and Special Projects for the New Orleans Health Department, shared lessons learned and policy implications developed as a result of the Hurricane Katrina evacuation. A research study sponsored by the *Washington Post*, the Kaiser Family Foundation, and Harvard University surveyed 680 randomly selected New Orleans adult evacuees in eight shelters in the Houston area between September 10 and 12, 2005. The study revealed that the lack of a car, personal immobility, care for an immobile family member, and reluctance to leave behind a pet were important reasons for remaining in the city.

In response to lessons learned from Hurricane Katrina, the city created the City Assisted Evacuation Plan (CAEP) and a registry for carless and disabled citizens. The plan is an evacuation method of last resort used to help citizens who want to evacuate but lack the capability to self-evacuate. The Superdome would no longer be the shelter of last resort. The presentation focused on CAEP implementation during Hurricane Gustav on September 1, 2008, which highlighted women's concerns such as safety for self and dependents at destination, proper food and hydration for children and the elderly, protection of female children from rape or consensual sexual activity during evacuation by train, and access to transportation during evacuations.

The city of New Orleans identified three main goals in the revamp of its evacuation plans:

1. Provide greater support to citizens who need special assistance.
2. Create and maintain an environment in which the decision to evacuate becomes more desirable than remaining behind.
3. Implement measures to greatly enhance the security of city resources.

Topics for Further Research

1. Explore the impact of transit frequency on evacuation time.
2. Develop models to relocate dependents.
3. Investigate congestion effects on evacuation time.
4. Develop methods to identify and categorize individuals who have special needs during evacuations.
5. Identify methods to deploy resources to address women's needs during evacuations.

PLENARY SESSION 5

Effects of Gender on Mobility

Susan Hanson, *Clark University, Presiding*
Randall Crane, *University of California, Los Angeles*
Liang Ye, *University of California, Davis*
Sandra Rosenbloom, *University of Arizona, Discussant*

The session on the effects of gender on mobility examined the demographics of travel demand and behavior in general as well as for specific cultures. Of particular interest to the authors were questions about gender as it relates to mode shift, especially to transit but also to walking and bicycling.

Sources of the Narrowing and Widening of Travel Differences by Gender

Randall Crane and Lois Takahashi

This study analyzes national microdata covering the past 20 years and examines convergence and divergence in travel behaviors by gender. The gender gap in the commute length of older workers is growing while that of younger workers steadily closes. At the same time, racial differences in mode choice and commute times are becoming less pronounced both by race and by gender. Gendered elements of travel demand are evolving, but perhaps not in predictable directions.

The data used for this study come from the American Housing Survey and are therefore national in scope. The data show commute length is growing for all ages and races. The length of commute for women increased by 30% over the 20-year period, while men's commutes increased by 22%. Men's commutes continue to be longer in both time and distance. The numbers are slowly converging, but it is not clear that the trend will continue.

The gender gap is largely a white phenomenon. The gap is opening for Hispanics, but it appears to be lessening for blacks and Asians. Commute length is most stable for white men. The largest increase is for Latino men, followed by black women, Latino women, and black men. Black women's use of transit has declined dramatically.

The gap between the genders declines during the child-bearing years. It is getting smaller for whites until about the age of 50, but then it gets larger. Working wives are catching up with men very quickly. For married women with children, the gender commute gap is narrowing; therefore, the presence of children in the household is apparently of no consequence in the length of commute.

Effects of Gender on Commuter Behavior Changes in the Context of Major Freeway Reconstruction

Patricia L. Mokhtarian, Liang Ye, and Meiping Yun

This study examined commuting impacts during a 9-week period between May 30 and July 31, 2008, when a 1-mile stretch of Interstate 5 (I-5) in downtown Sacramento, California, was intermittently closed for reconstruction (the "Fix I-5 project," or "the Fix"). Prior to and during the closings, extensive information was provided about the construction. Increased transit use was encouraged by offering enhanced service (and, in a few cases, reduced fares). Additional changes included free parking and reduced off-street parking rates after 5:00 p.m., tow truck service, and telecommuting promotion.

To study the impact of the Fix on commuters' travel behavior, a series of three Internet-based surveys were conducted. This study offers a preliminary analysis of the first two of those surveys, focusing on the effects of gender. Gender differences are analyzed for both passive impacts (impacts of the Fix that were out of commuters' control) and active changes (changes in commuters' behavior during the Fix).

The passive impacts of the Fix do not appear excessive. Women were more likely to be affected by the Fix, in both good and bad ways, but considering positive and negative effects together, they were not notably worse (or better) off than men. Among the active changes to commute trips, the easiest options—avoiding rush hour and changing route—were the most common responses (adopted by 48% and 45%, respectively), and women were more likely than men to employ them. Among the changes that reduce vehicle miles traveled, increasing transit use was the most common choice (although adopted by only 5% of the relevant subsample). Women were again more likely to use transit (6.1%) than men (4.2%). Overall, women were 21% more likely to make at least one change than men were (64% versus 53%), either because they experienced more adverse impacts than men or because they have a greater tendency to make socially and environmentally beneficial changes in general. A binary logit model of the choice to increase transit use suggests persuading current transit users to increase transit use was easier than convincing nonusers to switch. Employer transit subsidies supported increases in transit use (but only for women), while variable work hours (for women) and free on-site parking (for both men and women) discouraged transit use. Men in managerial, administrative, professional, or technical occupations and women in larger households were also more likely to increase their transit use.

In comparison with men, women survey respondents tended to have lower household income, have less education, and be slightly younger. They were also more likely to hold clerical positions and more likely to work part time. Women were more likely than men to drive alone and also to use carpools or vanpools. They were less likely to use transit or to bicycle.

Women were slightly more likely to be affected by the Fix, as they were more likely to be delayed or to take a detour and arrive more quickly. Many (40% to 45%) said they would continue to commute by transit. Men were more likely to report negatively about their transit commutes. Both groups were likely to continue adopting a compressed work week (40% to 45%), but men were slightly more inclined to do so.

Discussant

Sandra Rosenbloom

Rosenbloom noted we have come a long way in establishing gender research as a legitimate area of inquiry, but we need to go beyond gender differences and include race, household size, and other variables. Researchers need to react quickly and study circumstances such as the Fix, which presents a real-world example. She suggested that we need to learn much more about the constant conflict between sustainability, green growth, and other issues and their effects on women. Research in this area is increasingly sophisticated; we are digging deeper, and each piece generates new ideas for further research.

Topics for Further Research

The research needs identified include the following:

- Conduct more study of age–gender and race–gender interactions in more detail, particularly among the working elderly and suburbanizing minorities.
- Merge the attitudinal and behavioral data collected in conjunction with the Fix and analyze the persistence of Fix-related changes several months after normal operations resumed.
- Explore gender differences in behavior changes other than increased transit use (e.g., increased telecommuting).
- Explore other unplanned changes in cases of earthquake and other extreme events.
- Study behavior changes in relation to women's occupations.
- Examine the differences in men's and women's reporting behavior (e.g., the tendency of women to report at the extremes).

PLENARY SESSION 6

Where Do We Go from Here?
Constructing a Research Agenda

Gloria Jeff, *Consultant, Presiding*
Susan Herbel, *Cambridge Systematics, Inc., Facilitator*

Gloria Jeff moderated the closing conference plenary session, which revolved around a discussion of the development of a formal research agenda for the Women's Issues in Transportation standing committee. Jeff began by chronicling the development of the Women's Issues in Transportation research agenda and TRB standing committee after the first conference on women's issues in 1978.

Developing a Research Needs Statement

Susan Herbel

Susan Herbel discussed the elements of a research agenda and the process of implementing a research agenda. The most important point discussed was achieving more focus by the TRB Standing Committee on Women's Issues in Transportation on the task of developing research needs statements. The group brainstormed topics for further research to incorporate into the committee's research needs statements. The following topics were discussed:

- Gender-neutral transportation system:
  - Develop a definition of a gender-neutral system.
  - Identify the characteristics of a gender-neutral system with regard to values, needs, choice, constraints, and impacts.
  - Consider how the male norm in transportation research and planning can be broken so as to move to more qualitative standards.
  - Identify the information and knowledge needed to include gender-sensitive metrics in transportation planning.
  - Investigate what other countries are doing to support gender-equal transport. Consider organizing an international scan tour to address and review global experiences.
  - Investigate principles or guidelines from other countries related to gender-neutral transport.
  - Develop principles with respect to women's travel (e.g., sustainability, climate change).
- International component:
  - Consider how an international component can be incorporated into the research needs statement.
  - Identify key international research that should be incorporated into the research agenda.
  - Consider hosting the next conference abroad.
- Demographics and travel behavior:
  - Combine qualitative and quantitative approaches by carefully structuring qualitative studies linked to quantitative studies.
  - Within TRB's standing committee structure, work with other groups and committees to incorporate gender and special populations into the sociodemographics of travel demand analyses.
  - Determine how women and men's values differ with respect to mode, travel choices, and so forth.
  - Investigate the importance and role of transit for women and its effects on the sustainable environment.

POSTSCRIPT

Looking to the Future

The 2009 International Conference on Women's Issues in Transportation confirmed the continuing importance of this research. Conference participants identified a host of topics for further research with an agenda revolving around four themes: demographics and travel behavior, safety and personal security, transportation planning, and extreme events. Also noted was the desirability of broadening the topic to that of a "gender-neutral transportation system" rather than focusing solely on women's issues. To accomplish this goal, the first step is to define a gender-neutral system. What are the characteristics of a gender-neutral system with respect to values, needs, choice, constraints, and impacts? International research on gender-neutral transport also offers opportunities for exploration and led to the notion of holding the next conference beyond U.S. borders.

Women's travel issues are recognized to greater or lesser extent around the world but have limited policy traction. Researchers understand the gendered nature of travel, but gender-specific policies, programs, and mandates require greater attention. Further research could explore methods for translating the findings of gender research into policy. Analysis of transportation policies and expenditures could be examined to determine how they address impacts on women.

TRB's Standing Committee on Women's Issues in Transportation will use the discussion and recommendations from the 2009 International Conference on Women's Issues in Transportation to frame a strategic, international, and multidisciplinary research agenda and develop research needs statements based on the agenda. The agenda will address the most salient research questions from the conference and will expand on the body of knowledge and research conducted as a result of the Women's Issues in Transportation Conference.

PART 2

Plenary Papers

Women's Travel Issues
Creating Knowledge, Improving Policy, and Making Change

Martin Wachs, *Transportation, Space, and Technology, RAND Corporation, Santa Monica, California*

Since the first conference more than 30 years ago, the study of gender and transportation has become a legitimate focus of research. The transportation community has developed a deeper understanding of relationships between gender, travel, and many ways in which they are linked; however, major knowledge gaps remain that are deeply in need of research. Although we have learned more about traffic safety and gender, knowledge in that area has not advanced nearly as much as knowledge about travel patterns and choices. There has been far more analysis of gender issues with respect to travel, traffic, and safety and security in developed economies than in poorer societies undergoing rapid development, and there is deeper understanding of those issues. Furthermore, understanding of the historical evolution of relationships between gender and transportation remains rudimentary, and even within advanced urban societies, knowledge has improved unevenly. Although great advances have been made in understanding gender differences in travel patterns in developed urban societies, there is much to learn about gender and mobility in rural areas and with respect to long-distance (intercity) travel, non-work-related travel, and air travel. Insufficient attention has been given to gender issues associated with employment and advancement within the transportation industry and with respect to transportation employees and professionals. Information technology and electronic connectivity are already transforming relationships between gender and mobility, and that change is in need of systematic research and analysis. There have been few broad syntheses linking the several thematic areas discussed at this conference, and few studies have integrated social science analysis with broader theories of social change and gender in society.

As we begin the Fourth International Conference on Women's Issues in Transportation, I am pleased to add my welcome to those already offered by colleagues who spoke earlier. Thank you for coming to lend your presence and your voice to an important undertaking. I hope to frame the issues we will be exploring together for several days and to stimulate your thinking by offering several challenges for our collective consideration throughout the conference.

The first international conference in this series was held in 1978, the second in 1996, the third in 2004, and, of course, the fourth is being held today in 2009. The second conference took place 17 years after the first; the third 8 years after the second; and the fourth is taking place roughly 5 years after the third. Simple mathematical projection would lead us to expect that we will be meeting next between 2 and 3 years from now, and that within a decade we will be holding a conference every few days. This projection must be very alarming to the TRB staff and to the organizing committee, who have worked so hard and so long to pull this event together for the benefit of all of us in attendance and those who will read the proceedings. We all know, however, that simple mathematical projections are always dangerous. That could also be true of projections made about the future of women's travel patterns and of the place of women in the field of transportation.

It is well known to many of you that in the 1970s, when the concept of a conference on women's travel issues was put forward, it was ridiculed as frivolous and used as an example of absurd wastefulness of public resources. Thanks to the leadership of some of the women who continue to shape this field and who are here with us again, and thanks to the intervention of some senior national figures—men and women—the first conference was held. It featured excellent presentations and discussions, and the published proceedings were and still are widely cited. The second and third conferences assured that the themes and topics discussed under the heading of "women's travel issues" began to enter the mainstream of scholarly and policy discourse.

A community of interest was nurtured by these events; people compared notes and exchanged data, studies were replicated, data collection gradually was institutionalized, and trends were tracked over time. These are all important accomplishments that mark the maturing of an intellectual enterprise. In place of the anomalous set of inquiries at the edge of the mainstream with which we began 30 years ago, there are now graduate seminars, a stream of journal articles and books, and policy innovations all over the world addressing the theme of gender in transport. We have a session at this conference, for example, devoted to analysis and interpretation of a national law in Sweden intended to bring gender equality to public policy in the realm of transport and mobility. There is no doubt that there have been accomplishments of enormous import, and these conferences have been landmarks along the path of growth and change.

Exploring Gender and Mobility

The word "mobility" interestingly is used in two different ways by social scientists. To those of us who study transportation, mobility most commonly is related to moving from place to place. When we say that we live in a highly mobile society we mean that people travel with increasing frequency, for a wide variety of purposes, by many modes, to increasingly diverse destinations. The term also refers, of course, to social mobility, with "upward mobility" being an increase in people's ability to engage in satisfying economic, social, and recreational activities.

The use of the term "mobility" in both ways is symbolic of the themes that bring us together and of the evolution of knowledge over the time span marked by the four conferences. Physical mobility is about having the means to reach places, things, and activities, while social mobility is, very similarly, about access as well. Access can be limited by inadequate motive power or poor roads but also can be truncated by strictures placed on us by others in our lives, such as families, religious and social communities, and the nations in which we live (*1*).

What we have learned and continue to explore together through this sequence of conferences is the importance of mobility of both types and how closely they interact in our lives. Causes and effects differ from one society to another and from one period to another, yet for all people, and particularly for women, physical mobility and social mobility are intimately connected. In some instances, the barriers preventing people from meeting their full potential as human beings include limited physical mobility in an increasingly mobile and dynamic world. In other instances, people are prevented from meeting their full potential as human beings because, even in developed societies, they lack the authority, rights, or status to take advantage of the existence of multiple forms of physical mobility present in their environments. Associations between physical and social mobility and the complexity of these relationships will shape our discussions over the coming few days.

We acknowledge at the outset of this conference that mobility is a complex and, at times, fuzzy notion. In general we think of increasing social and physical mobility as inherently complementary and inherently worthy objectives, but we must acknowledge that these notions are by no means universal. In addition to grappling with alternative notions of mobility and ways of measuring degrees of mobility, we must also confront the challenge that some feminist scholars have recently posed in questioning whether some forms of satisfaction might be found in immobility. People are increasingly taking the position that environmental and financial sustainability may require limiting growth in mobility that others have seen as generally beneficial.

The concept of mobility is inherently complex, and our task is further complicated by the fact that gender is also complex. There are physical biological differences between men and women, but we interpret those differences differently depending on the specific time, place, and culture in which they are situated. Gender is far more about the social and cultural characteristics and roles that societies attach to men and women (and girls and boys) than it is about obvious sex-linked differences. Depending on the society in which one lives, the roles and expected appropriate behaviors of fathers differ from those of mothers, and expectations for daughters and sons are often dramatically different. Of particular interest to us at this conference is that social and cultural definitions of gender-related roles interact with social and cultural definitions and expectations relating to mobility. We can be pretty sure that differences in the mobility and travel patterns of males and females result from socially defined gender roles. Increasingly, however, the picture is complicated by the growing realization that some interesting phenomena might have causalities in the opposite direction. That is, some of our gender-related social differences may well result from the ways in which physical mobility is experienced in particular societies.

Insights from History

In the 1830s, the first horse-drawn "omnibuses" were introduced into commercial service in France, and soon they were imitated in many world capitals and major cities, including London; Stockholm, Sweden; New York; Philadelphia, Pennsylvania; and Boston, Massachusetts. From limited but persuasive documentation, we know that the responses were similar in many cities. Some richer people, who could afford the cost of daily commuting, gradually moved their residences from the city centers toward the edges along routes served by these rudimentary public transport services. At the edges, they built and occupied larger homes on larger lots with gardens and separated their home environments from the noise, crowding, crime, and squalor of the central cities, where industrial facilities burned coal and wood and stood near flammable wooden homes along streets in which common elements of the environment were horse manure and urine, flies, and carcasses of horses that had died in the course of their work, along with the rodents that bred in that environment (*2*).

Even in these early days, physical mobility was intimately related to social mobility, in that it brought dramatic improvement in the quality of life for those who could afford it. With few urban women employed outside of domestic service, early users of public transport were mostly males of the upper income classes. As long as transit fares exceeded the daily wage of most citizens, poorer working males, along with their families, had to remain in the central city to access employment by walking. The clientele for public transport consisted of males of the upper classes whose wives and children benefited by living in greener, cleaner, more spacious settings. This also contributed to the increasing physical separation of men and women according to their gender roles. Privileged men worked in the city where business predominated, while women carried out their economic and social duties in the home, which, in response to the availability of transit, was now increasingly located at some distance from the world of commerce. The separation of men's and women's realms extended to time as well as place. Although men constituted the vast majority of transit system users at the peak hours in the course of commuting to and from work, women and children used transit to a greater extent at off-peak periods for shopping and for social, medical, and other purposes.

I do not mean to attribute the growing disparity in gender roles exclusively to the transportation system. Physical mobility played an enabling or facilitating role in these early times as well as more recently, and clearly, growing mobility enabled society to change more rapidly in directions for which there were many causal factors working simultaneously.

This year [2009] marks the 100th anniversary of the first national conference on city planning in America, officially entitled "The First National Conference on City Planning and the Problem of Congestion," which was held in Washington, D.C., during May 1909. The predominant themes of the conference—which remain uncomfortably familiar to us today—were urban crowding, blight, the accommodation of large numbers of immigrants to urban areas, urban environmental problems, and the shortage of affordable housing. The program of speakers at the conference reveals that the professions of public health, social work, civil engineering, and urban planning were all taking shape simultaneously and that the boundaries between them had not yet been as well defined as they later were to become. Among the speakers were the founding giants of these several fields. They included some of the great names in the founding of the field of planning, among them Daniel Burnham, Frederick Law Olmsted, and Benjamin Marsh, but also the Surgeon General of the United States and the founders of the settlement house movement. President William Howard Taft was supposed to offer greetings in person but was unable to attend because he was ill (*3*).

Of particular interest to us here a century later is the talk given by the only woman to address the conference, Mary Kingsbury Simkhovitch, founder and director of Greenwich House, a settlement house in lower Manhattan. Born into an upper-class family, she was an activist renegade who married a radical Russian immigrant and chose to work for the improvement of conditions for recent immigrant communities. She spoke at the conference of the need to educate the populace everywhere of the need for urban planning and of the need to provide affordable housing. She also directly linked physical to social mobility. In her speech, Simkhovitch noted that new immigrants from foreign lands would have to struggle against disease or become criminals if they had to live in crowded, unsanitary, substandard conditions in lower Manhattan. She was well aware of the growing importance of elevated railways and the first elements of underground subways, and she urged that entire neighborhoods of new affordable housing be built in outlying areas of the Bronx, Brooklyn, and Queens. She advocated that the transportation system adopt a flat fare structure, so that the poor could travel longer distances for the same fare that they paid to travel shorter distances. This would help to "deconcentrate" the city, and the lower densities at the edge would provide healthier environments in which she believed immigrant women and children could thrive. She was not the only advocate of this policy, of course, and it did become the dominant approach to pricing urban transportation in America's largest cities (*4*).

It is interesting to interpret Simkhovitch's presentation in light of the century that has passed since she delivered

it. Giving high priority to environmental quality and tying the prospect for social mobility more explicitly to the quality of the physical environment than we might today, she advocated that transportation policy be used to promote suburbanization and the lowering of urban densities. Like many at that first American planning conference, she seemed to be accepting environmental determinism to a far greater degree than we would today. She believed that there was a strong causal relationship between the physical environment in which a person dwelled and his or her access to social and economic opportunity. Because of her great commitment to reducing density and physical crowding, she was—perhaps implicitly, and in keeping with her time—accepting greater geographic separation of men's and women's worlds into separate spheres, with women carrying out their family roles increasingly removed from the dense urban core.

In just a few years, though, the employment of young women in urban industrial sweat shops would become a mainstay of economic growth for working-class women as well as men. Women increasingly became users of public transit networks in the 1920s and afterward. As entry into manual labor facilitated urban economic growth by exploiting lower- and middle-income women, it also gave these women a taste of economic activity outside the home and motivated many to seek further education and more rewarding employment. Along the way, women had to struggle to make public transit a safe, accepting environment in which to travel between their outlying homes and centrally located jobs. There are many, many accounts of verbal abuse and harassment, such as groping and pinching, of women as they increasingly used public transportation for access to work as well as nonwork services located in the central city.

Gender roles were reasonably well defined with respect to personal transportation well before the arrival of the automobile. Women could certainly ride horses and drive wagons, but because of cultural norms that were widely shared, when they traveled independently or far from home, they stretched the boundaries of proper behavior. When women were in the company of men, it was understood that men would hold the reins, and families limited the mobility of their daughters (*5*).

The coming of the automobile dramatically extended patterns already well established. Women did travel independently in cars in the early years, were among the earliest cross-country automobile adventurers, and were successful automobile racers. During roughly the same period, they became airplane pilots as well. Cultural norms struck back with force, however. Far fewer women than men became licensed to drive. Parents supervised the behavior of young women far more aggressively than that of young men when it came to automobile travel, because increased mobility certainly contributed to increased opportunities for sexual license and situations in which the use of alcohol and tobacco was beyond parental control. Household rules limited the mobility of wives and daughters, and in highly symbolic ways, rules were adopted in competitive automobile and aircraft racing to limit roles for women. The deeply harmful stereotype of the woman driver as indecisive, impetuous, and lacking in skill held an instrumental place in popular culture for more than 70 years. Pseudoscientific evidence of questionable validity was used to promote and explain the rules and stereotypes. Laughable by today's standards, they were taken seriously and used aggressively to limit women's freedom of motion, thereby limiting women's social as well as physical mobility (*6*).

Taking Stock: Research Accomplishments and Needs

Review of the proceedings of the three previous international conferences and the papers submitted to this conference, along with review of the published literature on gender and transportation, reveals some unambiguous patterns that show where understanding of gender and mobility has advanced since intellectual attention was first focused on the subject. Also revealed are themes and topics about which enormous gaps remain in knowledge of gender in relation to transportation. This is not surprising, given that this is only the fourth—not the 40th—international conference on this subject. Both accomplishments and challenges are worthy of summary here at the beginning of the conference. The purpose in pointing to gaps in our collective knowledge is not intended to be critical of the excellent and informative work that has been done. It is intended to spur discussion that hopefully can lead to some consensus on research needs and opportunities, which is one of the most important purposes of our gathering. Perhaps this also can motivate some to undertake work to fill in those gaps.

In part because of professional norms of the research community that define some questions as more appropriate to analyze than others, and in part because the results of studies are most credible when based on quantitative analysis using authoritative data series, we invariably ask similar questions over and over again, looking ever more intently at a narrow subset of issues. We behave like the person searching at night for a lost set of keys only in the area lighted by the street lamp.

Public policy must be made, however, with respect to a very broad set of concerns, whether or not these concerns are readily amenable to systematic quantitative analysis. Although as knowledge is refined, it tends to develop an increasingly narrow focus, governments continually make judgments about policies on the basis of broad sets of concerns that are often not well addressed by research.

As the subject matter of gender and transportation has developed deeper and more refined pictures of travel and related traffic safety patterns of men and women in the most economically developed urban areas using more deeply focused data analyses, we have also started to recognize concerns that have not been nearly as well addressed by the existing literature. These include many important questions that remain largely unanswered. The issues encompass the following:

- Gender differences in travel patterns,
- Traffic safety and gender,
- Gender and travel in poorer societies and countries undergoing rapid development,
- The historical evolution of relationships between gender and transportation,
- Gender and mobility in rural areas,
- Employment and advancement within the transportation industry,
- Information technology and electronic connectivity, and
- The need for broad syntheses that link different thematic areas.

Gender Differences in Travel Patterns

We have learned a great deal during recent decades about gender differences in travel patterns in developed urban societies. Comparative quantitative social science analysis of travel by men, women, children, and families in urban areas of developed, economically advanced societies has advanced greatly since the first conference was held three decades ago. National and regional databases and specialized local studies relying on travel diaries, standardized surveys, and the collection of administrative data in the course of the operation of our transportation systems have yielded large numbers of purposeful studies of ways in which mobility is affected by gender. We can state some fairly strong generalizations that hold across metropolitan areas and even across national boundaries and that seem more persistent over many decades than we might have predicted they would be.

Literally hundreds of studies in many locations make it clear that women's travel patterns typically are more compact than men's. The spatial range of women's travel is shorter even when and where women make more total trips than men. For a variety of reasons, women's travel is more likely than men's to be proximate to home, and this reflects gender roles. Data on travel by trip purpose reveal that women do more of their household's shopping than men and make trips in support of others (from children to the elderly) to schools, doctor's offices, the homes of relatives, and the location of supportive services of many types.

Additionally, as women in economically advanced societies also increase their participation in the paid labor force, including professional, technical, and specialized work, their work trips, while lengthening over time, are characteristically on average shorter than those of men. This is presumably because they spatially limit their employment choices in reflection of their more common responsibilities for supportive roles within households. Whether employed by others or owning their own businesses, women are more likely to work at home or closer to home than men, are less likely to hold jobs that require visiting a wide variety of sites in the course of the work week, and are less likely than men to engage in overnight travel in the course of their work. Closely related to these findings are those that tell us women are more likely than men to use public transit for work- and non-work-related trips and to use carpools and vanpools, and that they are less likely than men to drive alone to work.

Although these patterns are repeated in many settings and at many points in time, there is a great deal of variation in these observed patterns, as is typical with most generalizations about human behavior, and many exceptions and anomalies are to be found in the data. In a recent paper, conference chair Susan Hanson asserts the importance of concentrating on some of the outliers or anomalies in these well-known patterns, arguing that important new insights are to be gained by focusing on unexpected outcomes and deviations from expectations than by reviewing data or studies that reconfirm them (*7*). There are, for example, some differences from the dominant patterns that appear to be associated with particular ethnic communities, and in a few geographic settings, some data sets reveal other inconsistencies with respect to the expected patterns.

On the basis of a smaller number of studies, earlier conferences and the accumulated published literature also demonstrate that women are more likely than men to be more concerned about security while traveling. While there are data that help us understand the association between gender and security, as exemplified by the plenary paper for this conference by Anastasia Loukaitou-Sideris, such data are most available for urban surface transportation. The data show that women are more likely than men to be victimized and hence to be concerned about security when traveling with respect to robbery, purse snatching, assault, sexual battery, verbal harassment, leering, and petty annoyances. Concerns for security combine with actual victimization to limit free and unfettered movement of women in urban settings (*8*).

Traffic Safety and Gender

Although we have learned more about traffic safety and gender, knowledge has not advanced nearly as much as

has knowledge about travel patterns and choices. There also are some increasingly well-understood relationships between traffic safety, crash rates, injuries, deaths, and gender. We now rather broadly accept the generalization that taking into consideration important contextual variations such as age, education level, and cultural setting, males are more likely than females to engage in risky behavior such as driving under the influence of alcohol or drugs, exceeding the speed limit, violating traffic laws, or driving without seat belts. The propensity for males to engage in riskier behavior may also extend to motorcycle use, bicycling, and pedestrian behavior.

It also appears, with less certainty, that in a crash of particular severity and characteristics, after controlling for a wide variety of contextual variables, women may be more prone to injury or to more serious injury than men. This may be because the design of vehicles and restraint systems has been influenced by the physical characteristics of men to a greater extent than those of women. Research has started to explore such issues, but it remains exploratory, and deeper analysis is needed.

Interactions between aging, gender, and traffic safety are important, in that women in many places have longer life expectancy than men. In many societies, we are today experiencing the first generation of elderly women who have been drivers throughout their lives. This is a subject about which we have learned a great deal from research done by some present at this conference, yet there remain deep, interesting, and researchable questions. In this area as in some others, we have the collective sense that we have only barely scratched the surface and that opportunities abound for deeper analysis and new insights (*9*).

Gender and Travel in Poorer Societies and Countries Undergoing Rapid Development

There has been far more analysis of gender issues with respect to travel, traffic, safety, and security in advanced, developed economies than in poorer societies and countries undergoing rapid development. The rates of change in economic status, mobility, and relationships between men and women are greatest outside of North America and Western Europe. In many ways, the most pressing current policy problems and the greatest opportunities for the advancement of knowledge about relationships between gender and transportation are to be found in Latin America, Africa, South Asia, and the Middle East. There remain many places in the world in which women's physical mobility is formally circumscribed by social conventions associated with their society's intent to limit their social mobility. Not so coincidentally, there are some, although certainly fewer, places in which revolutionary social movements are attempting to transform social mobility by attacking issues related to physical mobility. Because few databases exist in these places as the basis for formal statistical studies, we must rely more heavily in these contexts upon case studies, participant observation, one-of-a-kind surveys employing small samples, and weaker evidence such as news media accounts of situations and challenges to the status quo. The conference planning committee, recognizing the significance of problems in the developing world and of changes occurring there, was pleased to invite and to gain the participation of Professor Ananya Roy, whose research on these issues will be presented shortly at this session. It is hoped that her talk and the proceedings of this conference will contribute to a genuine "internationalization" of future investigations of gender and travel (*10*).

Historical Evolution of Relationships Between Gender and Transportation

Despite some historical analysis of women, men, and travel, understandings of the historical evolution of relationships between gender and transportation remain rudimentary. There has been modest, gradual growth in our understanding of the history of gender issues in transportation, especially in the richest and most advanced societies. While historical research using primary source material is much rarer than social science research based on current data, the historical work that has been done has resulted in increased comprehension of the evolution of differences in male and female travel, mode choice, safety, and security over a period of many decades leading to the present. We know more than we did just a few decades ago about differences in the mobility of men and women as modern cities formed. We know more about how patterns of mobility responded when transportation modes and technologies, including public transit and automobiles, were newly adopted and were playing important roles in the development of urban spatial patterns. Many of the published accounts of the historical evolution of gender issues in mobility are repetitions of already published work, however, and there is limited original scholarly work on this theme.

Beyond the direct study of historical events using primary sources, scholars have barely scratched the surface of opportunities to examine relationships between gender and mobility as revealed in popular culture. In the early 20th century, for example, trains, cars, and trips featured prominently in pulp magazine fiction, romance novels, and early radio dramas. The content of these media presentations is rich in symbolism and is ripe for interpretation about the social implications of physical mobility.

We have learned that there are indeed many adventurers and folk heroes to be found among women who strongly influenced the early history of travel as race-car drivers, pioneers of long-distance driving adventure, and even as barnstorming pilots in the early days of aviation. We also know that history tells us a great deal about

the interaction between gender, mobility, race, and ethnicity. Uncovering the layers of history, we learn that some of the folk heroes linking gender and mobility were people from racial and ethnic minority groups and from communities having lower economic status.

We know that efforts to create more ideal communities at different times in our history responded to explicit notions of appropriate gender roles and that these encapsulated concepts of gender, mobility, spatial separation, and access (*11*). In turn, these ideas were, though often clumsily, reflected in policies that actually were adopted and that gave rise to particular urban forms.

There remain enormous gaps in historical research relating to gender and mobility outside of the most advanced Western countries, and there are opportunities to contribute through comparative and cross-cultural historical analysis. Even within advanced industrial societies that have been the subject of extensive analysis, histories are still to be written of women's roles and gender-related issues that have unfolded over more than a century within the transportation industry and within the many institutions that constitute the environments within which we do our work.

Gender and Mobility in Rural Areas

Even within advanced urban societies, our knowledge has improved unevenly, and there remains much to learn about gender and mobility in rural areas and with respect to long-distance (intercity) travel, non-work-related travel, and air travel. Research presented at previous conferences in this series and to be presented at this one makes it clear that we have studied gender issues mostly in relation to urban travel, daily commuting, and routine, repetitive family travel such as trips to school, shopping trips, and trips related to family business. Even within well-studied, data-rich societies such as the United States and Western Europe, we have devoted far less attention to relationships between gender and transportation in rural areas, small towns, and unique cultural settings ranging broadly from Indian reservations to retirement communities. Similarly, there are far fewer published works about the gender dimensions of nonwork travel, such as recreational and vacation travel, and long-distance, international, and air travel related to work and professional activities as well as to leisure and family activities. Much remains to be learned from future studies on these topics.

Employment and Advancement Within the Transportation Industry

Insufficient attention has been given to gender issues associated with employment and advancement within the transportation industry (passenger and goods transport) and with respect to the roles of transportation employees and professionals. Travel and transportation make up a substantial proportion of economic activity in modern economies, and very large numbers of people are engaged in providing transportation services as well as in using them. Economic and social mobility in many societies has been facilitated by employment in the transportation industry. It is well known, for example, that in the United States and Europe, women became bus and truck drivers during the Second World War and that, more recently, bus, train, aircraft, and freight operations have been an important entry point into the middle class for ethnic minority and immigrant communities. Yet much less scholarship has been devoted to the study of the implications for men and women of shifts in employment patterns in transportation, including such important issues as trends in unionization, rates of advancement, differences in salaries and wages by gender, gender differences in full-time versus part-time employment, access to fringe and retirement benefits, and implications for men and women of the contracting out of transportation operations.

Information Technology and Electronic Connectivity

Information technology and electronic connectivity are already transforming the relationship between gender and mobility, and the present and future of that change are in need of systematic research and analysis. The global revolution in information technology has profoundly affected the field of transportation. Two decades ago, most people believed that improved worldwide electronic access would substitute for physical access. Today we realize that in most advanced technological societies, electronic and physical access are complementary. They work together to enable us to maintain business and personal relationships over longer distances and to do so asynchronously. As we did with the telephone generations earlier, we may substitute some electronic exchanges for trips, but ultimately, we tend to travel more because electronic connectivity encourages us to build more dispersed commercial and personal networks. Just as public transit, the automobile, and the telephone interacted with one another and with gender in related but distinct ways, it is reasonable to expect that the increasing integration of information with mobility—especially in societies changing most rapidly—will affect men and women differently. In some ways, such technological advances reduce differences, while in other ways they enhance differences between social, economic, and family roles that we closely associate with gender. The importance of this type of research may not have been clear when the first

international conference was held, but it should today be an obvious dimension of our curiosity about gender roles in relation to travel and transportation.

Need for Broad Syntheses

While there have been many insightful and informative studies of gender issues related to travel patterns and traffic safety, as well as some interesting historical studies, there have been few broad syntheses linking these different thematic areas. Even fewer studies have integrated social science analysis with broader theories of social change and gender in society. The body of scholarship dealing with women, travel, and transportation issues is growing in breadth and in depth, however. Characteristic of many themes in the scholarly literature that are of relatively recent origin, the work is promising but still fragmented. Advances made by social scientists and historians, for example, intersect with one another only occasionally. Scholarly analysis in the context of rapidly changing countries overseas is not well integrated with insights (reflecting both similarities and differences) from the findings of studies carried out in America and Western Europe. Innovations in policy take place from time to time, and government agencies and private companies also take initiatives with respect to services and employment policies. Often policy and program innovations are only loosely informed by or based on scholarly findings. These initiatives rarely are systematically evaluated, and opportunities to learn from experiments in the real world are more often lost to the research community than they are taken advantage of. Still very much needed are syntheses, comparative studies, and cross-disciplinary studies that compare, contrast, interpret, and integrate the findings of researchers whose individual works reflect the particular perspectives and methods associated with their disciplines.

Conclusion

As we begin the fourth international conference on women's issues in transportation, we can be aware of some important differences between this and earlier conferences. It is hoped that today there is less need to assert that the issues bringing us together are legitimate or meaningful ones for transportation scholars and practitioners. People today ask far less frequently why there is a conference on women's issues and whether there are important issues to be addressed at such a conference. The theme of the conference is not quite yet to be found in the mainstream of either transportation or gender scholarship, however, and the questions being asked today are, if anything, more challenging—because they are both more complex and more subtle—than those asked in the 1970s. There is today growing opportunity to think in more integrative and cumulative ways about our subject matter. We note the maturation of this field of inquiry by reference to many more completed studies and stronger consensus on the meanings of the conclusions reached on the basis of studies that have come earlier.

It would be fair to say that on the basis of earlier conferences and the wider literature they have helped to create, the scholarly questions about relationships between gender and transportation posed today are far more insightful than those posed at the first of the conferences. Although the questions are becoming more sophisticated, there remains doubt that we have arrived at authoritative conclusions, robust interpretations, or the ability to meaningfully link policy initiatives with research. Some of the questions to be addressed at this conference are the same as at the first one, but they are posed with deeper insight and sophistication because of the many threads of insight that have come from work done in the interim. New questions also are being considered, and these reflect the gradual growth of participation in these conferences as well as insights from new scholarly analysis and recent initiatives in programs and policies.

As we embark on the fourth conference, I am keenly aware of the important contributions of those who participated in the earlier conferences and of those who raised gender issues in transportation to a much higher profile than these issues have previously had in the evolution of our field. I thank you all for coming and I thank the many who did the hard work of planning for the event and assembling the program. I look forward to being part of the interesting presentations and discussions that are about to begin.

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Gender, Poverty, and Transportation in the Developing World

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The start of the 21st century is marked by striking contrasts. Until the recent financial crisis, many countries of the world were experiencing brisk economic growth. This global material prosperity was not confined to the countries of the industrialized world—what is often known as the developed world. Indeed, emerging economies such as India and China have harnessed the benefits of globalization and have captured significant shares of the world economy. It is thus that Thomas Friedman (2005), the well-known analyst of globalization, declared that the "world is flat" and that it is a "level playing-field" of economic competition where old geographical separations and historical divisions are irrelevant—one where Bangalore, India, can compete neck and neck with Silicon Valley, California. This world, as imagined by Friedman, is one of mobile entrepreneurs, instantaneous flows of capital and innovations, and unprecedented time-space compression enabled by new technologies of information and transportation. It is an interconnected world, but more important, it is a world where such connections have engendered the democratization of economic opportunity. Such optimism is only slightly amended in Friedman's (2008) most recent text, which notes that the world is flat but that it is also hot and crowded.

In sharp contrast to Friedman's celebratory narrative of globalization is the sheer fact of widespread and persistent global poverty. The statistics have now become common sense: of a world population of 7 billion people, 1.3 billion live under conditions of extreme poverty, earning less than $1.25 a day. Such figures are a shorthand for what is in fact a complex configuration of deprivation and vulnerability. Viewed from the perspective of the "bottom billion," the world is constituted of steep hierarchies, exclusive enclaves, and unbridgeable distances and borders. It is a world where there may be mobility, but where such mobility is often forced, keeping the poor on the move as refugees, migrants, and the homeless. In short, the world is not flat.

In this paper, I take a closer look at a world marked by persistent poverty and inequality. I am particularly interested in the gendered nature of vulnerability and deprivation. I am equally interested in how such vulnerability is closely connected with issues of "spatial disadvantage." I borrow this term from the latest report of the Chronic Poverty Research Centre (2008), which is based in England. Indeed, spatial disadvantage—whether manifested in the form of forced migration and displacement or in the form of limited access to transportation—is a key feature of poverty. The relationship between gender, poverty, and spatial disadvantage lies at the heart of this paper.

Millennium Development Goals: Integrating Gender

The world's poor are disproportionately concentrated in the countries of the developing world. They are disproportionately concentrated in rural areas. They bear a disproportionately high burden of risk and exposure, thereby suffering during moments of crisis, be it a natural disaster or a financial crisis. The world's poor are also disproportionately women. While sex-disaggregated sta-

tistics are hard to come by, an oft-quoted figure is that 70% of the world's extreme poor are women, a claim first asserted at the Fourth United Nations Conference on Women in 1995 (Chant 2008, p. 166). It is not surprising, then, that the Millennium Development Goals (MDGs), ratified in 2000 by the member countries of the United Nations, have highlighted the status of women as a central component of human development. MDG 3 explicitly seeks to "promote gender equality and empower women." MDG 5 seeks to "improve maternal health." In addition to these women-focused goals, the other MDGs also emphasize the gendered dimensions of poverty and inequality. Thus, MDG 1, which seeks to eradicate extreme poverty and hunger, has recently added a new target of achieving full and productive employment and decent work for all, especially women and children.

The MDGs can be viewed as a global social contract. They make poverty visible and make the task of poverty alleviation urgent and central to international development and global partnerships. However, the achievement of the MDGs now faces significant obstacles. The 2008 MDG report, recently released by the United Nations, makes note of swelling ranks of the world's poor. A perfect storm of rising food prices, climate change and environmental vulnerability, and the financial crisis with cutbacks in aid now stands to threaten the gains made in poverty alleviation in the early years of the 21st century. For example, the 2008 MDG report estimates that higher food prices will push nearly 100 million people deeper into poverty, with much of this increase taking place in sub-Saharan Africa and Southern Asia, already the regions with the largest numbers of people living in extreme poverty (United Nations 2008, p. 6). At the same time, the report estimates that overseas development assistance will continue to drop, reversing commitments made in 2005 and earlier (United Nations 2008, p. 44). Indeed, as various editorials have noted, the world's rich countries, gripped by a financial crisis, are "failing the world's poor" (*New York Times*, September 23, 2008). Some of the MDG targets that are therefore threatened are the achievement of gender parity in primary and secondary school enrollment, reductions in maternal mortality, and improved sanitation and living conditions for slum dwellers (United Nations 2008, p. 4). Many of these relate to women in poverty. Indeed, the introduction to the 2008 MDG report makes a strong statement about this matter:

> Ensuring gender equality and empowering women in all respects—desirable objectives in themselves—are required to combat poverty, hunger and disease and to ensure sustainable development. The limited progress in empowering women and achieving gender equality is a pervasive shortcoming that extends beyond the goal itself. Relative neglect of, and de facto bias against, women and girls continues to prevail in most countries. As an indispensable starting point for women's betterment in later life, all countries that failed to achieve gender parity in primary and secondary enrolment by the target year of 2005 should make a renewed effort to do so as soon as possible. Improved support for women's self-employment, and rights to land and other assets, are key to countries' economic development. Above all, however, achieving gender equality requires that women have an equal role with men in decision-making at all levels, from the home to the pinnacles of economic and political power. (United Nations 2008, p. 5)

It is a powerful statement, one that is echoed in a recent United Nations Development Fund for Women (UNIFEM) "Progress of the World's Women" report titled *Who Answers to Women? Gender and Accountability* (UNIFEM 2008). The report notes shortfalls in the achievements of women-focused MDGs, such as the reduction of maternal mortality, but also argues more broadly that "gender inequality is a major factor in holding back achievement of the MDGs" (UNIFEM 2008, p. 14). One example is that of access to water, a target of MDG 7. The UNIFEM report reveals the deeply gendered dimension of the water target, noting that in most poor communities around the world, "women carry the buckets" (UNIFEM 2008, p. 36). Indeed, the 2008 MDG report shows that in 71% of poor households, women and girls collect and carry water (United Nations 2008, p. 42). The UNIFEM report highlights the disabling effects of this conjuncture of gendered labor and service deprivation:

> Research in sub-Saharan Africa suggests that women spend some 40 billion hours a year collecting water—the equivalent of a year's worth of labor by the entire workforce in France. Where water is more readily available, men increasingly share in the responsibility of managing household water supplies. This makes an investment in improved water also an investment in freeing women's time. (UNIFEM 2008, p. 37)

Of course, the MDGs are not the only way in which we can track the gendered dimensions of poverty, but they are "the expression of a global aspiration" and "a key element of accountability systems" with "clear, time-bound targets" that make possible tracking, measurement, and monitoring (UNIFEM 2008, p. 116). It is therefore worth using the MDGs to analyze not only the nexus of gender and poverty, but also that of an additional nexus: that of gender, poverty, and spatial

disadvantage. In the water example, spatial disadvantage, or the lack of access to water, also manifests itself as a crushing time-use burden, one borne primarily by women. Transportation, as a connective infrastructure, makes evident such issues of space and time. I now turn to the role of transportation in spatial disadvantage and time-use burdens, structural patterns that are key features of the nexus of gender and poverty.

Whither Transportation?

The MDGs are surprisingly silent on the matter of transportation. Although Goal 7 pays attention to infrastructural deficits, such as access to safe water and basic sanitation, and seeks to improve the lives of slum dwellers, there is little mention of transportation in the implementation targets. I believe this is a serious gap and one that hampers the achievement of the MDGs, and especially the efforts to tackle the gendered dimensions of poverty (see also Riverson et al. 2006, p. 153).

There are two ways in which transportation matters at this nexus of gender and poverty. First, it is an infrastructure of mobility, one that is inevitably implicated in human development goals, be it the achievement of universal primary school enrollment or reductions in maternal mortality or access to full and productive employment. For example, an often-cited World Bank case study from Morocco found that girls' school attendance increased by more than 40% after a new road was put in (Peters 2001).

Second, transportation is a collective good. The political economy of its provision, that is, whether it is privatized or whether it is publicly provided, gives an important indication of the welfare entitlements of the poor. Such themes are central to the latest World Development Report recently released by the World Bank. Titled *Reshaping Economic Geography*, the 2009 World Development Report focuses on geographic disadvantage. It presents as the urgent development challenge three intersecting geographies, "an intersecting 3 billion: a billion slum dwellers in the developing world's cities, a billion people in fragile lagging areas within countries, a billion at the bottom of the global hierarchy of nations" (World Bank 2009, p. 5). Rather than make the case for the geographic dispersal of economic activities, the report argues for economic concentration, declaring that "the world is not flat" (World Bank 2009, p. 9). It also argues, however, that such forms of economic concentration must be accompanied by investments in "connective infrastructure." In a press release, the World Bank (2008) states, "Throughout history, mobility has helped people escape the tyranny of poor geography or poor governance. The report sees this as part of a vital process of economic integration, since mobile people and products form the cornerstone of inclusive, sustainable globalization." Indeed, it is such mobility across a broad range of geographic scales that makes possible the report's insistence that economic concentration and the convergence of living standards can be combined: "Prosperity will not come to every place at once, but no place should remain mired in poverty" (World Bank 2009, p. 20).

While the World Development Report's argument about "economic concentration" may be controversial, it is worth taking away the important point that transportation is a key type of "connective infrastructure." It is thus that researchers have emphasized the linkages between gender, mobility, and health, for example, in relation to maternal mortality. As emphasized by the UNIFEM 2008 report, the "most off-track of all MDGs" is that concerned with maternal health: "Globally, over half a million women every year die during pregnancy or childbirth, and over 90% of these largely preventable deaths occur in developing countries" (UNIFEM 2008). Between 1990 and 2005, maternal deaths decreased at a rate of less than 0.4% per year, far short of the 5.5% annual reduction targeted by the MDGs (UNIFEM 2008, p. 126). Spatial disadvantage once again plays an important role in such deaths, greatly reducing women's access to medical care and greatly increasing the risk of maternal mortality. Thus, the important work of Margaret Grieco highlights the role of transportation as a key factor in maternal deaths (see Porter 2008). Many transportation networks (for example, East Africa's motorcycle *boda-boda* taxi services), mostly operated by young men, are poorly equipped to deal with obstetric care. A new project in Kenya, funded by the United Kingdom's Department for International Development, thus seeks to rework these motorbike ambulances with padded sidecars in which a patient can lie down, safely strapped in, and which allow a nurse or midwife to travel behind the driver in an emergency (Mobility & Health n.d.). Similar experiments are afoot in Southern Sudan (Martell 2009). The challenge is that each motorcycle with sidecar costs $6,000, a steep price in resource-constrained environments (Raube, personal communication).

Such interventions speak to the complexity of the gender, poverty, and transportation nexus. As Peters (2001, p. 7) notes, there is a "new core consensus that 'roads are not enough.'" In rural Africa, only about 10% of transport activity is regional travel; the overwhelming majority of trips take place locally, on village-level tracks, trails, and paths, and on foot. Much of this is the work of women. Thus, Malmberg-Calvo concludes that "the most common means of transport in Africa are the legs, heads and backs of African women" (in Porter 2001, p. 8). This texture of mobility means that transportation planning has to involve much more than the building of roads. It has to remake local transportation networks such as the *boda-bodas*, thereby reversing the deprioriti-

zation of certain transportation activities such as obstetric care. It also has to understand the gendered division of labor in households and communities. For example, in rural Africa, the starting point has to be that "women account for over 65 percent of household time and effort spend on transport" (Peters 2001, p. 8) and that much of this transport quite literally takes place through the bodies of poor women. Implicated in this starting point is a set of gendered meanings and practices. As Porter (2008, p. 287) notes, "head loading and child carrying are embodied skills widely expected of poorer women, in particular, and imbued with social meanings such that a woman may carry 63 kg of fuel wood (with a baby on her back; this an actual case) but find no contradiction in the fact that she is considered—and may consider herself—too weak to operate a push-truck." For transportation to be a "connective infrastructure" its planning and provision has to confront such gendered meanings and practices. These in turn are embedded in broader structures of power. Here it is worth taking a short detour through the feminist literature on gender, poverty, and power.

From "Women" to "Gender"

A common way in which the nexus between gender and poverty is addressed is through the concept of the "feminization of poverty." Initially used to indicate high levels of poverty among women-headed households in the United States, the term is now more generally used to suggest a gender gap in income, opportunity, and assets. Indeed, Buvinic (1997) declared women in poverty to be a "global underclass." She argued that women were not only income poor but also experienced a range of vulnerabilities and burdens, and that these were especially exacerbated in women-headed households. Chant (2008) agrees that gendered poverty is much more than income poverty but also notes that women should not be viewed as a homogeneous mass. Indeed, there are sharp class differences among women, just as there are between women and men. The term "feminization of poverty," though provocative, thus requires some amendment.

In my work, I have found two other concepts to be much more useful. The first is the "feminization of livelihood." In its broadest use, the term signals the gender order of global labor regimes. For example, Standing (1999) makes note of how globalization proceeds through the incorporation of large numbers of women into formal and informal labor. It is in this sense that Ehrenreich and Hochschild (2002) have designated a "Global Woman," referring to the maids, nannies, and sex workers—the laboring bodies—through which the globalization of services is constituted. Of course, the feminization of work means more than simply increasing numbers of women workers. It also indicates the feminization or downgrading of work itself. My research on Calcutta, India, shows how the deindustrialization of a once vibrant industrial region has been accompanied by the disappearance of formal work and the rapid growth of informal work (Roy 2003). At the bottom of the economy, these disposable and flexible jobs are increasingly held by women, who have emerged as the primary wage earners in poor households. As is the case in many other parts of the developing world, poor urban women are present in large numbers in the labor force, and yet they are concentrated in the informal segments of the labor market. Indeed, such a feminization of livelihood shows that the issue at hand is not so much poor women, but rather how gender is an analytic category that allows us to understand how certain social groups come to be concentrated in devalued and marginalized segments of the economy.

The second concept is the "feminization of responsibility and obligation." In their recent work, Brickell and Chant (2010) note that

> Women's disproportionate share of the "altruistic burden" within low-income households appears to be increasing rather than declining. For example, rising female labor force participation in most countries of the Global South does not seem to have replaced the centrality of domesticity or childcare in women's lives, or to have granted them extra rights and privileges, but instead simply involved them in an "ever-expanding portfolio of maternal obligations."

Such "altruistic burdens" take place not only within households but also in communities. Feminist theorists have argued that the "New Poverty Agenda" of the 1990s has turned poor women into an "instrument" of development (Jackson 1996). By this they mean that various development interventions, from health programs to environmental management initiatives, rely on the work—often unpaid work—of women. The inclusion of poor women in such programs is of course welcome. As Molyneux (2006, p. 432) argues, it is "global feminism" that made women's poverty a visible and urgent part of the new poverty agenda. In the 1990s, various United Nations summits, such as the Cairo Conference on Population and the Beijing Conference on Women, created arenas for the agendas and activism of thousands of nongovernmental organizations (NGOs), advocacy groups, and activists affiliated with the field. Indeed, as Rankin (2001) argues, the current mainstream development interest in women would not have been possible without the decades of organizing and institution-building by the Women in Development movement.

The issue at stake, however, is how poor women are integrated into antipoverty and development programs.

Does their inclusion reinforce or dismantle gender inequalities? Does it lessen or increase the altruistic burden of women? For example, various poverty programs, such as Oportunidades, Mexico's highly praised cash transfer program, position motherhood as key to their success (Molyneux 2006, p. 432). The program pivots on the idea of "co-responsibility," making mothers "primarily responsible for securing the program's outcomes" (Molyneux 2006, p. 434). Molyneux (2006, p. 437) rightly asks if this is "female altruism at the service of the state"? I have termed such trends a "feminization of policy," indicating the ways in which development operates through women-oriented policies that serve to maintain traditional gender roles of social reproduction. Such policies can deepen the "feminization of responsibility and obligation," often creating a third shift of voluntary, unpaid labor for women (Roy 2002).

Such policies can also open up a space of negotiation and even empowerment for women. This seems to be the case in Bangladesh. One of the poorest countries in the world, Bangladesh has, in recent years, witnessed significant improvements in human development. A 2008 World Bank report titled *Whispers to Voices: Gender and Social Transformation in Bangladesh* notes the halving of fertility rates, the closing of the gender gap in infant mortality, and higher enrollment of girls in secondary schools than boys. Such achievements stand in sharp contrast to Bangladesh's giant neighbor, India, which has enjoyed brisk rates of economic growth but has also seen increases in poverty and inequality. This so-called Bangladesh paradox—strides in human development in a "cultural context widely believed to be repressive to women" (Das 2008, p. 3)—is partly attributed to a unique set of NGOs in Bangladesh that provide microcredit to poor women. The World Bank report characterizes the effects of these programs thus: "Not only did women learn to save and get access to credit but the credit groups created a sense of solidarity that allowed for other services, such as family planning, to be delivered through them. Women's awareness in many other spheres was enhanced through these collectives as they began to access other opportunities, including training and self-employment" (Das 2008, p. 5). These microcredit programs do not lessen the burdens of feminized obligation, but they perhaps transform women's voice and role within households and communities.

The complexities and contradictions of such findings indicate that there is no simple and fixed formula by which we can designate the nexus of gender and poverty. At work in each case is what may be understood as a "space of vulnerability" (Watts and Bohle 1993). Building on the work of Jean Dreze and Amartya Sen, Watts and Bohle (1993, p. 44) designate this space of vulnerability as shaped by three processes: a distribution of entitlements that allow a command over commodities, the larger canvas of rights through which entitlements are defined and fought over, and the structural properties of the political economy that precipitates entitlement crises. Such spaces of vulnerability are shaped by, and produce, gender. Such spaces are more than metaphorical spaces; they are also real geographies. The seminal work of Hanson and Pratt (1995) indicates how spaces of vulnerability are also spaces of containment, restrictive geographies of home and work that reproduce gendered divisions of labor and opportunity. Once again, transportation is a "connective infrastructure," one that can disrupt or consolidate this vulnerability. In the next sections of this paper, I explore the real urban geographies that are entangled with spaces of vulnerability, with special attention to the case of Indian cities.

Case Study 1: Commute Against Hunger

I first became interested in the nexus of gender, poverty, and transportation while conducting research in the city of Calcutta, India, in 1996 and 1997. My project examined structures of rural–urban poverty, tracking the survival strategies through which poor migrants found a foothold in the city. As rural landless households migrated to the city, they made a fragile living as domestic servants and day laborers and squatted in peripheral spaces—alongside railway tracks and canals and in the interstices of agricultural land at the eastern metropolitan edge. I also discovered another, more "footloose" condition (Breman 2003): the daily commuting of poor women from villages to the city on the crowded local trains. This was a daily commute against hunger and rural deprivation. Dubbed the "automatic washing machines," these women were the laboring bodies that made possible everyday life in the city.

The commuter women are a poignant example of what I have earlier described as the "feminization of livelihood." In a context of high male unemployment, these women are the primary wage-earners in their rural households. Yet, they are concentrated in "feminized occupations" such as informal vending and domestic service. Their routines of work are grueling. For example, these domestic servants are paid not on a monthly basis, but often on a piece-rate basis: for every bucket of clothes washed, the number of rooms cleaned, and so forth. These are the sweatshops of urban services. The trends captured by my research are borne out in recent macrostudies. In 2004, the state of West Bengal (of which Calcutta is the capital), in collaboration with the United Nations Development Program, launched its first *Human Development Report*. The report documents that in the past decade, economic growth in West Bengal has gained momentum. It shows, however, that employment growth has not kept pace with income growth or population

growth. More striking, in West Bengal, the "pattern of job creation has shifted towards more casual, marginal, part-time, and insecure contracts or self-employment" (Government of West Bengal, 2004, p. 89). It seems that West Bengal is heading toward a postindustrial pattern where employment in the formal sector will be available only to a small techno-professional class and the rest of the economy will be made up of part-time, flexible, low-paid service jobs. The report thus concludes that the informal sector in urban West Bengal is most likely between 56% and 62% of the workforce (Government of West Bengal 2004, p. 110).

Such trends are not unique to Calcutta. Indeed, they have important connections with emerging global trends. Most striking is a body of work that traces the formation of a "new urban marginality," particularly in Western Europe and the Americas. During the 1970s, researchers were optimistic, arguing that the urban poor were integrated into the labor markets, social life, and political systems of the city; now they are making the case for the "reality of marginality" (Perlman 2003). Wacquant's work (1996, 1999, 2007), for example, documents the emergence of an "advanced marginality" that is linked to the "territorial stigmatization" faced by residents of marginalized spaces—the ghetto, the banlieue, the favela. The concept of "territorial stigmatization" once again echoes the idea of "spatial disadvantage." Such research also shows how forms of territorial stigmatization are produced by, and in turn produce, poor access to jobs. Indeed, researchers are documenting the steady disappearance of full-time, stable jobs in many economies of the world, including those of North America and Western Europe. These forms of unemployment are worsened by cutbacks in welfare services that came into effect on both sides of the Atlantic in the 1980s and 1990s. In the developing world—for example, Brazil—while there have been state interventions to improve living conditions in slums and squatter settlements, researchers show that such programs are minor palliatives in the face of persistent territorial stigmatization. The communities of the urban poor are now overwhelmed by violence: the violence of state repression, the symbolic violence of stigma and discrimination, and the material violence of poverty and unemployment (Perlman 2003; Roberts 2004). In short, territorial stigmatization is no longer an anomaly; rather it is a structural feature of societies in the developed and developing world.

In *City Requiem, Calcutta* (Roy 2003), I trace similar structures of "advanced marginality," though there has been little subsequent work on this issue in the context of India. As Breman (2003, p. 4354), points out, the migrants and commuters whose lives are depicted in *City Requiem, Calcutta*, "have left the village but whether they have arrived at the city is a debatable issue . . . they are kept in a footloose condition on the outskirts of the metropolis." He calls this a "footloose condition" to indicate the ways in which these groups float between city and countryside but are unable to gain access to shelter, services, and jobs. They are mobile, but it is a mobility that indicates great vulnerability rather than advantage. Indeed, this "footloose condition" is also an example of "territorial stigmatization"—namely, there is no place in the formal city for the poor.

For the women commuters, the local trains are crucial. They rely on this daily commuting to support their rural families. Yet, on the trains, they also contest and critique the conditions of work and home. For example, they present their husbands as *bekar*, a word that means both unemployed and useless: "We work all day long and they stay at home." In contrast, commuter women define themselves as androgynous, simultaneously participating in male and female realms: "*Amra purush ebong meye* [we are both men and women], earning for the household like a man and taking care of the house like a woman." It is important that these women put forward these critiques on the local trains, in the midst of long commutes that are typically associated with men.

Another striking aspect of these commuter women is their daily engagement in political action. Every day, thousands of poor women travel ticketless on the trains to and from Calcutta and are militant in their refusal to buy tickets. Although male ticketless commuters are at times arrested by ticket checkers, female commuters are aware that they can use gendered techniques to ward off harassment by male ticket checkers. They therefore crowd into the "Men Not Allowed" compartments of local trains. Such compartments are common in many parts of the developing world and are meant to provide a safe space for women. In India, these compartments are most often used by middle-class women, but in this case they are commonly used by the poorest women. The railway authorities have tried to deal with the problem by hiring female ticket checkers, but the women commuters have been extremely aggressive in their responses. Here are some of them:

- "Let them arrest us all. There isn't enough space in the hold for all of us."
- "When she came to fine me, I said, take off your coat and give it to me so that I'll have your job. Then only will I be able to afford the fine."
- "You want to arrest me? First, get my children from the village. We'll all stay in your jail and you can feed us."

Especially significant is the ability of commuter women to articulate and press claims vis-à-vis the state, defining ticketless travel as an entitlement of citizenship. Their most common statement is this: "We vote and therefore why should we have to pay for what we cannot afford?" The statement is a powerful one, making the case that as

voting citizens, poor women are entitled to various state protections, including subsidized transportation.

At Calcutta's rural–urban interface, ticketless travel remains a distinctive practice of poor women. Male commuters from similarly poor households have a very different response to the issue of ticket checking. Not only are male commuters eager to maintain the impression of being law-abiding travelers, but they also devise elaborate mechanisms to avoid ticket checkers when they cannot afford to buy tickets, such as traveling on late-night trains. While poor women mobilize in rowdy groups on the local trains, poor men travel alone. They are thus much more likely to be detained by ticket checkers and much less able to contest such arrest. It is also difficult for a railway administration to be perceived as conducting harsh crackdowns on poor women, especially those whose labor is much needed by the entire city.

I am convinced that the ability of commuter women to resist, critique, and challenge has to do with the experience of commuting, of being together with women who are strangers from strange villages but who are intimate in that the conditions of their lives are agonizingly similar. Commuter women form a collectivity in sites where they gather, such as waiting points on platforms and on trains. They travel on the trains for at least an hour each way each day. The tangible experience of traveling on the overflowing trains has a distinct texture—a sense not only of one's own body but also that of other bodies, jostling against one's own, usurping space. This means that the space of the trains is distinct from that of home, work, and even political community. The appropriation of the "Men Not Allowed" spaces by commuter women points to how they redefine the very meaning of public space and the public sphere. They do so with a sense of entitlement and belonging.

Of course there are important limits to such politics. These women remain trapped in feminized work, especially the back-breaking labor of domestic service. As more and more poor women turn to the city for livelihood, the competition for jobs becomes even more severe. Older commuters complain about the influx of young girls and women willing to accept lower and lower wages. Indeed, despite this daily mobility, poor women are unable to ensure socioeconomic mobility for their households. Their daily commute simply guarantees basic survival. The persistence of poverty through the persistence of feminized livelihoods is amply evident. In fact, the emergence of this sort of commuting in the past 25 years is a sign of economic crisis in the Calcutta metropolitan region. This footloose condition, the constant movement, is thus an expression of stasis rather than progress. The daily commute is at once a new and unanticipated public sphere as well as a desperate commute against hunger by those who remain on the margins of the city.

Case Study 2: Making Peace with the World-Class City

In India, the turn of the century has been marked by the violent expansion of the frontier of urbanization, making way and making space for the new Indian urban middle class through the smashing of the homes and livelihoods of the rural–urban poor in Delhi, Mumbai, Bangalore, and Calcutta. These new forms of urbanism seek to remake Indian cities as "world-class" cities, those that are globally competitive with other Asian successes, such as Shanghai, Singapore, and Dubai. With this in mind, in Calcutta, the government has sought to displace peasants and sharecroppers from agricultural land to accommodate special economic zones, foreign investment, and gated suburban developments. Furious protests have ensued, in some cases blocking some of these plans and in other cases proving futile. In Mumbai, such evictions were starkly evident in the winter of 2004–2005. Acting on a bold report by the global consulting firm McKinsey & Company, the city put into motion "Vision Mumbai." A cornerstone of this vision is a world-class, slum-free city, promoted by an "NGO" of the elite, Bombay First. In a matter of weeks, government authorities had demolished several slums, rendering 300,000 people homeless. The demolitions came to be known as the "Indian tsunami." The urban poor of Mumbai were quite literally being erased from the face of the world-class city. Vijay Patil, the municipality officer who led the demolitions, stated that it was time to turn Mumbai into the "next Shanghai" and that to do so, "we want to put the fear of the consequences of migration into these people. We have to restrain them from coming to Mumbai" (Biswas 2005). "How can you ask people to stop coming to Mumbai? This is a democracy," noted urban analyst Kalpana Sharma (Biswas 2005). A particularly striking characteristic of the Vision Mumbai demolitions is that they carried neither the promise nor pretense of resettlement and rehabilitation. Indeed, the United Nations Special Rapporteur on adequate housing, Miloon Kothari, sharply criticized Mumbai at the United Nations Commission on Human Rights, noting that the city had effectively criminalized poverty and violated all expectations of humane resettlement (Khan 2005). This brutal vision of the world-class city was contested by the National Alliance of Peoples Movements (NAPM). Since the Vision Mumbai plan had sought to remake Mumbai in the image of Shanghai, the NAPM framed the "Shanghaification of Mumbai" as primarily an issue of rights: whether the urban–rural poor have a "right over urban space" (Patkar and Athialy 2005): "In Mumbai, 60 per cent live in the slums. Shouldn't they have a right over 60 per cent of the land in Mumbai?"

But it is a question that has been cast aside as the demolitions and evictions continue apace. The latest "world-

class" development is in the very heart of Dharavi, Asia's largest slum. Featured in the film, *Slumdog Millionaire*, Dharavi is a "a million-dollar economic miracle providing food to Mumbai and exporting crafts and manufactured goods to places as far away as Sweden" (Echanove and Srivastava 2009). It is also a particularly important urban "asset" (Tutton 2009) at the intersection of the city's infrastructural connections. Mukesh Mehta, the architect who is leading the redevelopment plan, argues that Dharavi could be India's "Canary Wharf" (Tutton 2009). Today, 19 consortiums from around the world are vying to claim and redevelop the "only vast tract of land left that can be made available for fresh construction activities" at the heart of the city (Singh 2007). Where then will the hundreds of thousands of the working poor currently housed in Dharavi live? How will they survive their forced mobility, their footloose condition? What will be the connective infrastructure that binds them to the city? Not surprisingly, the redevelopment of Dharavi faces protests. As Dharavi lies at the intersection of Mumbai's infrastructural connections, so its slum dwellers have organized marches that utilize these urban arteries. Two of Mumbai's most famous activists, Sheela Patel and Jockin Arputham write, "The march reminded the government that the inhabitants of Dharavi could easily block all the roads and train tracks that are close to Dharavi, and this would virtually suspend the flow of north-south traffic in the city. . . . they could have caused chaos with traffic, but the organizers chose not to do so" (Patel and Arputham 2008). How long will they choose not to do so? For how long will the urban poor make peace with and make space for the world-class city? These are pressing questions in Indian cities and in many cities of the Global South.

In the case of Mumbai, such questions lead us once again to the nexus of gender, poverty, and transportation. The 2004–2005 mass evictions came as a surprise because since 1987, Mumbai's most prominent pro-poor NGO, the Society for the Promotion of Area Resource Centres (SPARC), has pioneered a shift away from demolitions to dialogue. Working with federations of the poor, SPARC articulates a strategy of community-led resettlement and rehabilitation. Most famously, in 2001, SPARC brokered the resettlement and rehabilitation of nearly 18,000 families (approximately 60,000 people) living along Mumbai's railway tracks on behalf of the World Bank–funded Mumbai Urban Transport Project (MUTP). SPARC saw the MUTP case as setting a new precedent for urban governance in Mumbai, one characterized by voluntary demolitions and speedy resettlement (Patel, D'Cruz, and Burra 2002). The MUTP project also led SPARC to bid for World Bank tenders, from the design of low-cost resettlement housing and community toilets to the preparation of Resettlement Action Plans and baseline socioeconomic surveys (SPARC n.d.a).

SPARC's approach, which has been celebrated as an example of "deep democracy" (Appadurai 2002) seeks to shift the locus of urban planning to the grassroots, specifically to the urban poor. Thus, a core philosophy of SPARC is self-enumeration. Starting with the path-breaking *We the Invisible* report (1985), SPARC has made it possible for pavement dwellers, slum dwellers, and squatters to count, categorize, and map their own communities. Indeed, SPARC's motto is "Knowledge is Power, When in Doubt Count" (unpublished annual report, 2004–2005). SPARC not only promotes knowledge creation in the poor communities of Mumbai, but also facilitates transnational exchanges of such knowledge, for example, through international networks such as Slum–Shack Dwellers International (SDI), so that the squatters of India can be in conversation with the squatters of South Africa. SPARC writes that such exchanges "enable low-income people to develop their own understanding of their social and economic context, not just on a microlevel but via exchange in regional and global arenas" (Patel, Bolnick, and Mitlin 2001). Indeed, SPARC must be lauded for having created a new model of pro-poor urban planning.

Yet, such a model also demands a more careful and critical look. Central to SPARC's strategy is the idea that the urban poor must make way for urban development, that they are somehow in the way of the world-class city. For example, in a recent essay on the MUTP "voluntary" evictions, Patel and Bartlett (2009, pp. 3–4) explain the strategy as follows.

Millions of people in Mumbai's narrow island confines depend on the north–south railways to reach their places of work each day. The tracks are the city's lifeline, but service had become overcrowded and slow. A critical problem was the sheer number of people living close to the tracks. Wherever shacks were within 30 feet, trains were required to slow down to 5 kilometers per hour, adding to the congestion of the entire system. When Indian Railways and the Government of Maharashtra embarked on long-planned improvements, these 18,000 households, with support from SPARC, planned and managed their own resettlement, avoiding the turmoil and impoverishment that so commonly result from forced displacement. As cities grow and new or improved infrastructure becomes necessary, some displacement inevitably occurs, but it is rarely a success for all involved. This resettlement was successful by any standard—for the railways, state and local governments, the World Bank, millions of commuters, and the railway dwellers themselves.

For SPARC, such a strategy is pragmatic rather than ideological; however, the organization also argues that such a strategy emerges from the central role of women in their urban communities. Indeed, SPARC documents root the philosophy of community-led resettlement and negotiated development in the actions and demands of poor women.

The Federation was used to the strategies of the rights-based approach—vocal and public opposition on the streets and pressure for legal reform. In the 1990s, as the women leaders in Mahila Milan gained in confidence, they began to challenge the way in which they were being used by the male leadership. In 1985, when the city threatened to demolish the pavement dwellings, all NGOs and youth groups wanted to fight street battles to defend the rights of pavement dwellers to reside on the pavements of Bombay. SPARC, the support NGO, asked women in the Byculla area, who were living on pavements, and members of Mahila Milan what they wanted to do. The women said, "We don't want to fight and we don't want to stay on the pavements either! Go and speak to the municipality and to the state government and see if you can explain to them our situation" (Mitlin and Patel 2005).

In this way, SPARC has made poor women central actors in Mumbai and "trustees of resources within their communities" (Burra, Patel, and Kerr 2003, p. 32). D'Cruz (n.d.) notes how the efforts of these women began a model for slums all around Mumbai and eventually those in other cities in India:

> These practices have become the rituals that federations across many cities undertake, and they form the basis of a discussion between informal settlements and cities. The formula is simple and powerful. The state provides land at subsidized costs, the Municipal Corporation provides off-site infrastructure like it does to all its citizens, and communities design and manage their settlements spearheaded by the women in the settlements, who having built their capacity to manage savings, create a database of residents, and supervise construction, undertake these activities.

To assert that women are the "core of the politics of patience" (Appadurai 2002, p. 34) also places an altruistic burden on women. Various SPARC documents make note of the "essential qualities" of women (SPARC n.d.b) and of "women as nurturers of their families" (Patel and Bartlett 2009, p. 5). Involving women, SPARC argues, ensures that processes are sustainable, equitable, and collective. Such an approach, however, overlooks the social construction of gendered practices and meanings. What SPARC interprets as women's essential qualities can be understood as what feminist theorists have analyzed as a "feminization of obligation," in which women take on the additional responsibilities of community organizing and development (Brickell and Chant 2010). The emphasis on women's essential qualities also obscures what I believe is a core ingredient of the SPARC model: that successful community-led resettlement and rehabilitation was engendered not so much by the spontaneous actions of poor women as it was mandated by World Bank guidelines. These guidelines themselves were developed by the World Bank to respond to harsh critiques by social movements. Such guidelines are ironically lacking in the developments initiated by the Indian government; it is thus that the Vision Mumbai evictions had little in the way of resettlement or rehabilitation. SPARC's framing of itself as a solitary David facing the "three Goliaths" of "the state government, the railways board and the World Bank" (Patel and Sharma 1998, p. 149) is thus a mischaracterization. Instead, World Bank guidelines, however faulty, can be seen to constitute a political economy that facilitates entitlements, including those by poor women.

None of this of course changes the fundamental reality of Mumbai's urban political economy: that the making of the world-class city squeezes the poor out of their homes and livelihoods. SPARC's gendered pragmatism is unable to tackle this logic; it must make peace with it. As the urban poor get pushed to more remote edges of the city, however, as they are kept footloose and "dis-placed," so it must be asked how they can be connected to the urban fabric. Such an inquiry is crucial, for as Anand and Tiwari (2006, p. 64) demonstrate in the case of Delhi, the relocation of slum dwellers to the outskirts of the city "has severed the shelter–transport–livelihood links of the poor people residing in these slums." Similar findings are presented for Mumbai by Baker et al. (2005, p. 46), who note that poor households rely more on walking than other households (63% of poor households versus 44% of all commuter households) and that thus, the poor who live in the peripheries are more isolated than the poor in central Mumbai. Anand and Tiwari (2006, p. 65) note that poor women in particular experience significant transport deprivations. Their study confirms many of the gendered dimensions of women's limited mobility: their poverty of resources and time, their high concentration in informal and home-based production and service sectors, and the high burden of unpaid reproductive labor. In a finding that echoes that of Hanson and Pratt (1995), albeit in a very different setting, they note that women look for work at shorter distances from home (Anand and Tiwari 2006, p. 78). They also depend on slower and cheaper modes of transportation. These forms of spatial entrapment are exacerbated, the authors argue, through forced evictions that push women to the peripheries of cities and further restrict their geographies of opportunity.

Conclusion: Transportation Justice, Transnational Analysis

In this paper, by exploring the nexus of gender, poverty, and transportation, I have argued that the world is not flat and that the struggle to create a "connective infra-

structure" must take into account "spaces of vulnerability." I have also argued that gender, as an analytic category, allows us to better understand the divisions of labor, hierarchies of resource access, and politics of meaning that shape society and space. For example, a gendered lens makes visible the structures of decision making that in turn shape connective infrastructure. The 2008 UNIFEM report asks a sharp question: "Who answers to women?" The report highlights the significance of representation and accountability, noting the absence of women in many decision-making and agenda-setting venues. Such issues are also of pressing concern in transportation planning.

In adopting a gendered analysis, I have also sought to provide a global overview, drawing attention to trends such as the feminization of livelihood and the altruistic burden. Yet, a cautionary note is in order. My case studies come primarily from India. The nexus of gender, poverty, and transportation is quite different in remote rural Africa or in highly urbanized Bogotá than in Mumbai or Calcutta. Surely such contexts have little in common with the transportation issues of North America. Yet, I hope there are lessons to be drawn that cut across the inevitable diversity of socioeconomic and political conditions. Such lessons are united by a broader theme of "transportation justice," an aspiration that I believe is transnational and cross-cultural.

In the North American context, "transportation justice" has emerged as an important concept. It makes possible a "social audit" of transportation policies, revealing enduring deficits. It is a term that makes visible the burdens carried by low-income communities of color and thus calls for transportation policies that can mitigate such social inequities. It is a dream that evokes a long history of organizing around transportation, one that connects access to transportation to a broader struggle for environmental justice, civil rights, and inclusive cities.

The issue of transportation justice is particularly urgent in the cities of the developing world. It is here that much of the urban growth of the new century will take place. This rapid urbanization will unfold in contexts of great poverty and inequality. Will transportation policies mitigate, deepen, or neglect such stratifications? The evictions in cities such as Mumbai indicate a difficult dilemma for the urban poor: that the poor can only have a fragile and insecure existence in the heart of the city; regimes of shelter may be more secure in the periphery, but these are also sites of isolation poorly served by affordable transportation networks (Baker et al. 2005). While some cities in the Global South have sought to expand their rail and bus networks, it remains to be seen whether such circuits of transportation will serve the urban poor, those who constitute the "bottom billion." Indeed, Gilbert's (2008) recent analysis of the much celebrated TransMilenio project in Bogotá, Colombia, indicates that this system primarily serves middle-income users. While there are many elements of the TransMilenio system that help the poor, such as fixed fares (so that the poor who live in the outskirts and travel long distances are subsidized by the fares of middle-class users who make short journeys), TransMilenio fares remain higher than those on traditional buses (Gilbert 2008, pp. 49–50). Gilbert estimates that with recent fare increases, 20 return journeys a month cost 12.9% of the minimum wage in Bogotá. Such figures are borne out in other contexts. Baker et al.'s (2005, pp. 30–34) study of poverty and transportation in Mumbai demonstrates that

> The out-of-pocket cost of rail and bus constitute[s] a much higher fraction of income for the poor than for the non-poor, and that this also explains the less frequent use of these modes by the poor. . . . The results are striking: for the poorest households whose main earner commutes by train, transportation expenditures are 17% of income; when the main earner commutes by bus they are over 19% of income. . . . The share of transport-related expenses . . . is highest among the poorest households. . . . It remains approximately constant at 10% of income for the rest of the income categories.

Indeed, the poor pay disproportionately more for transportation—as well as for water, housing, utilities, and health care—than other urban citizens. This is as true in North America as it is India. In the developing world, such burdens will only increase as the urban poor are pushed to the peripheries of cities through evictions and displacements.

The examples from the developing world that I have provided also indicate that more is at stake in transportation justice than access to transportation. Equally important is access to jobs and shelter. The cruel trade-off in Mumbai between decent and secure shelter on the peripheries and a reasonable commute with access to jobs makes a mockery of transportation justice. Similarly, the footloose condition of poor commuter women in Calcutta maintains a state of feminized poverty. Such issues are no longer "Third World" issues; they are also relevant to the North American context, where persistent unemployment and underemployment are now structural features of the economy. It must be asked: are we entering an economic phase where full-time, stable jobs with benefits are the exception rather than the rule? If so, what type of connective infrastructure would be needed for increasingly fragmented, flexible, part-time, informal labor markets? The spatial disadvantage that was once associated with spaces of poverty such as the ghetto may in fact be a more generalized condition. Linda McDowell's (1991, p. 408) provocative phrase is highly relevant here: "We are all becoming women workers now."

The struggle for transportation justice may also be marked by contradictions and dilemmas. As a concluding example, let me return to the case of India, and specifically the Calcutta metropolitan region. It is here that a few years ago the famed Indian corporation, Tata, broke ground on their eagerly awaited Nanocar factory. The Nanocar itself can be interpreted as a symbol of transportation justice, a cheap car that is meant to dramatically increase the access of low-income groups to automobility in the world's largest democracy. The factory was plagued by controversy, however. It was located on land that had been confiscated from poor peasants, sharecroppers, and squatters. While the local government, ironically led by the Communist Party of India, had used its power of eminent domain to secure such land, the displacement of the poor became a lightning rod for organized political opposition. Soon, a powerful social movement emerged, drawing attention to the plight of the displaced poor, those who would not be able to participate in the benefits of the Nanocar factory or the Nanocar itself. By 2008, the Tata Corporation had to abandon the Nanocar factory, relocating its assembly line to another part of India. The political landscape of the Calcutta metropolitan region was also decisively altered, and the Communist Party of India suffered severe defeats in several subsequent elections. In leaving Calcutta, Ratan Tata, the head of the Tata Corporation, framed the situation as one where politics and hostility had overcome modern infrastructure and industrial growth. Indeed, there were new protests, this time by those who had hoped to have jobs in the Nanocar factory, some who had even exchanged their farm land for this dream of industrial jobs.

While this is an Indian story, the issues are not unique to India. This case demonstrates the complexities of transportation justice and raises the difficult question, "justice for whom?" Transportation justice for the extreme poor who are constantly pushed to the peripheries of metropolitan regions to make way for urban development? Transportation justice for those who have been unable until now to participate in automobility and for whom a cheap car greatly expands geographies of opportunity? These are the dilemmas of spatial disadvantage that are evident in many contexts from Los Angeles to Rio de Janeiro and that demand our attention. Indeed, the world is not flat.

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Women's Travel in Developed and Developing Countries
Two Versions of the Same Story?

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This paper compares women's travel in the developed and the developing worlds in the context of four societal trends: globalization, urbanization, motorization, and sociodemographic transitions. The paper finds two versions of the same story: while women in the Global South suffer from far worse transportation problems, women around the world have less access to better transport modes and new technology; their travel patterns continue to differ from men's, both because of their household and child-care roles and because of norms about women's appropriate travel behavior; and they face greater fear and anxiety in traveling. These differences are largely ignored or even made worse by policy responses and government programs. Women's travel needs and patterns can be given more traction in policy debates by encouraging researchers to recognize the underlying causes of differences in women's travel behavior using a mixture of qualitative and quantitative approaches, encouraging more women to enter transportation planning and research, and requiring policy makers to assess projects and policies in terms of their differential impacts on women and men both before and after implementation.

> Nearly every book and many articles on bicycling at the turn of the 20th century addressed the topic of the effect of cycling on women's health. Both sides used medical arguments, and, as it turns out, both had a common interest in keeping women in traditional roles. Those opposed to cycling argued that it was dangerous for women to expend so much of their strength on physical activity. The other line of the argument focused on sexual health and the supposed problematic effects of bicycle saddles. (Dill 2009)

> Cycling is a very common form of transport in many Asian and some African societies, but women's use of bicycles is limited. . . . Women usually have neither the purchasing power to acquire a bicycle nor, in many cases, the social acceptance of riding one. (Fernando 1999, p. 67)

The parallels are striking: women in developed countries were actively discouraged from using the bicycle when it was a newly emerging technology, and women in developing nations are often prevented from using bicycles, a means of transport that could make a meaningful difference in their lives, by societal norms or financial constraints, or both. This is not a fanciful link; feminist geographer Susan Hanson (2010) in a recent article talks about the importance of the bicycle to a noted suffragette.

Our review of gender and travel in developed and developing countries reveals two versions of the same story; across time and space, women often have unequal access to better transport services, display very different travel patterns, and face more fear and anxiety in traveling than do comparable men. These differences reflect both cultural values and norms and the heavier family and sustenance obligations that women often assume or are assigned. Yet the differences between women's and men's travel patterns often have little traction in policy

and planning efforts; as a result, many governmental responses fail to improve the options available to women and may even widen the gap between the sexes.

In the Global South, many governmental responses advantage a certain kind of mobility, by providing major roads or formal bus or rail systems, at the expense of accessibility, which could be enhanced by improving local pedestrian facilities, rural footpaths, and connections to main routes. At the same time, cultural norms may limit women's access to intermediate mobility modes (like bicycles and other wheeled vehicles) while government policies fail to address their personal security and safety concerns. In industrial nations, the same bias for mobility over accessibility exists, but the failure of government policies to address women's growing dependence on the car to reach dispersed jobs and to effectively balance domestic and special needs is more far reaching.

The disconnect between our knowledge about women's travel needs and patterns and public policy making results in part from the way in which research questions about travel behavior are framed and how data are collected and analyzed. We suggest that this situation could be improved in several ways. Researchers need to focus on the underlying causes of differences in women's travel behavior by using a mixture of qualitative and quantitative approaches. Policy makers need to assess projects and policies before and after implementation to understand differential impacts on women and men. Moreover, more women need to enter transportation planning and to engage in travel behavior research.

This paper first reviews four societal trends that affect women's and men's travel. The second section summarizes what is known about women's travel patterns in both industrial nations and the Global South. The third section briefly discusses the ways in which data on women's travel patterns are collected and used in policy making and shows how little the knowledge base about women's travel in both industrial nations and the Global South affects policy making. The last section describes some ways to change the ending of these parallel stories.

Societal Trends

Four major trends have important implications for how women and men organize family life, view their daily activities, and ultimately structure their travel patterns: globalization, urbanization, motorization, and sociodemographic transitions.

Globalization

Globalization is one of the most significant trends of the 21st century and has substantial implications for many facets of society. The two components of globalization with the most impact on transportation are the movement of manufacturing and some service sector functions from developed to developing nations and the migration of workers from poorer to wealthier countries in search of better economic opportunities.

As firms and industries move from high-wage to low-wage countries, women in the latter gain new opportunities for paid employment (Leinbach 2000), which creates new travel needs and patterns. At the same time, the international migration of male labor means that the sending countries are challenged by a large number of families headed by women alone. New immigrants in the receiving countries increase the population and work force (Pisarski 2006), but they also bring with them their cultural values about women's appropriate transportation behavior (Handy et al. 2008; Tal and Handy 2010). For example, in both the United States and the United Kingdom, immigrants display the largest gender gaps in driver licensing and use of the car (FHWA 2006; Rosenbloom 2006).

The loss of industrial jobs in developed nations has fueled the growth of the service economy. Women hold a disproportionate share of service sector jobs, which often pay substantially less than the manufacturing jobs they replaced (U.S. BLS 2009). Such shifts have profound transportation implications because such workers have less money to spend for transportation and often have jobs that are hard to serve with public transit or human-powered modes. Many service sector jobs are scattered across a metropolitan area rather than concentrated in employment centers, and they often have nontraditional or variable work schedules. In addition, working at night or in low-density areas can create personal security issues. All of these patterns affect women's travel more than men's (Fay 2005; Rosenbloom 2006).

Urbanization

In 2008, the world reached a "momentous milestone" (UNFPA 2007): 50% of the world's population, or 3.3 billion people, lived in cities (ULI 2008). The transportation implications are profound. In the Global South, areas undergoing urbanization provide a wide array of work opportunities that allow women gradual access to paid economic activities, and these activities change their daily travel patterns (Tannerfeldt and Ljung 2006). The higher density of economic activity often makes jobs accessible by foot; cities also offer a wide variety of formal and informal transport modes, including motorbikes, shared taxis, and informal buses of various kinds (Turner and Fouracre 1995). However, urbanization in the Global South is also associated with large and dense settlements of poor dwellers at the edges of urban areas,

where public or private services are limited and transport resources are inadequate (Ipingbemi 2010).

In developed nations, urbanization is largely complete, but its nature and impact differ from city to city. Many major cities in industrial countries have lost either population or jobs or both in their historic cores, while their suburban areas have grown rapidly. Increasing suburbanization either supports or creates a greater dependence on motorized vehicles; this often requires those with lower incomes—more often women—to endure longer commutes by slower modes or to spend a larger share of their income to maintain a car (Cox 2007; Currie et al. 2009). Those lacking a car are often unable to search for a job effectively or to travel to jobs far from their home (Dobbs 2005; Blumenberg and Manville 2006; Rogalsky 2009; Baum 2009).

Motorization

Most nations are experiencing the rapidly growing use of motor vehicles. The first wave of motorization involves the development of formal bus systems and the growing use and ownership of basic kinds of motorized modes, such as electric bikes and three-wheeled vehicles. The next (and often overlapping) wave of motorization is the greater use of personally owned cars, vans, and trucks. Although vehicle ownership rates in poorer countries are currently substantially below those of the developed world, in the next 20 years, the number of cars in use is expected to double to more than 2 billion, with the largest share of that growth being in the Global South (Sperling and Gordon 2009).

Motorization often affects men and women differently. Women in the Global South are substantially less likely to have access to motorized modes of travel—and they may be even more disadvantaged by this than women in developed nations. Many developing nations are making major investments in highways and rail systems as part of their economic development strategies. Although these investments provide some transport benefits to some women, they rarely recognize or respond to the different transportation patterns and needs of women (Fernando and Porter 2002; Philpott 1994; Sieber 1998). Thus, government transport investments often both fail to respond to women's needs and widen the disparities between the sexes (GTZ 2007; Riverson et al. 2006).

Even in industrial nations, women are less likely to have a driver's license or to drive even if licensed. Women's lower access to the private car is associated with difficulties in gaining and keeping jobs; far longer commutes, as measured in time, because of the use of slower modes; and the need to spend larger shares of their income on transportation when forced to drive (Cox 2007; Currie et al. 2009).

Sociodemographic Transitions

Probably the most important sociodemographic transition of the past 40 years has been the growing involvement of women, particularly those with children, in the paid labor force. In developing countries with a traditional agrarian base, most women worked without pay in the fields and fetching water, food, and fuel in addition to carrying out their child-care and household responsibilities. As economies slowly diversify away from subsistence agriculture, more women gain paid employment outside the home (Leinbach 2000).

Women's formal participation rates are not always measured well in the Global South and range widely (World Bank 2009a). In 2008, less than 25% of women were in paid employment in the Middle East and North Africa; in fact, the countries of North Africa had the largest gender gap in paid employment. At the same time in the countries of East Asia and the Pacific, almost 60% of women were in the paid labor force.

Women's paid employment in industrial nations, while traditionally higher than in the Global South, has also increased significantly over the past four decades. In 1970, only 43% of all American women were in the paid labor force, compared with almost 60% by 2008 (U.S. BLS 2009, Table 2). The average female labor force participation rate in the 27 countries of the European Union (EU-27) was 51.4% in 1997 but increased to almost 65% by 2009 (although there was wide variation among these countries, ranging from a low of 41% in Malta to a high of 70% in Finland and the Netherlands) (Massarelli 2010, Table 2; Ramb 2008, Table 6). Growth in all indicators of travel and motorization paralleled the rise in women's paid employment, because women generally add commuter trips to household maintenance trips they are already making (Pisarski 2006; Rosenbloom 2006).

The second most significant sociodemographic transition occurred in household structures, particularly the growing number of households headed by women alone. Household surveys in 11 African countries between 1999 and 2007 found that the percentage of such households ranged from 7% to 32%, with an average of 20% (World Bank 2009b). Household structures are changing in the developed world as well. In 2009, roughly one-third of all U.S. households were headed by a woman alone, some by mothers of young children and others by older women (U.S. Census Bureau 2009). Around the world, female-headed families have the highest poverty rates of any household type; in 2008, more than half of all U.S. female-headed households with children under age six lived below the poverty level, as did roughly 20% of those headed by a woman alone who was over age 65 (World Bank 2009a; U.S. Census Bureau 2009, Table 3). The travel patterns of these households are often very different from those of two-parent households, as single parents struggle to jug-

gle employment and child-care responsibilities and older people struggle to maintain their lifestyles (Rosenbloom 2006; Rosenbloom and Herbel 2009).

The Global South: Women's Travel Patterns, Attitudes, and Preferences

Women's travel patterns in general are a response to, and a result of, the state of economic development in their region and country interacting with pervasive cultural and religious norms about women's appropriate behavior and access to transportation resources. Nowhere is that more obvious than in the Global South. The developing countries that make up the Global South fall generally into three categories classified by world development indicators: low income, low middle income, and upper middle income. These categories are useful in understanding travel patterns because they represent distinct clusters of societal trends that affect women's transportation needs and patterns (World Bank 2009a). In almost all these countries, the differences between women's and men's travel patterns are wider than in the industrial world and are greatest in the poorest countries (Blackden and Wodon 2006; Cao and Chai 2007; GTZ 2007). At the same time, transport patterns vary enormously across these countries and between rural and urban areas in the same country—far more so than in the industrial world.

Low-income countries are home to 20% of the world's population, or 1.3 billion people. There are 45 low-income countries, and in 2007 they had a per capita gross national income (GNI) of less than US$935. They include mostly smaller economies such as Cambodia, Haiti, Yemen, and 33 of the 47 countries of sub-Saharan Africa. Although data about women's travel in such countries (and particularly in urban areas) are limited (Kumar and Barrett 2007), we do know that women in rural areas engage in substantial daily travel just to conduct unpaid subsistence activities such as gathering water and fuel and tending crops. As a result, women often travel farther than men, almost entirely on foot, while carrying heavy loads that often include children born and unborn (GTZ 2007; Sieber 1998; World Bank 2007).

The lower-middle-income countries, of which there are 54, had a 2007 per capita GNI of between US$935 and US$3,705. Together they contain roughly 3.5 billion people, or 52% of the world's population. This category includes a diverse set of countries that includes half of the countries of Asia, half of the countries of Europe (such as the Ukraine and Armenia), most of the small countries of Central America, the land-locked countries of South America, most of the Middle East, and some African countries with mineral resources (such as Sudan and Congo). Most of these countries are still experiencing rapid urbanization, which is creating more opportunities for women to undertake activities for pay and making some informal and occasionally formal transport options available to them. Women often carry headloads to market, mostly without affordable or accessible bus service; even when buses exist, they are crowded on market day and unfriendly to women with large or smelly loads (Rao 2001). Moreover, women are usually accompanied by children and must pay fares for them as well.

The 42 upper-middle-income countries are the most affluent group of developing countries, with a 2007 per capita GNI of between US$3,705 and US$11,455. These countries house 823 million people, or 12% of the world's population. Because they are rapidly modernizing and fairly urbanized, women in these countries are more likely to be in the paid labor force. Because these economies provide a favorable environment for public investments in transportation infrastructure and services, women often have more transportation choices than in poorer economies while still having travel patterns that are substantially different from those of comparable men (World Bank 2009a).

Although these categories of countries are very different (as are individual countries within each category), they display some common and interrelated characteristics:

- Income disparities,
- Major differences in travel patterns,
- Cultural and religious norms about appropriate transport behavior, and
- Personal security and safety concerns.

One constant that cuts across all these characteristics is women's greater responsibility for household maintenance and child care, even when they work for pay outside their homes.

Income and Poverty

In the Global South, women are poorer than men, and the gaps are much greater than those in developed nations. Poverty is inextricably linked to women's mobility (Al-Hamad and Sera 2008; Salon and Gulyani 2010). First, low-income women, and particularly those in rural areas, are often limited to nonmotorized or informal modes. Yet most government policies give limited or no attention to providing, improving, maintaining, or regulating those modes (Leinbach 2000; Philpott 1994).

To make matters worse, people with better transport resources can make more money. Rao (2001) found that in Jharkhand, some of the market-based foraging for wood, traditionally a female responsibility, is being taken over by men who carry produce on bikes, a mode largely unavailable to women. This further lowers the income of the women, who can no longer compete

because they lack good transport options. Conversely, Fernando (1999) found that when women in the Indian Himalayas were given mules, they were able to use the time previously spent on foot in fuel collection for income-generating activities.

Second, income and residential location are significantly related. Poor people, and particularly women, are often forced to live on the periphery of urban areas, but the negative impacts of the distance between jobs and homes fall more heavily on women (Astrop 2000). For example, after the Indian government resettled central area squatters in Delhi to peripheral areas, unemployment rose 27% for women but only 5% for men. This was largely a result of males' greater access to faster transport modes; the time costs of the slower modes made continued employment very difficult for many women (Venter et al. 2007).

Third, even when improved transport options become available, cost is a key concern, as Ananya Roy (2010) noted in her keynote address. She described how, when poor women in Delhi were unable to pay railway fares, they banded together to refuse to pay. Even in relatively wealthy countries such as Argentina, women are often unable to afford public transit fares (World Bank 2004). In poorer countries, such as Indonesia, women are more likely than men to use a variety of informal transport solutions because they are cheaper, even though female travelers report being dissatisfied with such services (Joewono and Kubota 2008; Tarigan et al. 2010).

At the same time, because women working in urban areas often have both different kinds of jobs and much longer commutes than comparable men, they may be forced to spend more money on transport than comparable men. Women often work in the service sector—as domestics, for example—in far-flung locations not well served by mass modes of transport. To get and keep those jobs, they are forced to use informal modes such as motorcycle taxis and even car taxis, although they are more expensive (and often more uncomfortable and dangerous) than formal public transport options (Kamuhanda and Schmidt 2009).

Finally, because there is a strong relationship between income and social status, the less income a woman makes, the less she is in a position to bargain for access to better household modes of transport. This creates a vicious cycle: because lack of transport reduces her income potential, her social status remains too low to affect the division of transport resources in her own household (Astrop 2000).

Differences in Travel Patterns

Women and men in roughly comparable socioeconomic situations often have fairly different travel patterns, for a variety of reasons. First, in rural areas and in the least-developed economies, women combine personal transport and human portage, that is, the carrying of goods and produce to and from fields (Bryceson and Howe 1993). In rural Africa, women carry three times the load men carry (Venter et al. 2007). Hilton and Greaves (2008) found that women foragers in Pumé, Venezuela, traveled farther carrying heavier loads than comparable male foragers. Rao (2001) found that some women spent up to 10 hours per day traveling to collect water, fuel, and other forest produce and to do field work.

Second, in contrast to average patterns in the industrial world, women who work in urban areas often spend a longer time traveling, for three interrelated reasons: the nature of their jobs, their need to combine household and child-care duties with their commutes, and their use of slower modes. In the outskirts of Calcutta, poor women who travel into the city for work spend almost 12 hours per day out of the home, including 90 minutes walking and 60 minutes just waiting for informal modes to arrive or leave (Venter et al. 2007). In Tanzania, a typical woman spends 30 hours per week on transport (Fernando 1999). In Santiago, Chile, more than a quarter of women carry children and groceries for long, difficult bus trips lasting more than 2 hours in each direction (Ballas 2009, cited in GTZ 2007).

Third, women and men have different trip rates and purposes. As in the developed world, women in many (but not all) countries in the Global South take many more trips than comparable men. Anand and Tiwari (2006) concluded that women's greater domestic responsibilities, coupled with their lower access to household resources, significantly increased both the number of trips they made and the overall time spent in travel. Other researchers found that women make fewer work-related trips but more trips in total than men. Women's trips are more frequently off peak and are more spatially concentrated (Srinivasan 2008; Srinivasan and Rogers 2005). In contrast, a study in Shenzhen, China, found that men made more out-of-home trips daily than did women (Cao and Chai 2007).

Fourth, as previous discussions have suggested, women use different transport modes than men. In urban areas, women are more likely to walk or use public transit and less likely to have a car because ownership and use of vehicles is often a male prerogative (Venter et al. 2007). Srinivasan (2008) compared the mobility patterns of women and men in Chengdu, China, and Chennai, India. She found that women in both cities take more trips by foot and make a lower percentage of trips using any type of vehicle, including bikes, than comparable men. Women who live in places with better accessibility (i.e., shorter distances between home and various destinations, such that walking is possible) make more and longer trips than the average traveler.

Kamuhanda and Schmidt (2009) found that women are more likely to use informal modes of transport where those are cheaper. However, women are also more likely to use informal modes, even when they are not cheaper, when those options are the only effective way to get to domestic and service sector jobs. In rural areas or less-developed economies, women are less likely to use intermediate travel modes such as bicycles or animals.

Impact of Cultural and Religious Norms

Some of the differences between men's and women's travel patterns in the Global South can be explained by income disparities and differences in the spatial distribution of the industries and jobs in which women work. Not all differences between the sexes can be explained by socioeconomic and spatial factors, however, and these variables themselves, as well as women's travel patterns, are inextricably linked to societal norms and values about women's traveling outside the home at all and about their use of certain (usually superior) travel modes (Cunha 2006).

In several countries that are predominantly, but not exclusively, Muslim, law and custom restrict the ability of women to work or travel outside the home. As a result, women in these countries make fewer trips, trip-chain less, spend less time traveling, make fewer stops, and stay a shorter time at each stop than comparable men. Men predominantly travel by private vehicle, and women mostly walk. Few women use public transit. One study found that one in six Arab women never leave home on a given day, compared with only one in 30 men (Wafa et al. 2008).

In other countries, there are significant barriers to women adopting new technology or certain modes. Bryceson and Howe (1993) found that women were far less likely to adopt new technologies (e.g., handcarts or motorbikes) because they were significantly affected by cultural norms that held that the use of such modes was not proper behavior for women. In Uganda, very few women would use bicycles offered for free because they were fearful of being seen as being too liberated or acting like men. In a similar vein, a project in Sri Lanka that gave away bicycles had no impact on women's mobility because women could not or would not use them. As Fernando (1999, p. 74) notes, "Women's ability to benefit from interventions depends on the appropriateness of the alternatives introduced and on the method of their dissemination. It is vital to understand women's transport needs and the social, economic and cultural factors that facilitate or obstruct women's ability to acquire and/or use new technology." He found that a Tanzanian government program that gave women wheelbarrows was a failure because women believed that the vehicles were designed for men to use in construction (they were also difficult for one person with many children to load) (Fernando, 1999).

Leinbach (2000, p. 5) argues that international aid agencies are unwilling to challenge the cultural norms that keep women from adopting new technologies: "International agencies have been reluctant to challenge the 'cultural preferences of communities' even though these preferences give rise to gross inequities between the sexes."

Personal Security and Safety Concerns

Fear of crime, assault, robbery, or harassment constitutes a major mobility problem for women in the Global South (Buvinic et al. 1999). Seedat et al. (2006) found that in India and certain countries of South Asia, sexual harassment by a lone man or gangs of men—"Eve teasing," as described by Mitra-Sarkar and Partheeban at this conference—is common in public places (Mitra-Sarkar and Partheeban in press). This unwelcome behavior includes lascivious stares, suggestive and lewd remarks, and men's attempts to make physical contact. As a result, women report intense mistrust, fear, helplessness, humiliation, and a sense of being objectified; their mobility is compromised.

Anand and Tiwari (2006) found that women often were targets of sexual harassment while walking or riding public transit; this situation was exacerbated by inadequate lighting and small, lonely paths connecting where they lived to bus stops. Women reported that they preferred to travel with males or in groups, but "most have a resigned acceptance of these daily incidents of sexual harassment. The nature of the entire transportation system of the city is then not only insensitive to the needs of women, but also actively disables accessibility and induces poverty" (Anand and Tiwari 2006, p. 78).

Women in the Global South also have safety concerns (Tarigan et al. 2010). As pedestrians, they fear falling on poorly maintained roads or footpaths, or losing their loads, or being hit by motorized vehicles (Mockus 2001; Seedat et al. 2006). In addition, walking in urban areas is frequently seen as extremely stressful as well as physically tiring; women reported concerns about overcrowding, congestion, noise and air-pollution, and unhygienic conditions (spitting and littering). Anand and Tiwari (2006) contend that these problems arise from the lack of adequate pedestrian infrastructure on busy roads, nonexistent or badly designed pedestrian crossings, the poor location of bus stops and shelters, and high entry steps on buses. The failure of the public sector to address these issues contributes to a system that is "outright hostile" to women (Anand and Tiwari 2006, p. 78).

Developing Countries: Women's Travel Patterns, Attitudes, and Preferences

Although few women in industrial nations face anything like the deprivation of women in developing countries, there are strong parallels that can also be discussed in terms of the same characteristics:

- Income disparities,
- Major differences in travel patterns,
- Cultural and religious norms about appropriate transport behavior, and
- Personal security and safety concerns.

Because several papers given at the conference address both personal security and safety issues in industrial nations, that topic will not be raised here. As in the Global South, however, a factor that cuts across all of these characteristics is women's greater responsibility for household maintenance and child care, even if those duties play out differently than in less advantaged economies.

Income Disparities

Overall, women in developed nations make less money than men; households headed by women make substantially less than two-parent households or those headed by men. In 2007, U.S. women in all industries working full-time annually made 77 cents for every dollar made by men. The gender gap in earnings was generally worse in some industries than in others; for example, U.S. women working full time in the health diagnosis field made only 59 cents for every dollar made by men in that industry (U.S. Census Bureau 2008). In 2008, women in the EU-27 made 18% less per hour (gross) than men (Dupré 2010).

As in the Global South, lower incomes are associated with less access to better modes of transport, notably private cars. There is a large literature on the impact of access to a car on the ability of women, particularly low-skilled workers, to obtain or keep jobs. A number of studies have shown that ownership of or access to a car is related to better employment outcomes for women, including higher incomes, for a variety of reasons (Baum 2009; Cervero et al. 2002; Ong 1996 and 2002; Rogalsky 2009). Cressell and Uteng (2008) report that immigrant women in Norway said that access to good jobs was only possible for those who had a car. A study in the northeast of England (Dobbs 2005) concluded that access to private transport is a key factor in determining women's economic inclusion.

Lacking a car restricts the initial job search, and employers are known to discriminate against applicants without cars. Even in Europe, public transport can be inadequate or nonexistent in the locations where most jobs exist or may not match the employment schedules of many service jobs (Dobbs 2005; Cressell and Uteng 2008). It is also difficult to balance domestic and employment obligations using a mode other than the car (Blumenberg and Manville 2006; Crane 2007; Rosenbloom 2006).

Almost every study in the United States, Europe, and Australia has found that poor women do not have a job because they do not have a car, and not the other way around. Thus, as in the Global South, limited access to better transportation options creates a vicious cycle. Moreover, poor women face difficulties in using public transportation, even when it matches their needs. Poor people are less likely to be able to buy monthly transit passes and must pay daily transit fares at full price. Women also have to pay for their children as well.

Differences in Travel Patterns

Mode of Travel

Throughout the industrial world, women have become more reliant on the private car, as seen in both their increased licensing rates and actual driving experience. In the United States, more than 90% of all women had a driver's license in 2007, compared with half that proportion only three decades earlier. In 2006, for the first time in the nation's driving history, more of the licensed drivers on U.S. highways were women than men (FHWA 2010, Table DL-20: Licensed Drivers by Percentage and Sex in Each Age Group). Although the percentage of women with licenses is less in most other industrial countries, the pattern of growth has been the same. Overall, the gender gap in auto use between women and men is diminishing greatly in most industrial countries, although there are wide variations.

On the other hand, the gender gap is far from gone; moreover, having a license is not equivalent to driving. McGuckin et al.'s paper for this conference shows that when women and men ride together in a car, men are driving 80% of the time, regardless of the age of the travelers or the licensing status of the woman (McGuckin et al. in press). Rosenbloom (2006) found that women drivers were far less likely to be driving the car in which they were riding than were male drivers of any age.

In Norway, Hjorthol (2008) used a conservative measure of access to transportation resources, combining people with a full driver's license and continuous access to a car. Few changes in this joint measure of motorization were evident from 1992 to 2005. Roughly 57% of women and 80% of men said that they have both a license and continuous access to a car; however, because licensing rates did go up substantially for Norwegian women during this 13-year period, the data actually

show that licensed women have relatively less access to a car than in the past, even though they were more likely to be licensed.

Most research also shows that in developed countries, while women are increasingly licensed to drive and are more dependent on the private car than ever before, a gender gap in mode choice still remains (Rosenbloom 2006). Naess (2008) found that salaried women in Copenhagen were less likely to use the car and more likely to cycle or walk to work than men, regardless of where they worked. In Tel Aviv, although driving is the dominant commuting mode, more men drive to work than women (54% versus 33%, respectively) (Prashker et al. 2008).

Given this paper's early focus on the bicycle, it is interesting to briefly examine its use by women today. Bicycle use among women is far higher in Europe than in the United States, where, as Catherine Emond's paper for this conference indicates, there are structural and environmental barriers to women cycling (Emond, in press). Cycling rates among both women and men have traditionally been the highest in the Netherlands, in part because of cultural norms and structural support for the mode (Pucher and Buehler 2007). As the Dutch paper for this conference indicates, however, cycling use has dropped by 10 percentage points among women in just the past few years, probably because of the difficulty of combining child care and domestic obligations with employment (Kalter et al. in press). Swedish research shows that cultural values still have a lot to do with the adoption of bicycles; among immigrants to Sweden, few men but more than one-third of women reported not knowing how to use a bicycle or feeling unsafe doing so (Lewin et al. 2006).

Commute Trip Length

Almost all research shows that in countries ranging from the United States to the United Kingdom and from Sweden, Norway, and Denmark to Italy, women commute shorter distances than men, even when other sociodemographic variables, such as income, are controlled for (Cristaldi 2005; Susilo and Kitamura 2008). Several researchers have concluded this gap might be closing, however, as women commute more often by car than men (see Crane 2007 for a review of this literature). Weinberger (2007) concludes that as women gain better-paid jobs that formerly were available only to men, work trip lengths may converge.

Several researchers have found wide differences by race and ethnicity, sometimes obscured by aggregate numbers. For example, single mothers and women of color sometimes have much longer home-to-work trips in the United States than do white women and their male counterparts (see Rosenbloom 2006 for a summary of this research). Some researchers have concluded that almost all gender differences in U.S. commute times disappear when race, sex, age, and mode are controlled for (Doyle and Taylor 2000; Taylor and Mauch 2000; Blumenberg and Ong 2001).

Crane (2007) directly addressed the contention that averages were hiding convergence among white non-Hispanic women and men. Crane found statistically significant gender differences in commute distance for all racial and ethnic groups, including whites, in both 1985 and 2004, but only for auto users. He ultimately concludes that even when race and ethnicity are controlled for, gender remains a significant independent influence on commute behavior:

> Put another way, those data indicate that the gender gap extends across differences in income, marital status, age, housing tenure, parenthood, and location within metropolitan area, and perhaps across occupations as well. . . . The gap appears rather pervasive through two decades, rather than being limited to White women, women with children, or to earlier years only. (Crane 2007, p. 309)

Cristaldi (2005) reported that, consistent with the international literature, Italian women do have shorter commutes. She noted, however, that average numbers hide wide variations in commute distances; however, although women's commutes varied with several sociodemographic variables, men's did not. She concluded that (*a*) the relationships between socioeconomic characteristics and commuting are substantially different for women and men, (*b*) these relationships are in turn related to the economic structure and geographic context of different regional labor markets, and (*c*) analysts must be sensitive to context when interpreting gender differences in commuting.

An interesting issue not directly addressed by many researchers is why substantial gender differences in mode choice and commute length exist between different ethnic and racial groups. Given that so-called minorities are becoming a larger portion of the population of many developed countries and will soon make up a majority of the U.S. population, the substantial gender differences in travel patterns among such groups raise major policy and planning questions that should not be lost.

Complicated Trip Patterns

A wide body of research suggests that women have far more complicated travel patterns than comparable men and that these patterns reflect their need to balance household responsibilities with employment, spatial

variations in the industries in which women are overrepresented, spatial entrapment in highly localized labor markets, lower access to cars even if they are licensed to drive, and the temporal and spatial parameters of social institutions (e.g., opening and closing hours) (Hjorthol 2008; Lyons and Chatterjee 2008; MacDonald 1999; Pazy et al. 1996; Prashker et al. 2008; Sandow 2008; see Dargay and Hanly 2007 for a contrasting view).

Hjorthol (2008) examined changes over 20 years in the travel patterns of Norwegian women and men and concluded that women's continued shorter commutes could be explained in terms of persistent gender roles. She concluded that marital status and the number or age of children had an impact on women's commuting but not on that of men. Married women with the most children had the shortest commutes of all commuters. Men's commutes were not affected by the number and age of their children (see also Hanson and Pratt 1995). Sandow (2008) found similar patterns; he concluded that living with a spouse and the presence of school-aged children decreased women's propensity to commute farther. Men's commutes were affected only if they had children not yet in school.

Naess (2008) found that Danish women choose what he terms "local employment," while men choose jobs from the entire metropolitan region; he attributes these choices to women's lack of access to a car and the pressure of family responsibilities. Yet even in two-car households in Copenhagen, he found substantial commute differences between women and men. The average commuting distance of men in two-car households in the suburbs was double that of men in one-car households. Women's commutes did not increase significantly with an additional household car. Naess concluded that having two cars lets men commute longer because they don't have to negotiate with their wives over the use of the car; women in such households use the additional car to save time on the work trips that they were already making.

In addition to having shorter commutes, women also more often link other trips to their work commutes, for example, to drop off or pick up children at school, daycare, or recreational activities or to conduct household duties such as shopping (Donaghy et al. 2004; McGuckin and Nakamoto 2005; McGuckin et al. 2005). Lyons and Chatterjee (2008) found that in the United Kingdom, men have substantially longer commutes than women because women's domestic responsibilities have to be organized around commuting. Women were almost twice as likely to trip-chain for shopping, chauffeuring, or social activities.

Rosenbloom's (2006) analysis of women's and men's 2001 trip patterns in the United States found that in all life cycles, women made more shopping trips and more chauffeuring ("serve passenger") trips than comparable men. Salaried married women with children made twice as many serve passenger trips as comparable men. If the data are adjusted to remove "returning home" as a trip purpose, married women in the paid labor force with children under age 15 made one of five trips to take someone somewhere they themselves did not need to be.

Hjorthol (2008) also found that the incidence of Norwegian children being chauffeured to some activity increased by 60% during the 1990s, with mothers far more likely to be the escort than fathers. Schwanen (2007) observed similar patterns in the Netherlands: the more hours the father worked, the more likely the mother was to chauffeur children; however, the mother's work hours were negatively correlated with the father chauffeuring children! Schwanen concluded that women with more responsible jobs had a greater ability to alter their schedules to provide transportation for their children. He also found that organizing the chauffeuring duties was considered the mother's responsibility, even if she was not conducting the trip.

Cultural Norms and Values

In most industrial countries, women's travel patterns differ, sometimes significantly, from men's overall and often from those of men in similar situations. This dichotomy begins early; a substantial literature suggests that young girls report being more fearful when walking about their neighborhoods. This may be the cause or the result of the fact that parents treat the mobility needs of daughters and sons differently, with sons often permitted to travel farther from home at much younger ages than are daughters. In contrast, parents chauffeur girls far more than boys or prevent them from leaving home at all for social and recreational activities when it is not possible to accompany or chauffeur them (McMillan et al. 2006; Yeung et al. 2008).

Norms about children's travel are also highly correlated with norms about parental roles. Hjorthol (2008) found that as more Norwegian women entered the labor force, housekeeping roles and standards changed; households relaxed their cleanliness standards and purchased more prepared foods. Men increased the amount of housework they did by a total of 15 minutes per day over the past 30 years (an average annual increase of 30 seconds). What was true of housekeeping was not true of parenting standards, however. She found that

> The norms related to parenting or mothering have changed little, when time use is the measurement. The focus on children in Norwegian society is significant. Giving children "quality time," engagement in their leisure activities and providing the best opportunities are examples [of the duties of mothers, employed or not]. (Hjorthol 2008, p. 198)

She concluded that in 2005, as in 1992,

> Women to a greater extent than men still have the main responsibility for the "management" of the household, a fact that is amply demonstrated by both time use studies and the elucidation of women's reasons for daily travel and mobility. As long as the distribution of tasks between genders within a household is maintained, the differences will also be reflected in travel patterns. (Hjorthol 2008, p. 205)

Schwanen's (2007) qualitative research showed that mothers continually challenged themselves about their parenting duties, whereas fathers clearly did not. He felt these differences reflected "complex moral rationalities about parenting that simultaneously challenge and reproduce traditional patriarchal relations" (Schwanen 2007, p. 456).

Investigating Women's Travel and Translating It into Policies and Programs

The knowledge base on women's travel has had, and continues to have, little impact on decision making in both industrial nations and the Global South. This situation is largely the result of the ways in which research is conducted and of the kinds of information on household travel that are gathered. In particular, the transportation models on which many infrastructure decisions are based operate with very limited and simplified data on people's travel patterns; moreover, they favor quantitative over qualitative data, even when the former are not useful in answering a variety of policy questions (Rosenbloom 2006; TRB 2007).

Most of what we know about women's and men's travel patterns comes from household surveys used to support travel demand modeling; travel demand modeling in turn is designed primarily to address the congestion created by commuting travel. Thus, a substantial amount of research on women's travel focuses on commuting (Crane 2007; Schwanen 2007). In many ways, this limited focus and the quantitative nature of the data collected either miss or mischaracterize important travel differences by gender (Schwanen 2007).

Many developing nations use the same approach to planning infrastructure projects as the developed economies use. They collect a limited amount of travel data (often at great expense) and use the information to determine where to build major infrastructure. These efforts assume no important differences between women's and men's travel needs or patterns, or none that are not easily explained by income or employment, as opposed to cultural and religious norms and values. Both by design and through the ways in which those data are used, these efforts focus largely on building major roadways or formal transit systems, ignoring the crucial role of walking and informal nonmotorized and motorized modes in women's travel patterns (Riverson and Carapetis 1991; Turner et al. 1996). Thus, these processes inherently neglect women's needs in the Global South, and arguably in the developed world.

Although some analysts believe that quantitative data are more "objective" than other forms of information, what can be quantified is not always the best information on people's attitudes, needs, and preferences (Rosenbloom 2006). For example, quantitative data yield little insight into the role of personal security and safety concerns in travel choices. Stern and Richardson (2005) assert that this is because most models do not have a "cognitive explanatory mechanism" of individual choice processes, which often vary by gender. In addition, measuring behavior often fails to address the extent to which observed patterns reflect what people want to do as opposed to what they are able to do given the constraints they face (Hanson 2010). Law (1999) suggests that to address that question, researchers must consider gender differences in access to resources, personal identity, cultural systems of meaning, and power relationships.

For example, in the Global South, the public sector often fails to provide or repair footpaths so that women pedestrians can more easily carry produce or firewood or use wheeled vehicles, such as carts or hand trucks, to transport their own children and/or agricultural and other products (Rao 2001; Sieber 1998). As Loukatou-Sideris (2010) shows, many aspects of neighborhoods in the United States create barriers and impediments to women pedestrians and cyclists.

There are important commonalities in the planning problems experienced both in the Global South and in developed countries. Bryceson and Howe (1993) suggest that most data are not disaggregated enough to understand women's travel patterns and constraints in the Global South. Fouracre et al. (2006) note that the models underlying these efforts assume travelers make decisions based on economic trade-offs between time and money; this may not even be true in the industrial world and can be easily challenged in the Global South (Kamuhanda and Schmidt 2009). Substantial research suggests that in the developing nations, many households are relatively unresponsive to price and are especially unconcerned with the time or money costs incurred by female members of the household. These criticisms parallel those made about current transportation planning methods in the United States (TRB 2007).

For example, in both the Global South and the developed world, formal data collection and modeling approaches fail to identify cultural and personal issues that have significant impact on travel needs. In the Global South they ignore how well new transport tech-

nologies are accepted or the cultural barriers to women traveling at certain times, by certain modes, or to certain places (Rwebangira 2001; Seedat et al. 2006; Srinivasan 2008; Turner and Kwakye 1996; Weinert et al. 2007). Although the cultural constraints on women in industrial nations are far less severe (and obvious) than in the Global South, traditional transportation planning approaches ignore differential norms by sex about parenting (and elder care) that have a significant impact on women's travel. Women's greater anxiety in traveling and fear for their personal security are relatively ignored in both sectors of the world.

Summary and Conclusions

Four major societal trends have profound transportation implications for women and men, and their families, around the world: globalization, urbanization, motorization, and sociodemographic transitions. Each creates new opportunities for economic growth and development in many countries while simultaneously throwing up barriers to women's mobility.

Examining women's travel patterns in the industrialized world and the Global South reveals two versions of the same story in countries around the world. Women, regardless of the level of economic development in their community or nation, have less access to better or faster transportation resources, display different and more complicated travel patterns, and are more influenced by fear of attack or harassment than are comparable men. These gender differences are a complex response to differential economic resources and societal norms about the use of transport modes as well as to household and child-care constraints, which themselves are embedded in a web of cultural attitudes and societal norms. Gender differences are starkest in the developing world because women's opportunities for paid employment are less and their social status is so much lower than that of comparable men; however, the parallels are many and strong.

Overall, "mainstream" research, data collection efforts, and the planning decisions based on them in both developing and developed nations

- Do not recognize or measure many gender differences in travel patterns and needs;
- Do not fully engage the question of why there are gender differences in travel, particularly those that are not captured by or explained by traditional socioeconomic variables (alone or all); and
- Rarely question why traditional socioeconomic variables that are linked to gender differences in travel behavior—such as lower income or the lack of a driver's license or access to motorized options—are so intensely gendered in the first place.

Critically, women's issues have little traction in transportation policy making, which creates a cascade of missed opportunities. Women in developing countries are often shut out economically or culturally from the technological improvements in transportation that are available to men. Most governmental responses in the Global South favor mobility over accessibility—that is, the provision of major roads from one urban area to another, rail transit systems in urban areas, and bus-based public transit outside those areas while often ignoring the need to improve pedestrian facilities, paths, and all-weather roads in informal urban settlements or rural areas and to increase the accessibility so needed by women. Overall, many transportation improvements in developing nations not only fail to meet women's transport needs adequately, but they often contribute to widening the gender gap in quality of life.

The same shortcomings are found in planning efforts in the developed world. Transportation and related housing and land use policies have long favored mobility over accessibility and motorized modes over human-powered ones. Few workers can walk or cycle to work in most cities. Public transit services tend to serve major employment sites and provide poor access to the far-flung suburban jobs to which women more often travel; public transit options are often unavailable late at night or early in the morning when needed by many women service workers. When available, transit may not address women's personal security issues. Inadequate transit access and the need to balance household responsibilities with employment create the need for even low-income women to invest a large share of their income in owning and operating a car in North America and, increasingly, around the developed world.

How can we address these deficiencies and write a different ending to the story of women's travel patterns in both the developed and developing world? At the policy level, we can require public projects to conduct gender-specific analyses of the costs and benefits of public expenditures and policies. We can also continue to encourage more women to enter the transportation planning and research fields, in part by promoting gender equity in employment, but also by making women aware of the important human dimensions of transportation. At the project level, we can require the inclusion of gender indicators in transport project design, a gender-based disaggregated beneficiary assessment, and follow-up monitoring.

We can challenge the resistance among researchers to evaluating travel patterns by gender and their reluctance to develop mixed methods of assessing the impact of the unequal distribution of resources and power that create those disparities. We can do this by telling the story clearly, thereby also helping women in the developing world. For it is hard to hear the story of women's almost insurmountable transportation barriers in the Global

South without being uncomfortably aware of the many parallels in the developed world.

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Her Money or Her Time
A Gendered View of Contemporary Transport Policy

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This paper reports on recent research and trends for women's transportation policy and planning in the United States. From among the wide range of factors that influence outcomes for women in cities, the authors focus on two key areas of major contemporary change in transportation policy: public transit and transportation finance. Both areas have responded to a wide range of policy goals, including energy, health, the environment, and climate change. In so doing, policy and planning have converged on one major goal: reducing vehicle miles traveled (VMT). However socially laudable in other dimensions VMT reduction may be, policy and planning based on this goal have gone forward largely without addressing or allowing for the related equity consequences that derive from social norms and institutions that contribute to gender inequality, including wage discrimination, gender segregation of labor markets, and household roles and labor divisions. A review of the scant literature on women's time poverty finds that anything that increases the time costs or uncertainties of auto travel is likely to disproportionately affect women and that public transit provision has not in the short term provided an effective substitute.

At times, women—particularly single mothers—seem to be more discussed than served by contemporary transportation policy and planning. For instance, *LA Times* editorialist Tim Rutten used a single mom to illustrate what he sees as the fundamental problem with high-occupancy toll (HOT) lanes: the affluent can easily afford them while single mothers cannot. Rutten envisions a senior partner (to whom he assigns the male pronoun) who would, without a second thought, hop into the HOT lane so that he can catch a few extra holes of golf. By contrast, Rutten has us imagine an impoverished single mother, employed at the same firm as the partner, sitting in the endless LA congestion worrying that she will not make her rent if she pays for the HOT lane to go get her sick preschooler.

HOT lane advocates countered in the online comments and letters to the editor that the partner is more likely to have a spouse he can turn to for help with child-related work, and he can also afford to purchase additional child care, landscaping, food delivery, housekeeping, and laundry service to make up for time lost while he is stranded in traffic. This same single mother, if she is really trading rent money against tolls, is hardly in the position of texting her nanny to go handle the sick child. Keeping the mom and the partner stuck in traffic together and thereby denying him his golf game may serve one's sense of class envy, but it offers little if any practical help for the single mom and probably delays her even more than if the partner were just to take the HOT lane and go golf.

The single mother is a potent symbol in transport policy because she is likely to be both time-poor and money-poor, whipsawed between earning a living and caring for her family (Albelda et al. 2004). Although all parents contend with these two priorities, single mothers face the problem more acutely, often as single earners without access to male wages and or additional adults to help with unpaid household service work, such as caring for children (Schmidt and Sevak 2003; Sigle-Rushton and Waldfogel 2007). Because

of the tension between time caring and time earning, anything that increases the monetary cost of mobility is likely to affect single mothers disproportionately, as is anything that increases the time it takes to get around. While single mothers have become ubiquitous symbols of social inequality on the roads, few if any real changes have occurred within either policy or planning to grapple specifically with the demands of women's mobility (Wekerle 2005). Women's challenges and differences have been widely described but seldom addressed.

Even as transport planning and policy have yet to catch up with the social reality of women's lives, they are responding readily to other social policy and planning agendas, such as urban growth management, air quality, obesity, climate change, and energy (Beatley 2000; Cervero 2000; Duany and Talen 2002; Frank and Engelke 2005). The consensus from multiple policy domains is that Americans, and the planet, would be a lot better off if they drove less and instead used alternative modes like walking and public transit. Reducing vehicle miles traveled (VMT) has become a fundamental objective for transport policy. To achieve this, researchers and advocates from a wide variety of perspectives argue for strategies that raise both the time and out-of-pocket costs of driving—the very same costs likely to affect women disproportionately.

This paper examines what the emphasis on VMT reduction means for women's transport, particularly in the short term. We focus on two major dimensions of transport policy—user fees and public transit—as these drive a significant portion of current U.S. policy debates. User fees are widely regarded as the "stick" part of changing travel behavior, a means of generating revenue for the "carrots" of transit and urban amenities around transit stations, which are anticipated in the long run to restructure metropolitan form and mobility. We begin our discussion with the larger context of women's lives. Social norms and institutions define gender roles that are played out at home and in the workplace and that in turn result in gendered differences in time value and travel preferences. We then discuss our policy examples. We show that in both cases, little attention has been paid to the travel needs of women. Neither policy is informed by women's value of time and money or by the travel patterns of women. Transport policies and plans that fail to accommodate difference—and here we must include race, class, gender, and physicality—reinforce other social structures of disadvantage and exclusion (Blumenberg 2004; Brown 1998; Hutchinson 2005; MacDonald 1998; Rosenbloom and Altshuler 1979; Schweitzer and Valenzuela Jr. 2004). The role of transport in the pursuit of social equality may be partial, but it is significant.

One caveat is in order. Our general discussion of trends may fail to convey that women and their mobility are heterogeneous, diverse, and context dependent. While the single mother may be a useful representative consumer to envision for transport services, single mothers vary in their private resources as well; some live and work ensconced within deep family and community networks that provide both monetary help and household services, while other single parents need more from public support (Wheelock et al. 2003). In turn, just because a woman might be married does not mean she shares adequately in household resources to make mobility affordable, nor does it mean that she has the help or resources she needs to cope with work and home roles (Iversen 2003). Additionally, most of a woman's adult life is spent without child-care responsibilities, even if she has children. As important as it is to recognize these differences among women, it is similarly important to note places where their needs intersect to form a cohesive policy agenda for transportation, as we seek to do here.

Gendered Time: Working and Caring

It is widely accepted that travel demand is derived from the demand for daily activities. Over the past three decades, women have greatly increased their participation in the paid labor force. In 2007, women accounted for 46% of the active labor force. Of women with children under the age of six in 1960, only 19% worked outside of the home, but by the early 2000s, that number had grown to 64% (Noonan 2001; U.S. Census Bureau 2009a). The overall amount of unpaid work has decreased somewhat in response to higher levels of workforce participation, and male partners have increased their share of household labor; however, neither of these effects has necessarily led to gender parity in household labor; women still report roughly twice the amount of time spent on housework, child care, and elder care (Coltrane 2001). The result has been time compression, along with wage and opportunity penalties at work (Noonan 2001).

Paid and Nonpaid Work

Scholars have proposed different explanations for the increased participation of women in the workforce. The standard economics perspective is that increased labor market choices for women resulted from economic restructuring, higher educational attainment, and greater control over child bearing. Outside of privileged income classes, women's increased labor force participation may actually be more related to the necessity of dual incomes resulting from the decline in U.S. real family income for lower-income households since the early 1970s (Albelda et al. 2004). Reduced real income is in turn reflected in changes in the types of work available to U.S. workers (both men and women), who since 1980 have faced a

reduction in manufacturing employment as well as a bifurcation of service work into high-paying, white-collar jobs and much lower-paying "pink"-collar jobs and low-skill service work. The latter are likely to have much lower wages and access to employment benefits at the same time that the U.S. federal government reduced social services and income support for education, welfare, and health. The result has been a systematic drawback in the provision of support for and supply of caring work done both in the United States and throughout the world (Hondagneu-Sotelo 2001; United Nations Development Program 1999).

However, the demands of unpaid caring work have not gone away. Caring work includes tending children, the elderly, or those in ill health; household maintenance; and volunteer work at churches and schools, among other tasks. Less access to health and welfare, along with reduced school budgets, adds to the demands for unpaid caring work. The result has been a trifecta that drives women's monetary and time impoverishment:

1. Increased hours of work for women, both paid and nonpaid. As women have increased their hours of paid labor, they have not had a corresponding reduction in their nonpaid work—the famous "second shift"—that has diminished little in practice even as awareness of it grows.
2. Higher amounts of nonpaid work for men, only not at the same rate. As men have increased their share of unpaid work—and they have done so substantially—they do so at a rate lower than that at which women have undertaken paid work (MacDonald et al. 2005).
3. Wage discrimination, and thus a lower cost of substitution between paid and nonpaid work for women. The allocation between paid work and unpaid work by gender tends to keep women's wages and work status—that is, entry into management and control positions—lower, which in turn prompts households pressed for both time and money to allocate more of the lower wage earner's time to nonpaid work, thereby creating and reinforcing a cycle in which women have more unpaid work. This can affect their ability to reach wage and rank parity with their male counterparts (Noonan 2001).

What does the labor market have do with women's mobility, and in particular, how much they will be affected by changes in transport policies? Each of these effects in the labor market translates into myriad differences in policy impact by gender—for a wide variety of services, including travel time saving and service quality—even within similar income ranges and within gender by income. Each factor affects whether women can afford tolls, certainly, but these factors also influence the degree to which a woman can substitute her time for her money (e.g., use transit), or her money for other types of services designed to save time.

Lower wages and more paid and unpaid work also determine whether a woman, when faced with higher time or monetary costs of travel, has the capability of negotiating higher wages or more flexible work hours in response to higher mobility costs or has to use her existing resources to cope with the costs. Research on working patterns suggests that women are less likely to be in jobs that allow for flexible work hours, but are more likely to work part time, in part as a result of caring work responsibilities (Rosenbloom 2006). These issues affect the elasticity of travel demand for women, which in turn affects how much women will be expected to benefit and lose from strategies such as VMT fees, congestion charges, or a new rail line. The extant research, though scant, offers many reasons to suspect that men and women have very different methods of time–money substitution.

Gender and Time Pressures

Gender is associated not just with higher total hours of work, both paid and unpaid, but also with the stressors associated with that work. So while the work–family bind is itself something that can drive demand for higher-quality transport services like time-saving HOT lanes, the time sensitivity and stress of uncertainty surrounding child-related travel can also contribute to the premium women are willing to pay to make sure they arrive on time.

For example, a recent Canadian study examined the force of these differences on women's workload and the time-sensitivity associated with that work (MacDonald et al. 2005). In its sample, the study found sizable differences in the amount of time spent in three different types of nonpaid caring work: child care, elder care, and housekeeping. According to the sample means among working-age respondents, men reported doing, on average, a little over 9 hours per week of housekeeping tasks, while women reported doing twice that amount, 18 hours. Women do about 30 hours per week of child-minding, while men do about 12. Finally, women and men report doing similar, very small amounts of helping out elders, ranging from about 2 hours per week for women to a little over 1 hour per week for men. In sum, women worked 75-hour weeks of paid and unpaid work, while men worked 65-hour weeks, on average.

Of these tasks, respondents ranked each in terms of the time spent and the amount of gratification received. Unsurprisingly, housework was the least gratifying, and child care was the most. Not all tasks related to child care were equally as gratifying, and not all were considered equally stressful or time-sensitive. Women reported being more likely to be responsible for time-sensitive, rigidly timed, or stressful household and child care tasks, such as food preparation at mealtimes and homework; in contrast, male respondents reported a heavier distribution of household

and child care tasks that could be more flexibly scheduled, such as lawn care, auto maintenance, and playing games or sports with children. This was true even for households without children. Gendered roles associated with nonpaid work appear to carry on from gendered work specializations constructed prior to women's widespread movement into the workforce, when women's nonpaid work time was less influenced by paid work structures. This has been found in other research as well (Field and Bramwell 1998; Hanson and Pratt 1995; Marshall 1993).

Given these differences, single mothers have to contend with the compression of real incomes that have prompted families to move into dual-earning arrangements; only they do so often without the support of male wages. They also may do so without the additional help—however evenly or unevenly distributed—of an additional adult to provide nonpaid household services, some of which, like landscaping or home repair, are expensive to purchase.

We conclude from this literature that women work more hours overall and are more likely to engage in caring tasks that are time sensitive. Women therefore may face the challenge of highly complex daily activities under a variety of binding time constraints. Speed and reliability become critical when schedules are tight and the cost of being late is substantial, as, for example, when one must stop at the cleaners before closing time on the way home from work.

New Finance Schemes and Women's Travel

Numerous factors have coalesced over the past few decades so that transportation finance is now at a transition point. First, federal policy makers have recognized the transportation finance problem. A national commission conducted 2 years of study and hearings and concluded that funding for surface transportation infrastructure was in crisis. The commission estimated that although between $133 and $188 billion in annual expenditures would be required through 2035 just to maintain the current highway system in acceptable condition, current sources—including federal, state and local—would generate only $68 billion annually. The report also stated that maintaining current levels of capital investment in transit (about $8 billion) would result in flat or declining mode share. To increase transit mode share, annual investment would need to be at least $13 billion per year (National Surface Transportation Policy and Revenue Study Commission 2007).

Second, high-profile infrastructure failures, such as the collapse of the I-35W bridge in Minneapolis, Minnesota, have brought infrastructure back into the public dialogue, lending credence to the warning of transportation professionals that the system is deteriorating at an alarming rate. These failures have also raised public recognition that our current source of funding—predominantly the gas tax—is inadequate to cover the demands for new systems while maintaining existing roadways (Brown 2001; Wachs 2003). Most recently, shortfalls in the Highway Trust Fund in 2009 demonstrated the reality of contemporary funding problems.

Academics and policy observers have argued for decades that transportation funding should be based on user fees and that externalities generated by transport should be reduced by pricing. Thus, new facilities should be financed from tolls, and congestion should be managed via pricing. Increasing user fees has proved politically unpopular, however, and states and localities have subsequently turned to local option sales taxes to meet their funding needs (Goldman et al. 2001).

Global climate change is the third factor influencing transportation finance. Facing the risk of potentially devastating impacts from climate change, user fees such as the gas tax or mileage-based fees are seen as an effective way of reducing greenhouse gas (GHG) emissions by reducing VMT and providing revenue for alternative modes (e.g., Sperling and Gordon 2009). With the support of several environmental advocacy groups, highway user fees as a way of reducing VMT are becoming a more visible part of the transportation funding discussion. The question comes down to whether reducing VMT will reduce mobility overall—and if so, for whom—or whether transit and land use strategies can make up the difference.

User Charges, Tolls, and Women's Time

Pricing is in principle the most efficient means for managing transport externalities like congestion or GHG emissions because taxes target the source of the externality. Pricing allows consumers to make choices (for example, to pay the fee or change route or mode) and generates revenues that can either be used to improve the system or to offset regressive impacts of the fees. User charges and pollution taxes are also, however, generally regressive; that is, they require a larger percentage of sacrifice in income from lower-income households than from the more affluent (Dill et al. 1999). Although there are numerous possible ways to redistribute revenues to offset, on average, the incidences of the charges, such redistribution schemes cannot fully compensate all individuals.[1]

[1] Researchers and practitioners have suggested numerous means for easing these monetary burdens, such as lowering other taxes, graduating payments by income, investing in public transit and other services for lower-income group, and offering credits (Bento et al. 2005; Kalmanje and Kockelman 2004). We regret the lack of sufficient time to discuss these issues here, as they are crucial to the social equity of transportation finance, and each portends consequences by gender.

In a recent review of more than 70 studies on the incidence of gas taxes, congestion tolls, emissions fees, VMT fees, and carbon taxes, Schweitzer found that only a handful of these studies in any way accounted for potential differences within income classes by gender or by race (L. Schweitzer, "An Overview of Existing and Emerging Transportation Finance Instruments and Their Effect on Low-Income Groups," unpublished work). Few studies go so far as to calculate the income elasticity of mobility price changes—the extent to which income affects an individual's response to price changes. Most equity studies of new transport finance measures do not even consider the idea that women might have a different, potentially less elastic demand for mobility—that is, women may be less able to change the amount or timing of travel in response to price changes than men of similar income categories. In a review of more than 100 transit demand studies, Paulley et al. (2006) mention gender only in passing and ethnicity not at all. These authors cite an earlier study by Mackett (1990) that women's demand for public transit is less elastic than men's, but they attribute this difference entirely to differences in affluence and vehicle access.

This omission of gender from studies of tax and user charge incidence is particularly difficult to understand given the overwhelming evidence from the travel behavior research of significant and persistent differences among women and among women of color in their travel demand. Although those who study equity in finance may attribute these differences to income, the evidence on the distribution of both paid and unpaid work between men and women discussed above suggests that these differences in demand for all types of mobility—transit, cars, and walking—may be related to income, but there are other labor market differences at play that affect travel demand and demand for other goods.

The new research on HOT lanes indicates that income is a determinant: commuters with higher incomes are more likely to use the lanes, thereby in some respects verifying the popular moniker of "Lexus Lanes" among opponents (Brownstone et al. 2003; Brownstone and Small 2005; Mastako et al. 1998; Parkany 1999). Yet, the same research also shows gender effects in addition to income effects (Brownstone et al. 2003; Li 2001). Although female-headed households are more likely to have lower incomes than dual or male-headed households, women of all income levels are far more likely to use a HOT lane, even if higher-income women are more likely to do so than low-income women. The results suggest that women highly value both travel time-savings and reliability.

Two studies are particularly significant here, though they are seldom considered as holding the answer to whether it is "fair" to women to charge congestion tolls or roadway user charges, given women's lower incomes. The first study, by Lam and Small (2001), examined data from California SR-91 to measure the value of time and the value of reliability (VOR), which in this case was the sample's revealed willingness to pay for decreasing variation in travel time. For value of time, their best-fitting model yielded $22.87 per hour, which was 72% of the average wage rate in the sample. Women's VOR was twice that of men's ($31.91 for women, $15.12 for men), and it was 101% of the prevailing wage rate. Their explanation for this difference was women's differential responsibility for child care.

The study is significant, and not just because it empirically begins to quantify the much discussed but seldom-studied phenomenon of the supermom stretched to her limits. The magnitude of the VOR difference suggests that that mobility and reliability are more high-stakes goods for women than men. This is not just a question of uneven work distribution. It also indicates that time-sensitivity and the potential stress of work are unevenly distributed (Floro 1995).

Purchasing Services: Defensive Measures Against Time Loss

Not only is there some evidence that women value travel time and reliability more highly than men, but there also is evidence that women are more likely to spend money to avoid the consequences of time and reliability problems. A second set of studies centers on the willingness and ability to change travel strategies, such as by telecommuting or using time-enhancing services and technology such as home computers (Cao and Mokhtarian 2005; Clay and Mokhtarian 2004; Mokhtarian and Raney 1997; Salomon and Mokhtarian 1997). This body of research examines behavioral response to congestion and travel choices, including the purchase of what economists call "defensive expenditures"—goods or services that individuals purchase to contend with unsatisfactory conditions like congestion or air pollution.

Mokhtarian and Raney (1997) use data from a survey administered to more than 600 city workers in the City of San Diego, California. The survey presented respondents with a choice set of 23 different mechanisms for adapting to traffic congestion. These responses ranged from the comparatively inexpensive, such as altering departure times, to the very expensive, such as changing residential location. These authors find, again, that income matters. Higher incomes enable individuals to purchase more effective and costly means to contend with congestion. Their most consistent finding, however, concerns gender. At almost every cost level, women were more likely than men to adopt measures to deal with congestion, including changing their departure times from work or negotiating for different work hours—all of which can

cost women in terms of earnings or prestige at work. In addition to gender, family structure influenced the adoption of congestion mitigation strategies, with the results mirroring the findings from labor economics in terms of household time allocations. The bottom line: the costs of dealing with congestion are not evenly distributed between genders.

Though the research from HOT lane usage and congestion mitigation is very new, it should prompt us to ask much more of policy analysis than whether a congestion toll or gas tax increase will "price poor drivers off the road." The questions here are just not that simple, not when we recognize gender difference. In the example of the debate over HOT lanes in Los Angeles, California, transportation equity research has not paid sufficient attention to measuring differences between men and women and how they use and value their time to be able to say whether Rutten is right or wrong. Should we, as Rutten suggests, be ashamed of asking a single mother to pay for timesaving when she also has rent to pay? Or are the commentators right? Should Rutten be ashamed for not recognizing what congestion delays and uncertain travel times do to this single mother's scarce time and frayed nerves? The answer is not clear because the financial research has not incorporated the findings regarding gender differences in travel behavior and the research on women's time allocation has yet to inform public policy in any meaningful way.

Sales Taxes

If gender is invisible in the analysis of new user charges like congestion tolls and value pricing, no studies of gas tax or sales tax burdens consider gender at all. Given budgetary shortfalls and growing commitments to stimulus projects like high-speed rail, sales taxes and gas tax increases have arisen as potential sources of new revenue. Of these, local option sales taxes have gained traction in metropolitan regions across the country. Half-cent local option sales taxes are already common in California; in April of this year [2009], North Carolina passed enabling legislation for sales taxes primarily to fund transit projects in metropolitan regions. Again, however, research assumes the cost burdens and benefits of tax increases to be gender neutral and to vary by income alone. This may not be the case for cost burdens associated with excise taxes or emissions fees any more than it was for congestion charges.

The research on behavioral responses to congestion shows that women's comparative time poverty also means they consume more timesaving services. The scant research on sales taxes suggests that many of these services are subject to differential taxation. In a recent study comparing the effects of HOT lanes and sales taxes in Orange County, California, Schweitzer and Taylor (2008) used consumer expenditure data to estimate a two-stage model of taxable goods expenditures. These researchers test a variety of variables, including gender, ethnicity, household structure, age, child age, and region of the country. They find that expenditures subjected to the sales tax vary by virtually all of these factors, but most notably by gender and by single-female households with children. Taxable expenditures also varied by gender and ethnicity. Single-parent households, disproportionately female-headed, were more likely to make a higher percentage of their overall expenditures on taxable services, particularly food away from home.

Food consumed away from home illustrates a particularly sticky problem for tax incidence analysis and women, as Schweitzer and Taylor's Orange County example suggests. Women's time poverty also means they deal with the time-sensitive task of feeding the family, at least partially, through purchasing prepared food, and that they face a tax for this behavior. These food preparation services are not a luxury for them, per se, in the way they might be for other families with fewer time constraints. Untaxed food prepared at home assumes the availability of unpaid work—traditionally a mother's time—for food preparation. Sales tax policy thus fails to accommodate differences in time constraints and fails to supply women with direct service quality benefits in return for their expense the way that congestion charges would.

Because the sales tax is spread across such a large tax base, these differences in payment amount to comparatively little for individual households. However, the problem illustrates how little gender informs policy design either in theory or practice. Principles of optimal taxation tend to treat differences in demand merely as taste variations—which do not merit special attention from an equity standpoint—rather than as systematic differences in resources and responsibilities—which do merit scrutiny. This omission may be a small problem in some contexts (like the sales tax) but are a much bigger issue for the total distributional effects of transport finance and investment. It suggests a need to rethink how we frame and analyze equity in finance and investment from a gendered perspective.

We conclude that the incidence of user fees and sales taxes are not gender neutral, and if the existing research is any indictor, gender effects and possible causes of travel time sensitivity persist throughout women's life course (Rosenbloom 1993). As a result of greater time pressures, women value travel time and reliability more highly than men and are more inclined to take coping actions to deal with congestion. Greater time pressures result in different consumer choices, yielding a different incidence of fees and tax payments for ostensibly "premium" mobility services such as HOT lanes, driving

alone, and taxes. This area represents a fertile ground for research.

Public Transit Trends and Women's Travel

For proponents of VMT reduction, higher auto travel costs for women can be resolved by providing less expensive substitutes, like transit and walking. If transport policy makes driving more expensive in terms of time or money, transport planning and investment can provide alternative means of access. To carry on with our exemplar, what the single mother needs, the argument goes, is high-quality public transit so that her sick preschooler is one inexpensive transit trip and short walk away from the mother's job and home. Yet, previous research on public transit suggests that in most U.S. regions, transit and walking do not necessarily serve time-constrained women particularly well; general transit trips, compared with auto trips, are both longer in duration and involve a higher uncertainty regarding arrival time (Rosenbloom 1992). This section examines trends in public transit policy and discusses both short- and long-term outcomes with respect to women.

Public transportation is a top priority for transportation planning. Improved public transit is seen as a means to a broad array of urban planning objectives: attracting people out of private vehicles (thereby reducing VMT); reshaping U.S. metropolitan areas; solving congestion, energy and air pollution problems; and revitalizing urban neighborhoods. Over the past 30 years, support for public transit has greatly increased, and among urban planners today, the role of public transit in solving metropolitan problems is assumed. For women's transport, however, the outcomes of policy appear more mixed. We argue that public transit policy is more about abstract, longer-term goals than about providing the best possible service to transit users. Transit policy therefore not only does not consider the particular needs of women, but also fails to provide services that respond to many transit user markets.

Public Transit Trends

The commitment to public transit, and particularly rail transit, as an urban policy tool is reflected in its funding and its expansion to metropolitan areas throughout the United States. By 2006, 50 metropolitan areas had at least one form of rail transit in operation. Annual transit capital expenses increased from $5.1 billion in 1991 to $8.9 billion 2007 in constant 1991 dollars (FTA 2008). In addition, the nationwide fare recovery for operating expenses is 33%. All capital expenses, and two-thirds of operating expenses (totaling about $32 billion in 2006), are subsidized by federal, state, or local governments. Public funding of this magnitude suggests broad political support for public transit, and this support is in part built on expectations that these investments will contribute to solving congestion, environment, energy, and quality of life issues. Table 1 provides an overview of public transit supply and consumption by mode.[2] Between 1984 and 2006, transit supply as measured by vehicle miles increased by 35%. Supply of rail services increased much more rapidly than bus services, with light rail more than tripling. Over the same period, transit ridership (as measured by unlinked passenger trips) increased by 13.5%. In all cases, ridership grew less than service supply, meaning that over the period, service productivity declined. Unlinked trips per vehicle mile dropped from 2.55 to 2.14, and the share of operating cost covered by fare revenue declined from 39% in 1996 to 33% in 2006 (earlier data not available).

The growing costs associated with attracting new riders have not yet dampened capital investment. Figure 1 gives capital expenditures from 1995 to 2006 by mode. While capital investment has increased for all modes (note however that the chart is in real dollars), the big increases are in light and heavy rail, even though bus service still accounts for nearly 60% of all trips.

Outcomes

What is the result of the investment made in transit over the past decades? The most recent national data source for characteristics of transit users is the 2001 National Household Travel Survey (NHTS). The NHTS shows that the transit market share has continued to decline and in 2001 accounted for just 1.6% of all person trips. Other long term trends continue; for example, transit use is still concentrated among minority and low-income persons (accounting for 63% of all transit riders), who have lower rates of car ownership (Pucher and Renne 2003). Transit ridership also remains concentrated in the largest metro areas, despite extensive capital investment in other, smaller metro areas. In 2006 the New York metro area accounted for 35% (about 3.5 billion) of all unlinked passenger trips (see Table 2). The next six ranking metropolitan areas accounted for an additional 30%. Thus seven metropolitan areas account for nearly two-thirds of the nation's 10 billion transit trips. The additional three metropolitan areas in the top 10 add just 5% of annual ridership.

The 2001 NHTS also shows that the transit market continues to be segmented, with lower-income and minority households as greater users of bus and light rail and higher-income households greater users of subway and

[2] All data are from APTA (2008).

TABLE 1 Supply and Consumption of Transit, by Mode: 1984 and 2006

	Vehicle Miles (millions)			Unlinked Passenger Trips (millions)		
Mode	1984	2006	Change (%)	1984	2006	Change (%)
Bus	1,844.7	2,494.9	35.2	5,908.0	5,894.0	0.2
Commuter rail	167.9	314.8	87.5	267.0	441.0	65.2
Heavy rail	435.8	652.1	49.6	2,231.0	2,927.0	31.2
Light rail	16.8	74.3	342.3	135.0	407.0	201.5
Total[a]	3,461.9	4,684.2	35.3	8,829.0	10,017.0	13.5

Source: APTA 2000; APTA 2008.
[a] For vehicle miles, total includes other modes and is calculated in bus-mile equivalents. For passenger trips, total includes other modes.

commuter rail. Persons in low-income households (less than $20,000 per year) account for 23% of all households but 47% of all bus and light rail riders; persons in high-income households (more than $100,000 per year) account for 11% of all households but 42% of all commuter rail users (Pucher and Renne 2003). Compared with bus riders, rail transit users are more likely male and employed and have higher household incomes and access to a private vehicle. In contrast, bus transit users are more likely female and of minority race or ethnicity, have lower household incomes, and are less likely to have access to a private vehicle (Pucher and Renne 2003). A recent APTA study based on 2006 on-board surveys shows the same ridership patterns (APTA 2007).

However, public transit policy has been focused on the discretionary rider, as reflected by the investment in rail transit and the differences in transit markets for bus and rail. This focus is consistent with the larger goals of reducing car use, congestion, and energy consumption and of restructuring metropolitan areas (Crane and Schweitzer 2003). If transit supply is a key factor in reducing VMT, then transit market share should increase. Data from the U.S. census show that the work mode share served by transit for the United States has consistently decreased from 6.22% in 1980 to 5.12% in 1990 to 4.58% in 2000. Analysis of U.S. census data at the metropolitan level reveals largely stable modal shares between 1990 and 2000. Among the 50 largest metropolitan areas, five experienced small decreases of drive-alone mode share (l percentage point), and 12 (eight in the West) experienced small increases of transit mode share (Pisarski 2006). American Community Survey (ACS) data document the same trend through the early 2000s (Pisarski 2006). However, the most recent ACS data suggest a slight increase in transit mode share for the work trip, from 4.6% to 4.9% between 2000 and 2007. Over the same period, the drive-alone share also increased, but the carpool share decreased (Demographia 2008). When transit market share is measured in terms of total passenger miles traveled, the market share in all U.S. metropolitan areas of 1 million or more population is seen to have fallen from 3.6% in 1983 to 2.5% in

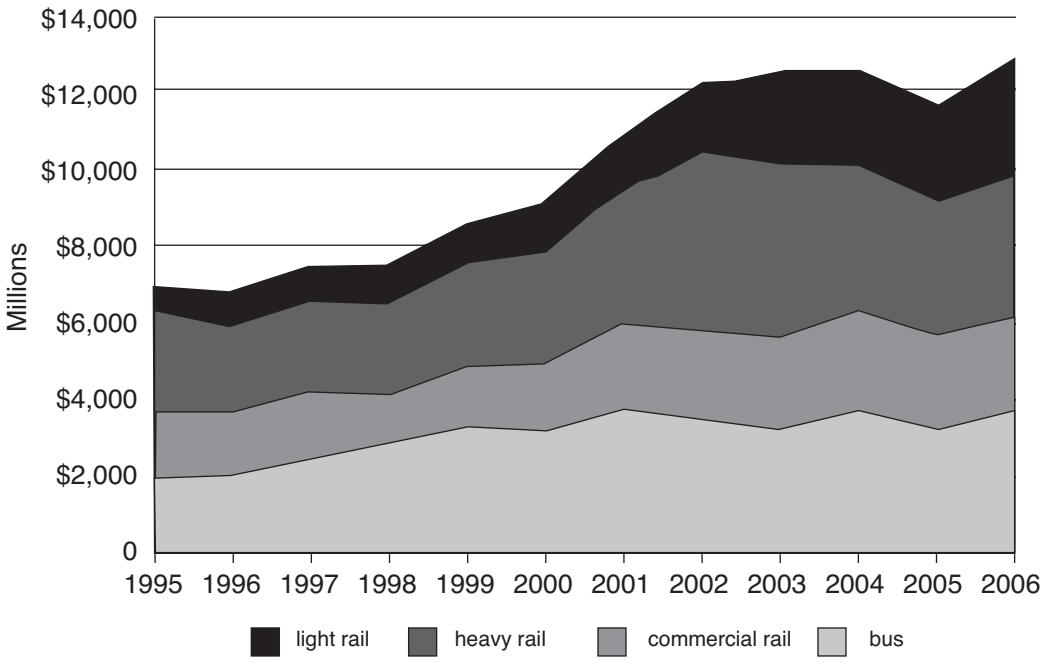

FIGURE 1 Capital expenses by mode.

TABLE 2 Concentration of Transit Ridership: 2006

Rank	Metropolitan Area	Unlinked Trips (millions)
1	New York–Newark, New Jersey (New York, New Jersey, Connecticut)	3,557
2	Los Angeles–Long Beach–Santa Ana, California	700
3	Chicago, Illinois (Illinois, Indiana)	611
4	Washington, D.C. (District of Columbia, Virginia, Maryland)	461
5	San Francisco–Oakland, California	420
6	Boston, Massachusetts (Massachusetts, New Hampshire, Rhode Island)	387
7	Philadephia, Pennsylvania (Pennsylvania, New Jersey, Delaware, Maryland)	342
8	Seattle, Washington	169
9	Miami, Florida	163
10	Atlanta, Georgia	149

Source: APTA 2008, p. 21.

2003. Transit market share increased in eight of these metropolitan areas and decreased in all others (Public Purpose, n.d.).[3] Overall, the large investment in public transit has not yet had much effect on transit market share or VMT.[4]

Impacts on Transit's "Second Market"

Giuliano (2005) has argued that those with low incomes and little access to cars constitute transit's "second market." Women are disproportionately represented in transit's second market: the 2008 U.S. poverty rate was 13.2%, but 14.4% for women and 18.9% for female heads of household (U.S. Census Bureau 2009b). Historically, support for public transit has been based on the public goods arguments that transit provides basic mobility. As the objectives for transit have broadened, however, the discretionary rider—specifically, the urban commuter—has become the "first market," because these broad objectives are contingent upon auto users shifting to transit.

In her discussion of this second market, Giuliano identifies three dimensions of transportation disadvantage: higher prices for basic goods and services, limited job access, and higher transport costs. With limited mobility, households may be captive consumers, restricted to local shops and unable to take advantage of more distant supermarkets or discount stores. As is described further below, access to jobs is much lower by transit than by car, even in transit-rich environments. Because of the limited accessibility transit provides, even the poorest households purchase and maintain cars, spending a disproportionate share of income doing so. Our iconic single mother is part of transit's second market. Does she benefit from the expansion of transit services?

One important measure of transit benefits is job accessibility. On this subject, the literature is quite clear: access to jobs by car is far superior to access to jobs by transit, even in central cities or locations with high levels of transit service. Blumenberg and Ong (2001) compared the number of jobs available within 30 minutes by car and by transit for several different low-income census tracts in Los Angeles. The ratio of jobs by car to jobs by transit ranged from 5 to 70. Shen (2000) compared commute times for low-income areas within the central city for the 20 largest metropolitan areas and found that in 17 cases, commutes from these areas were longer than average for the metropolitan area. He estimated commute time regressions using 1990 data for Boston; using public transit had a strong positive effect on commute time.

Measuring the impact of transit investments on job accessibility requires comparisons over time. Kawabata and Shen (2007) examined car versus transit accessibility in the San Francisco–Oakland–San Jose, California, consolidated metropolitan statistical area from 1990 to 2000. Using measures of accessibility that control for both supply and demand, they compared changes in access over the decade. Car access was found to be much higher in both decades, but it declined slightly in some areas in 2000 as a result of increased congestion. Although transit access increased, particularly on the main north and east commuter rail corridors, the average commute time on both modes increased from 25.6 to 29.4 minutes for driving alone and from 41.2 to 46.3 minutes for transit. Regression analysis revealed that job access is strongly and negatively associated with commute time for both drive-alone and transit commuters. For transit commuting, the job access coefficient was much smaller in 2000 than in 1990, suggesting an increase in long-distance transit commuting. The San Francisco area results are quite consistent with public transit policy's focus on the discretionary long-distance commuter.

The 1996 federal Welfare Reform Act generated a literature on the role of transport in welfare to work. Given that most welfare recipients are single mothers, these studies offer important insights on transit mobility for this group. Under the old spatial mismatch framework (e.g., Kain 1968), unemployment was cast largely as a problem of decentralized low-wage jobs and centralized low-skill job seekers. Thus, access to appropriate jobs was in part a transportation problem. Welfare eligibility rules limit capital assets, including cars, so most welfare recipients did not own cars. The public policy solution was to provide transit subsidies. Several studies

[3] The eight metropolitan areas are Boston, Massachusetts; Dallas–Fort Worth, Texas; Las Vegas, Nevada; Orlando, Florida; San Diego, California; Riverside–San Bernardino, California; Seattle, Washington; and Washington, D.C.

[4] More recently, the increase in fuel prices in 2008 has been anecdotally associated with more transit use. It is reasonable to expect such an association; increased transit ridership is affected by relative costs.

have shown that transit access has little or no impact on employment outcomes (e.g., Sanchez et al. 2004; Transportation Research Board 2009), while access to a car increases the likelihood of employment (Ong 2002; Cervero et al. 2002). A pilot study of low-income, employed single mothers suggests car access is also associated with better jobs (Lichtenwalter et al. 2006).

In a thoughtful review of low-income women and transportation policy, Blumenberg (2004) discusses the many aspects of life for single mothers that make the speed, reliability, and convenience of the car particularly important. These include more effective job seeking, a reliable commute mode, the time pressure of complex activity patterns (the caring work described above), and the capacity to respond to children's emergencies.

One final aspect of transit merits discussion here. The section above on new finance schemes and women's travel discusses emerging evidence on women's greater valuation of travel time reliability. Transit operators are concerned about schedule adherence, and route scheduling takes into account loads at stops and travel speeds and their random variations to maximize schedule adherence. Transit users, however, are more concerned about the travel time reliability of the entire journey, which often includes transfers between routes or modes (Paulley et al. 2006). Extensive searching found just one relatively recent paper on this topic, a study of the reliability of transit in the Netherlands (Rietveld et al. 2001). Based on estimates of stated preference data, 1 minute of "uncertainty" (meaning 50% probability of 2 minutes of delay) was valued at 2.4 times 1 minute of certain delay. That is, Dutch transit users place a high value on travel time reliability. This study did not consider gender differences.

Whether U.S. transit users have similar perceptions of transit reliability is unknown, but it is not unreasonable to think that they do. The lack of information on this issue suggests a lack of attention to the transit user as a customer.[5] Since bus transit is subject to more unreliability than rail, the transportation disadvantaged are likely more subject to reliability problems. No research was found on the possible value of improvements in information quality, such as real-time headway information and expected arrival times. It might be expected that those types of services would enable time-constrained women to work around reliability issues more than systems that do not have these information services. For time-pressured women, all of these service quality issues can render transit inconsistent with their needs.

Given the many advantages of the private vehicle, it is not surprising that women's use of transit continues to decline. Crane (2007) used American Consumer Survey data to compare commuting patterns of women and men between 1985 and 2005 and found that transit mode share dropped for both men and women across all racial groups except that of white men (again consistent with transit policy objectives). The transit mode share dropped the most among African-American women, whose share approached that of other women of color by 2005.

[5] One might argue that with congestion and risk of delays caused by accidents, road travel times are far more uncertain than transit times. Low-income workers have shorter commutes, however, and therefore less exposure to nonrecurrent congestion.

Transit and Urban Form

Transit policy is driven by long-term goals. It might be argued that as long as U.S. metropolitan areas remain dominated by the automobile, transit is a poor substitute. However, given enough investment in transit, and with complementary land use development policies, urban form will eventually change, which will lead to neighborhood environments that are more transit oriented and make walking, biking, and transit more competitive modes. With a greater mix of jobs, housing, and services and higher residential densities, trips should become shorter and reduce the travel burden for everyone, including busy women. This section addresses two questions: first, is there evidence that urban form is changing, and second, would the compact urban form promoted by many urban planners better support women's activities and travel?

Changing Urban Form

The rehabilitation and expansion of U.S. transit systems began nearly four decades ago. This length of time should reflect changing urban development patterns, given the rapid population and employment growth that has taken place during the same period. At the metropolitan scale, the evidence suggests that metropolitan population and employment have continued to decentralize. U.S. census data indicate that the share of central city population declined from 45.5% in 1970 to 34.7% in 2000. As of 2000, fully half of the U.S. population resided in suburbs (Giuliano et al. 2009). Studies of population density show that the density gradient continues to decline, though at a decreasing rate (Kim 2007). Similar trends are documented for employment, though the data are far more limited. Employment has grown faster outside of central cities, and employment gradients have decreased. The historic dominance of downtowns as major employment clusters has been increasingly offset by the growth of employment centers outside central cities (Giuliano et al. 2007; Lee 2007; Lee et al. 2006; McMillan and Smith 2003). Overall trends suggest an increasingly less transit-friendly urban environment.

Broad trends may obscure local changes that may be taking place in response to transit investment, such as

transit-oriented development or shifts in travel behavior that are essential for reducing congestion, emissions, and energy use. In a recent paper, Giuliano and Agarwal (2009) examined evidence on the impact of rail transit investments on urban spatial structure. Recognizing the complexities in trying to isolate the effects of investments, they found much of the existing literature limited in methodology, data, or both. Empirical studies that use appropriate statistical models, methods, and data show little or no impact of rail transit on land values or its proxies (population or employment density and commercial or residential building). To change land values, rail transit must significantly affect accessibility, and in most U.S. metropolitan areas, even the largest transit investments have had little impact on accessibility. Thus, the empirical results are consistent with theoretical expectations.

Much of the urban planning literature (particularly the literature oriented to practitioners), however, is more positive. Portland, Oregon; the impact of the Bay Area Rapid Transit on downtown San Francisco; and impacts around some Washington, D.C., Metro stations are well known and widely used as examples of success. Numerous publications document results of transit-oriented development and offer guidelines for successful projects (Bernick and Cervero 1997; Cervero et al. 2004; Dittmar and Ohlands 2004). Case studies, however, often do not distinguish between the impacts of land use policies (e.g., more flexible zoning, development subsidies) and the impacts of the transit investment (including impacts on transit use), and often do not consider the larger context that drives demand for new development. Thus, for example, the Del Mar station on the Pasadena Gold Line in the Los Angeles area is often considered a success story by urban planners, despite poor ridership.[6] Giuliano and Agarwal (2009) conclude that transit investments do not necessarily lead to more transit use or changes in land use patterns. Rather, impacts depend on local circumstances: the degree to which transit influences accessibility, the local and regional economy, and the local policy environment. At best, it would appear that greatly increased transit investment and more decades would be required to achieve compact development (and VMT reduction) goals.

Compact Urban Form and Women's Travel

Would women's activity patterns be less constrained should the visions of urban planners be implemented? The literature on individual travel and land use is quite vast, yet the complexity of travel behavior, measurement problems, and data limitations has made it difficult to draw many conclusions. There is substantial evidence that VMT is inversely related to population and employment density, but the relationship is of small magnitude. For example, doubling residential density might reduce VMT by 5% to 10% (Transportation Research Board 2009).

To our knowledge, there is little empirical research on whether women respond differently to specific urban form attributes, holding household and socioeconomic characteristics constant. Let us work through the logic. First, walking is a slow mode, so people who place high value on time would not be inclined to walk for a purposeful trip. The share of walking trips for commuting as well as for all purposes has steadily declined (Pucher and Renne 2003). Women make slightly more walking trips than men, but this is more likely related to poverty and poor access to cars than to placing low values on time. Research on poverty and walking among women challenges popular notions that privilege the exercise value of walking while discounting the hardships associated with walking while carrying children, groceries, or other burdens (Bostock 2001).

Second, higher density and mixed use, all else being equal, make more activities available in close proximity to home or work. Household maintenance chores (shopping, medical care, children's school trips) should require less travel. However, the opportunities in the closest proximity may or may not have the marginal value to supplant opportunities farther away. Examples include the local market versus the supermarket and the neighborhood school versus the charter or magnet school. It is also not clear that choices are as ubiquitous as measures of mixed land use might suggest. For example, most medical insurance plans limit access to doctors, labs, and hospitals that are not part of the plan. The presence of many medical services nearby may be of little relevance to those whose choices are determined by the insurance company. In addition, higher density is correlated with slower travel speeds. If time pressure is the problem, shorter but slower trips do not necessarily help. The ways in which the spatial distribution of activities may differentially affect women's travel choices are in need of more research.

Finally, the literature on wasteful commuting indicates that people do not optimize their commute trips: they live much further away from jobs than would be required based on the spatial distribution of workers and jobs (Giuliano and Small 1993; Hamilton 1989; Horner 2002; Yang 2008). Nonwork trips are shorter and often not as frequent as the work trip, so there is little reason to expect economizing behavior for nonwork trips. Basically, it does not cost much more to travel to the preferred restaurant, child-care center, dry cleaner, and so forth. Wasteful or excessive travel may appear incon-

[6] Some urban planners argue that land use policy changes to promote mixed-use, higher-density development are only possible when rail transit is present; thus, when these changes actually take place, the transit investment has in fact been the influencing factor.

sistent with women's constrained daily activity patterns. However, if women use travel resources to optimize activities, whether they be the better job, school, soccer league, park, dentist, or movie theater, the resulting travel outcomes are efficient for the individual. At this point, the private vehicle is the most flexible and convenient mode for accomplishing these activities in most U.S. regions, especially when carrying packages or accompanying small children or frail elders.

Conclusions on Transit

We draw the following conclusions regarding transit policy. First, investment patterns over the past two decades reflect long-term transit policy objectives based on attracting the discretionary passenger. Rail investments to serve conventional long-distance commuters (who are twice as likely to be men) are illustrative. To date, the success of this strategy is mixed, and national data do not yet suggest any significant change in transit market share. The particular needs of busy women make them harder to attract as discretionary transit users; it is much more difficult to pick up children or stop for food on the way home when using transit. The benefits of current transit policy are more likely to accrue for those with lower demands on their time and household labor.

Second, our iconic single mother, to the extent that she may be transit dependent, is faced with negotiating a (bus) system that is slow, sometimes unreliable, and difficult for strollers and packages. She may work part time and in the outbound direction and so may be traveling at times when service frequency is low. She is likely to be using the parts of the system that have received the least investment and capacity expansion. Like other members of transit's second market, she has received limited benefits from the annual $32 billion in public expenditures on transit.

Summary

We close with some observations and conclusions. First, despite dramatic societal changes in the past few decades, gender differences persist. Women spend more time in caring work; roles and norms yield highly constrained activity patterns that are expressed in travel behavior. Persistent gender differences yield persistent travel behavior differences that are based on the high value women place on both travel time and reliability. The limited evidence available suggests that women are more likely to travel by car and more likely to pay tolls to save time, all else being equal.

Second, the higher value women place on time and reliability suggests that transport policies that provide the option for saving time, such as HOT lanes or congestion fees, provide the benefit of more choices. Although user fees and taxes are regressive and therefore have greater incidence on lower-income travelers, it merits noting that indirect revenue sources such as sales or property taxes are also regressive, sometimes steeply so, and have the added disadvantage of distorting demand. Moreover, road tolls provide revenue that can be used to offset regressive impacts, either by redistributing revenues or reducing other regressive taxes.

The higher value women place on time and reliability suggests that public transit is not well suited to women's travel needs; therefore, female discretionary riders will be more difficult to attract than males. Better travel time and reliability, however, would make public transit more attractive to everyone. One example is the Los Angeles Metro's Rapid Bus program. The Orange Line, a 14-mile busway traversing the San Fernando Valley from North Hollywood west to Warner Center, was projected to open with 5,000 to 7,500 weekday boardings; yet the first month, November 2005, averaged 16,000 boardings. As of December 2006, boardings had reached about 19,000, with Orange Line patrons indicating that 17% were new transit passengers (Callahan and Vincent 2007). The Rapid Bus line on Wilshire Boulevard has experienced passenger increases of more than 40%. These are precisely the types of services that could greatly benefit transit's second market. They are also cost effective. In contrast, the Gold Line light rail, while comparable in scope, cost twice as much to construct and has a much higher cost per passenger and therefore requires a larger subsidy.

Third, we are struck by the disconnect between our understanding of women's travel and the making of U.S. transport policy. Since the Transportation Research Board's (TRB's) first women's conference, an extensive literature has been generated that identifies and explains the many dimensions of gender differences. It is quite clear that everyday life remains highly gendered, and because the daily lives of women and men are different, their travel behavior is different as well. We know that women trip-chain more, commute shorter distances, are less likely to have access to the car if there is only one in the household, and so forth. More recently, we have been learning that women place higher value on time and reliability, which is a logical outcome of highly pressured daily activity patterns with large penalties for being late attached to some activities.

Transportation planning and policy have been remarkably adept at adapting to and encompassing many policy objectives. Dramatic shifts in federal policy have occurred since that first TRB women's conference. From a strict focus on highway construction and maintenance, federal funding has moved increasingly toward being more multimodal and more flexible in response

to concerns about air pollution, urban decline, environmental justice, energy efficiency, and now global climate change. As noted at the start of this paper, VMT reduction captures much of the essence of transportation planning objectives. The consensus view from planning and policy is that VMT reductions must be achieved to save energy and reduce carbon emissions as well as to achieve the visions of compact development. Walking, biking, and transit will reduce emissions, save energy, and even make people thinner and healthier.

Again, the paucity of research that is sensitive to gender limits what can be concluded about VMT reduction or any of these social goals. Complicated and time-pressured lives depend on the most efficient transport available, however, and in most circumstances, this is the private vehicle. The car currently affords better access to jobs, shops, medical care, and elderly relatives than other modes do in most circumstances. More accessibility means more opportunities and choices. Thus, VMT reduction is inconsistent with women's accessibility needs, at least in the short term. Although raising the time and monetary costs of driving can create barriers to access for both genders, the scant evidence and theory available suggest that these barriers will present more significant obstacles to social inclusion, support for unpaid work, and economic advancement for women than for men.

Ideas for Transportation Planning and Policy

We begin with the often stated and obvious. The best thing we can do to reduce pollution and save energy is to "get the prices right." Although just about any scheme to increase the price of using private vehicles is bound to be regressive, we note again that current transportation finance mechanisms are also regressive and fail to send the right price signals to travelers. Most out-of-pocket costs associated with emissions fees are only about 0.1% to 0.2% of yearly income for even low-income households (Walls and Hanson 1999; West and Williams 2004; L. Schweitzer, "An Overview of Existing and Emerging Transportation Finance Instruments and Their Effect on Low-Income Groups," unpublished work). Raising the price of using private vehicles will at the margin lead to other choices, like changes in mode, destination, or trip. Congestion pricing or HOT lanes provide additional choices to travelers, and some evidence suggests that the benefits of savings in travel time may be of particular value to women.

With regard to transit, service quality and reliability are key. Frequent headways, quick transfers, and reliable travel times are what attract travelers to rapid bus or subways. Better service would provide benefits to both genders and both of transit's markets. Investment in rail services, based on the promise of benefits decades into the future, does little for the travel needs of today's women. Investments justified by such benefits also deemphasize the importance of the quality of existing current services (and the responsibility of transit agencies to focus on service quality), something of critical value to transit users.

Finally, we suggest that women's travel be considered in the transportation planning process. The planning process explicitly considers impacts on disadvantaged groups (minority and low-income populations), but otherwise assumes gender neutrality. Why not consider how various finance alternatives might affect low-income women or high-income women? Why not examine who receives the benefits of a new rail line?

We close by noting that travel demand continues to be largely derived from daily activity patterns. The differences in these patterns reflect gendered societal roles and norms. We understand that transportation policy by itself cannot change the role of women. Rather, the transportation system facilitates time-pressured activity patterns. It can even be argued that the transportation system is one part of the societal structure that enables and therefore reinforces gender differences. At the very least, transportation planning should "do no harm." It should not add to the challenges of our iconic single mother or her married sisters or her elderly aunts.

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Road User Safety
Women's Issues

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Every year about 1 million people are killed and between 20 and 50 million are injured worldwide in motor-vehicle-related crashes (Peden et al. 2004). Although males in the most economically active age group make up the largest proportion of reported casualties, women's fatality and injury rates appear to be increasing with motorization (Ghee et al. 1997). Motorization accompanies development, as do changes in women's traditional roles. The changes vary by country and culture, but in general, there are overall increases in the numbers of women who drive motor vehicles and who die of motor vehicle crashes. Differences between men and women in vehicle crash involvement have long been recognized, but much about gender differences in traffic safety remains unknown.

This resource paper examines vehicle crash patterns and trends by gender in the United States and discusses their implications for traffic safety. The primary reason for looking only at the United States is the availability of data on crashes, licensing, and amount of travel. Another reason is that the United States has undergone the process of motorization and has faced some of the issues and challenges that accompany the growth of automobile use in a society. Although, some gender issues in traffic safety are specific to a particular culture, many others are universal. Insights on gender differences in risks of crashes, injuries, and deaths in an environment where automobiles are the main transportation mode of a large proportion of women can increase knowledge of women's issues in traffic safety worldwide. This resource paper first presents an overview of trends in the number of motor vehicle crashes over time and then examines rates based on licensing and vehicle use. Risky driving behaviors are examined, and the risks of death and injury in crashes are discussed. The final section addresses research needs.

Motor Vehicle Fatalities

Motor-vehicle-related crashes in the United States have contributed to about 40,000 deaths annually for the past two decades. The number of injuries from motor vehicle crashes has decreased considerably over this time, from a high of about 3.5 million injuries in 1996 to about 2.3 million in 2008 (Figure 1). About one-third of the vehicle-crash fatalities involved women. Table 1 shows the number of persons killed in traffic crashes in 2008 by mode (NHTSA 2008, 2009a).

It is interesting to note that women account for about one-half of passenger fatalities and about 30% of driver fatalities, a pattern that has been evident for the past two decades (Figure 2). This pattern suggests that there may be many reasons behind these differences by gender and that they are centered on driver exposure, risk-taking behaviors, and injury outcomes in crashes.

Exposure

The issue of exposure includes licensing, the amount of driving, and also the types of driving. The proportion of women licensed to drive in the United States has increased over time. Figure 3 shows the growing trend of driver licensing of women in the United States over the

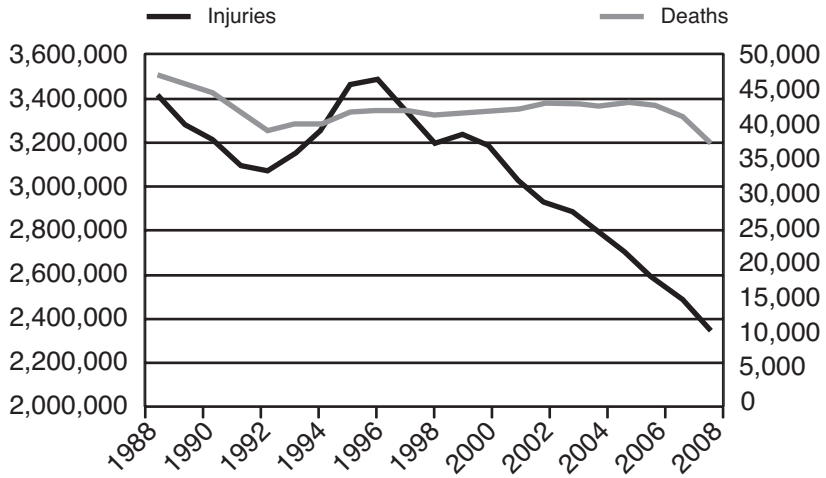

FIGURE 1 Injuries and deaths from vehicle crashes in the United States: 1988–2008.

TABLE 1 Persons Killed in Traffic Crashes, by Mode and Gender: 2008

Gender	Car Driver	Car Passenger	Motorcyclist	Pedestrian	Pedicyclist
Men	12,969	3,876	4,642	3,053	622
Women	5,226	3,297	448	1,321	92
Total	18,195	7,172	5,090	4,374	717

Note: Detail may not add to total because of rounding.

past half century by charting the ratio of licensed women relative to licensed men by age at 10-year intervals from 1965 to 2005. Half a century ago, young women under the age of 20 were not getting licensed to drive as early as young men. At that time, the ratio of licensed women to men for that age group was about 0.7. From ages 20 to about 50, there were about 0.8 women to each man with a driver's license. At the other end of the scale, the ratio of licensed women to men age 70 and older was 0.3. By about 1995, the ratio of licensed women to men was equal for every age group. By 2005, the ratio of licensed women to licensed men exceeded 1.0 for people age 65 and older. This shows that women now constitute more than half of the aging driver population, or at least the majority of older persons holding drivers licenses, and will do so in the future.

When rates of crash involvement by licensed driver are considered, men's rates for both fatal and injury crashes

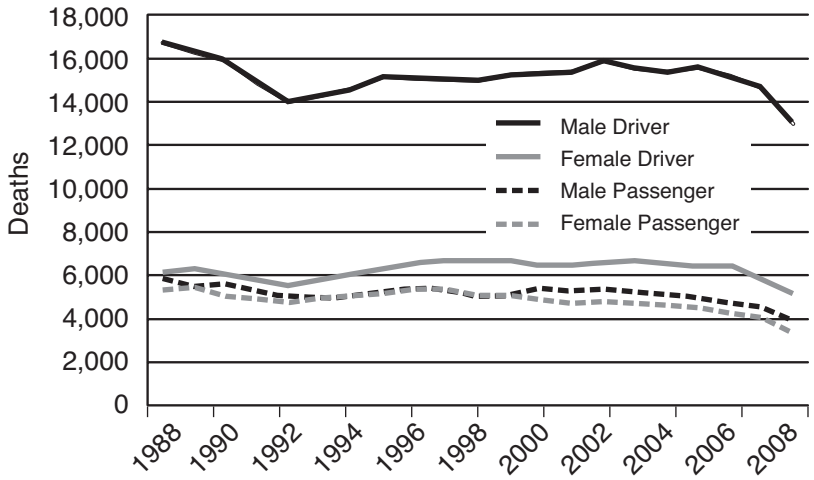

FIGURE 2 Driver and passenger fatalities in the United States, by gender: 1988–2008.

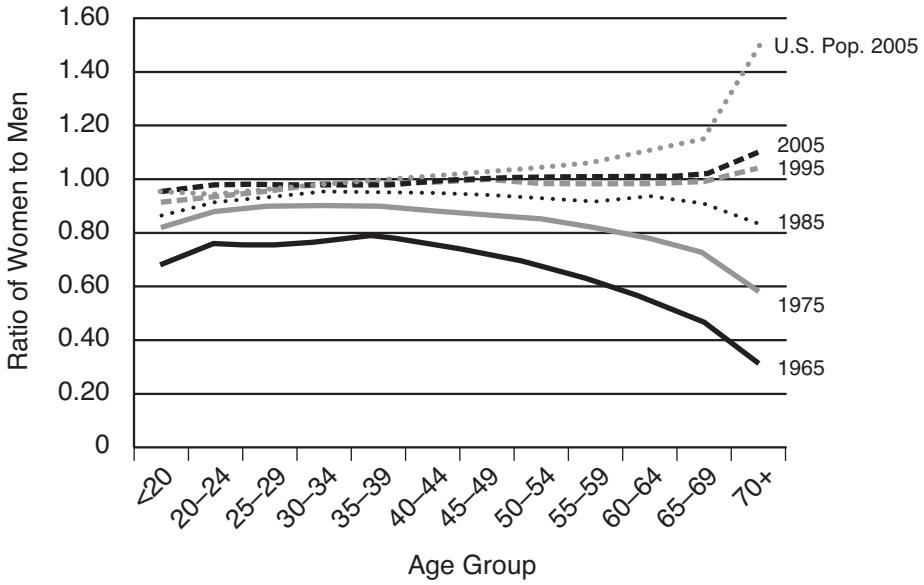

FIGURE 3 U.S. gender trends in driver licensing, by age: 1965–2005.

exceed those of women. The rate for women's fatal crash involvement per licensed driver is about one-third that of men. Figure 4 shows the trend in injury and fatal crash involvements per 100,000 licensed drivers from 1988 to 2008.

The next consideration is the amount of driving. Figure 5 shows the average annual mileage driven by age and gender as estimated by the 1969 and 1983 Nationwide Personal Transportation Survey and the 2001 National Household Travel Survey. While annual mileage has increased for all, men clearly drive more than women. Fatal crash involvements by gender and age for 1995 and 2001 are shown in Figure 6.

Examining fatal crash involvements per vehicle miles traveled (VMT) shows a very clear effect of age for both genders, with high rates for drivers under age 20 and again for drivers over age 70. The fatal crash rate per VMT for men is higher than for women, except in some of the older age categories. It should be noted that the annual mileage for drivers over age 70 is quite low compared with the mileage driven by middle-aged drivers, so a very few cases can affect the rate shown here.

Rates of nonfatal crash involvements per miles driven have been reported to be about 12% higher for women than men (Ferguson and Braitman 2006). However, it was noted that the estimates did not control for variables such as area type and road type. Women have different activity and travel patterns than men (Rosenbloom 2000), and there is evidence that the locations of crashes of men and women are different (Levine, in press). These

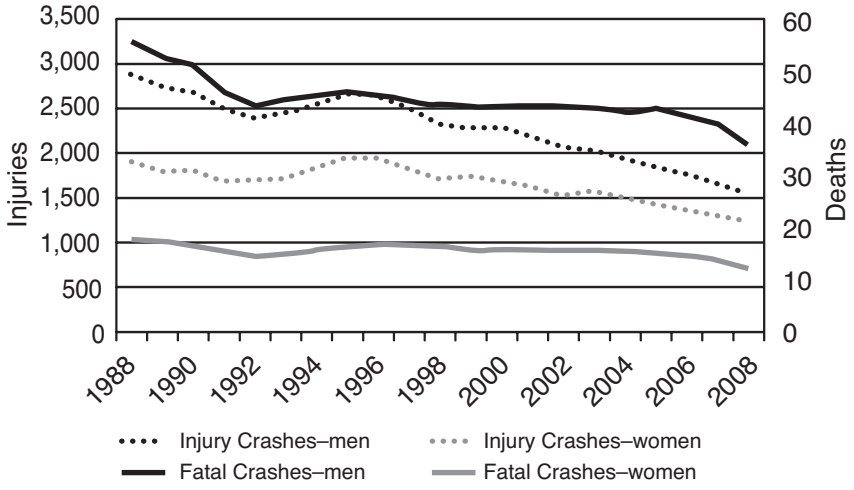

FIGURE 4 Injury and fatal crash involvement per 100,000 licensed drivers, by gender: 1988–2008.

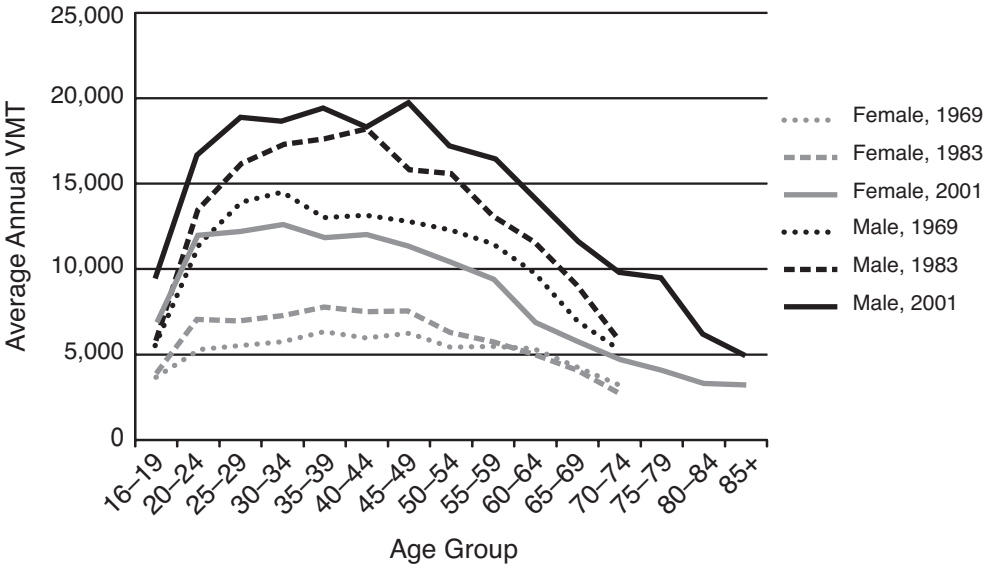

FIGURE 5 Average annual vehicle miles driven, by age and gender: 1969–2001. (Note: VMT for drivers over age 70 was collapsed into one category in the 1969 and 1983 NPTS reports, while in 2001, VMT was reported through age 84 and collapsed into one category for drivers over age 85.)

factors influence exposure and risks of crashes and should be considered when making comparisons.

Risky Driving Behaviors

Men's confidence in their driving ability in general is higher than women's, and they tend to exhibit riskier driving behavior than women. Surveys that ask drivers to rate their driving ability compared with others' consistently find that overall, drivers rate themselves above average and that men of all ages are more likely to do so than women (e.g., Kostyniuk et al. 2000; Sivak et al. 1989).

Men are more likely to drive under the influence of alcohol than women. Figure 7 shows the number of fatally injured drivers with a blood alcohol concentration (BAC) exceeding .08 grams per deciliter by gender over the past two decades. Over this period, approximately 84% of these drivers were men. The numbers of these drivers decreased from about 8,000 in 1988 to about 5,200 in 2008 for males, and from 1,500 in 1988 and to about 1,000 in 2008 for females. Of all drivers killed in traffic crashes in 2008, 40% of the male drivers

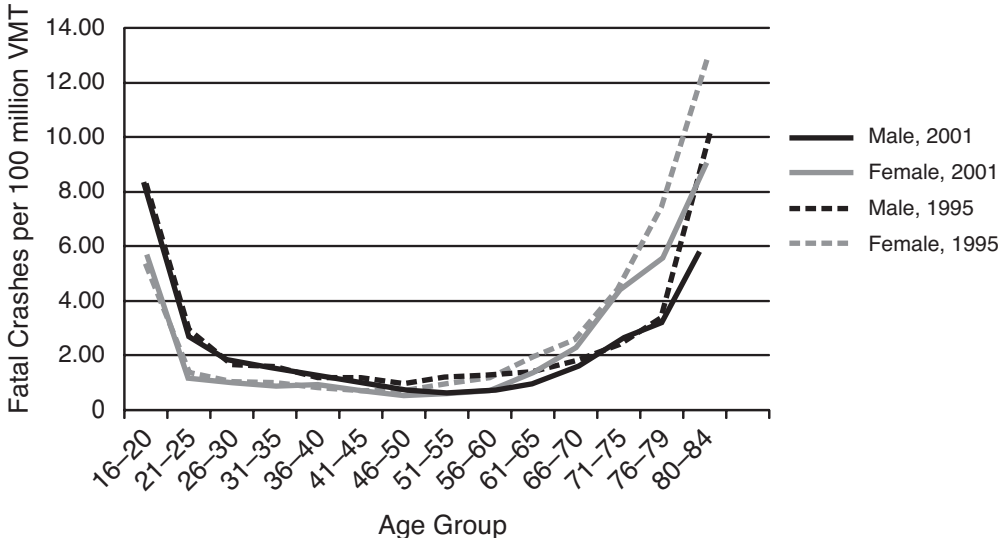

FIGURE 6 Fatal crash involvement per VMT, by age and gender: 1995 and 2001.

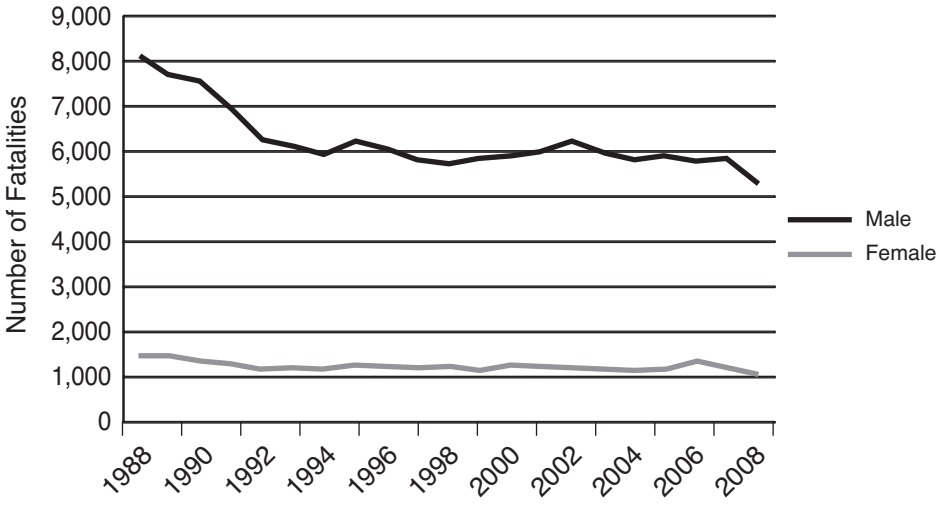

FIGURE 7 Fatally injured drivers with BAC of >0.8 grams per deciliter, by gender: 1998–2008.

and 21% of the female drivers had a BAC of >.08 grams per deciliter (derived from NHTSA 2009b).

Speed was attributed to about 30% of all fatal crashes in 2008 (NHTSA 2009a), and men were more likely to speed than women. Figure 8 shows the percentage of drivers of each age group and gender who were involved in fatal crashes related to speeding. Men exceeded women in all age groups, but there is a clear effect of age; of all fatal crashes of drivers under age 21, approximately 35% involving male drivers and 24% involving female drivers were related to speeding. For ages 21 to 24 years, 35% of fatal crashes involving men and about 20% of fatal crashes involving women were related to speeding. An analysis of speeding-related crashes of all severities in Michigan found that crash rates were about 7 per 1,000 licensed drivers for men and about 3 per 1,000 licensed drivers for women (Kostyniuk et al. 1996). These crashes also showed a clear age effect, with the most speeding crashes attributed to the youngest age group of drivers.

Following too closely or tailgating is another form of risky driving behavior that is more often reported for men than for women drivers. Results of a study by Evans and Wasiliewski (1983) conducted in Michigan and Ontario, Canada, found that men tended to maintain shorter headways than women when driving. If rear-end collisions can be considered a consequence of following too closely, then a study conducted by Kostyniuk et al. (1996) provides additional evidence. Kostyniuk et al. found that the rate of rear-end collisions in Michigan for male drivers was greater than that for female drivers (12 collisions per 1,000 licensed drivers for males and 8 collisions per 1,000 licensed drivers for females). Analy-

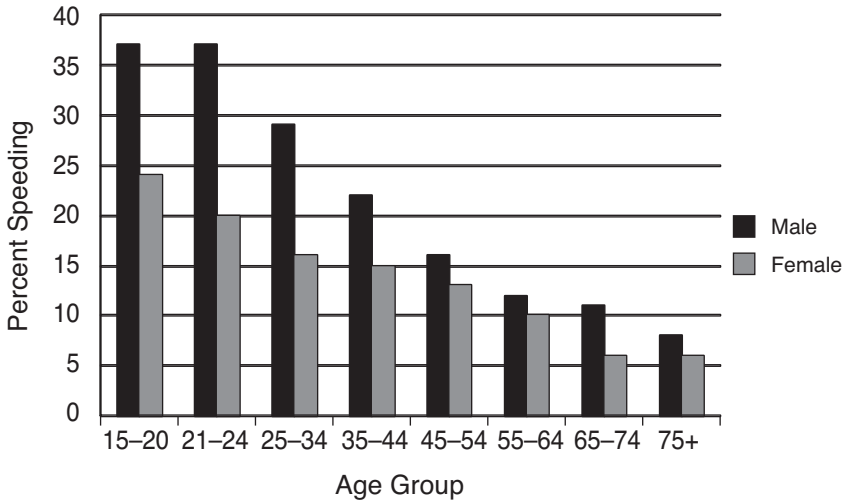

FIGURE 8 Speeding drivers in fatal crashes, by age and gender: 2008.

ses of car-following behaviors using naturalistic driving data from field operational tests in which 78 drivers were given instrumented vehicles for a month and told to drive as they normally do also identified gender effects in car following (Fancher et al. 1998). The analysis was based on the distance between cars and the rate of change of the distance. Short headways and rapid closure of the following distance were associated with young subjects (20 to 30 years) of both genders. Ultraconservative driving, so named because of large headways and a slow rate of closure, was associated with female drivers in the oldest age group (60 to 70 years).

Distraction

Driver distraction can also contribute to risky driving. In 2008, 16% of all fatal crashes and 21% of all injury crashes in the United States involved driver distraction (NHTSA 2009b). When a driver engages in other activities, attentional resources are diverted from driving, in some cases to a level below that necessary for safe driving. Use of mobile phones and other electronic communications devices provides an opportunity for driver distraction. Driver use of mobile phones has been reported to be associated with a fourfold risk increase of being involved in a crash (McEnvoy et al. 2005; Redelmeier and Tibshirani 1997). Use of mobile phones and other communications technology is growing, however. According to estimates from the National Occupant Protection Use Survey, about 3% of drivers in the United States were using hand-held mobile phones during daylight hours in 2000 (Glassbrenner 2004) and 6% were using hand-held mobile phones in daylight hours in 2008 (NHTSA 2009b). Of all drivers in 2008, 5% of males and 8% of females were using hand-held mobile phones, 0.6% of males and 0.5% of females were using visible headsets, and 0.5% of males and 0.9% of females were manipulating hand-held devices (NHTSA 2009c). Male drivers do not dominate this risky behavior to the extent that they dominate the other risky driving behaviors. There is nationwide concern about the distracting effects of communications technology on driving safety, and how gender differences in these behaviors will evolve remains to be seen.

Use of Safety Belts

Not using a safety belt is also risky behavior. If a crash occurs, safety belts and other in-vehicle occupant protection measures serve to mitigate the effect of the crash on the occupant. However, the safety belt requires action on the part of the occupant, in that the driver or passenger has to "buckle up." Observational safety belt surveys consistently show higher safety belt usage by women than by men. The overall U.S. safety belt rate in 2007 was reported as 86% for women and 79% for men (Ye and Pickrell 2008). Safety belts have been reported to reduce the risk of death in crashes involving passenger cars by about 45% for both men and women (Kahane 2000). Women's higher safety belt use rates are reflected in fatal crash records. Of all persons killed in vehicle crashes in 2003, 62% of the men and 47% of the women were not using safety belts (NHTSA 2004).

Survivability in Crashes

There is evidence of gender differences in the risk of injury and fatal crashes, and also in patterns of injuries for the same types of crashes. Evans (2004) reports that for a crash of a given force, the risk of death is higher for women than for men to about age 60. Using a double-pair comparison method, he calculated that the relative risk of death for women as compared with men (for a crash of the same force) was about 1.2 at age 20, about 1.3 at age 40, and about 1 at age 60. In an analysis of driver deaths by age and gender, Li et al. (2003) identified a very strong fragility effect of age for both genders. When compared with driver deaths in crashes at ages 30 to 59, the likelihood of dying was 2.1 for women drivers ages 65 to 69 years, 2.7 for women ages 75 to 79 years, and 5.2 for women age 80 years and older. For men, this likelihood was about 1.5 for ages 65 to 69 years, 3.5 for ages 75 to 79 years, and 4.3 for age 80 years and older. The results of these two studies are not inconsistent. Evans's analysis compared crashes of the same force, while the study by Li et al. examined records of all crashes and did not control for equal forces in crashes. As noted earlier, travel patterns, including which roads are used and which areas are traveled in, are most likely different for men and women. Furthermore, speeding, which contributes to the forces in a crash, is more prevalent among male drivers than female drivers. Thus, although women are at greater risk of death in a crash, more men than women die of vehicle-related crashes because they drive more miles and because their crashes are of higher severity.

Differences by gender in patterns of injuries in the same types of crashes have also been noted by researchers. Women are reported to sustain a higher incidence of spine and leg injuries (Welsh and Lenerd 2001). Women are at greater risk of head, thorax, and lower leg injuries in frontal crashes (Makay and Hassan 2000); of neck injuries in rear-end crashes (Chapline et al. 2000); and of head, face, and neck injuries in near-side-impact crashes (IIHS 2003). People of shorter stature, which includes a large proportion of women, were also reported to be at higher risk of lower limb injuries in head-on crashes (Crandall et al. 1998).

Crashworthiness and occupant protection are part of motor vehicle design. Because women are more prone to injury in crashes of the same severity, and because of women's smaller size, they are affected differently by various safety systems than are men. However, these differences are increasingly being taken into consideration. An example of this is the design of frontal air bags. The first generation of airbags did not consider the effect of the aggressivity of the airbag on people of short stature sitting very close to the airbag. Of the 84 drivers who died as a result of airbag deployment, 64 were women. This lead to changes in the design of airbag systems, including the ability to turn them off, and to the development of devices that sense occupant size and adjust the force of the airbag. The recognition of the higher risk of neck injuries among women in rear-end crashes is also influencing the design of head restraints.

Among advancements in crashworthiness is the development of better crash test dummies and computational models for both men and women for testing the effectiveness of crashworthiness design and occupant protection systems in the laboratory. There still is a need for better understanding and modeling of some of the special conditions of women (e.g., osteoporosis in older women, pregnancy) in the design of safety systems.

At any given time, about 10% of female car occupants ages 15 to 45 are pregnant (Klinich et al. 2005). Although the number of fetal deaths from maternal involvement in vehicle crashes is not known, conservative estimates place the number at about 370 per year (Klinich et al. 2005). The number of children who are born with disabilities from in utero crashes is not known, but indications are that the number is quite large (Klinich et al. 2005). Safety belt usage among pregnant women is reported to be quite low, at 66% (Ikossi 2005), and the nonuse of safety belts increases the risk of injury to the mother in the event of a crash. The risk of fetal injury from airbag deployment increases when the mother is unrestrained.

There is a need for better understanding of the effects of safety belt use and airbag deployment on the fetus in utero and on the mother. Researchers have been studying and modeling pregnant vehicle occupants, and better computational models such as MAMA-2B are being developed. However, there still is much to be done in this field.

Summary and Research Needs

An overview of vehicle crash trends and patterns in the United States shows that currently the rates of driver licensing of men and women are about equal. Among drivers over age 70, the number of women licensed to drive exceeds that of men. Overall, women drive fewer miles than men. The number of people killed in vehicle-related crashes and the per capita rate of these deaths is much lower for women than for men. When exposure in terms of VMT is considered, women's and men's fatal crash involvements follow the same U-shaped age pattern, that is, high for young ages, lowest through the middle ages, and increasing again starting at about age 65. Overall, the fatal involvement rate for women is lower than for men. However, in some years, the rate for women exceeded that for men in a few of the older age categories. This may be just a spurious effect or part of a new trend as the gender mix of the older driving population changes.

Women engage in less risky driving behaviors than men. Women are less likely to drive under the influence of alcohol, speed, or tailgate. They are more likely to use safety belts. However, early evidence from observation surveys of mobile phone use indicates that women are more likely than men to use a hand-held mobile phone while driving. Again, this is a trend that needs to be monitored.

Women are more vulnerable in crashes than men and more likely to die in crashes of equal force. The patterns of injuries sustained by women in vehicle crashes are also different from those sustained by men in the same type of crash. Vehicle crashworthiness and occupant protection systems are increasingly considering the differences between men and women in their designs. However, much is still unknown and further research is still needed.

More research is needed on occupant protection. More accurate computational models and more accurate crash test dummies that represent women of all ages are needed. There is a particular need to better understand the effects of vehicle protection systems on the pregnant woman and her fetus. There is also a need for better modeling of the conditions of older women drivers, such as osteoporosis.

Another area of needed research is that of driving behaviors with regard to the new technologies that are being introduced, including various in-vehicle assistance systems and communications devices. There is a need to understand how these devices affect driving performance and safety, whether women are using them differently than men, and their implications for driving safety. Naturalistic driving studies offer promising and exciting approaches to this research question.

While much of the research on crashworthiness and the design of occupant protection systems for women can be applied universally, research on the behavioral aspects of vehicle use might be more culturally specific. Good, consistent, and reliable data on crashes, travel, and behavior are not readily available in the developing world, nor is the collection of such data a priority. In the United States and in other developed countries, however,

there are opportunities to study immigrant communities and to identify patterns of vehicle use and behavior that could contribute to the understanding of women's safety issues in societies undergoing motorization.

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What Is Blocking Her Path?
Women, Mobility, and Security

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> I am parking as close to my destination as I can. I'm definitely looking around and being very self-aware, understanding that it is important to be alert. (Amy Stear, Wisconsin Director of 9to5, quoted in Loukaitou-Sideris et al. 2009)

> We are talking about nothing less . . . [than] public transportation justice. This is one of the biggest concerns our members have. As low-income women and mothers, they depend heavily on public transportation, and unfortunately there are not a lot of safe places, especially in the evening, where they can wait for the bus; or they cut off service so you have to walk through not very safe neighborhoods to get home. If you work non-traditional hours, you are screwed! (Anita Rees, Associate Director, LIFETIME, quoted in Loukaitou-Sideris et al. 2009)

Fear and anxiety about personal security impede mobility. Historically, women's presence in public environments and their journeys throughout the city have been impeded by norms imposed on them by society but also by their own fear of victimization. Indeed, fear of victimization and crime is quite widespread among women. Almost every fear of crime survey reports that women are much more fearful than men (Gordon and Riger 1989). Many women are fearful of rape and serious violence against them, but feminist scholars also argue about an existing continuum of violence against women that includes intimidation, groping, sexual comments, harassment, threats, and other nuisance crimes with sexual undertones (Morrell 1996; Stanko 1990). In explaining the gendered nature of fear of crime, criminologists highlight these often "invisible" and underreported crimes against women.

Whether real or only perceived, fear has significant consequences for women and leads them to use precautionary measures and strategies that affect their mobility and travel behavior (Figure 1). These range from the adoption of certain behavioral mechanisms when in public to the choice of specific routes, modes, and transit environments over others to completely avoiding particular transportation environments, trips, and activities deemed as more unsafe for women (e.g., walking or bicycling). Of course, not all women experience similar levels of fear, and significant differences exist among them. As we will later discuss, important sociopsychological, sociodemographic, and environmental factors intervene and may modify women's levels of fear.

This paper takes stock of the issues affecting women's unobstructed movement in the city and assesses changes occurring during the past decades with respect to personal security as it pertains to women's mobility. Following a brief historic overview of issues affecting women's mobility patterns in the city, I discuss how changes in sociospatial conditions are currently affecting women's travel. Because fear of crime and violence influence women's travel behavior, I also examine and assess how research and practice have responded to these concerns. Finally, I outline some promising research and policy directions for making women's travel in the city less hindered by the fear of crime and violence.

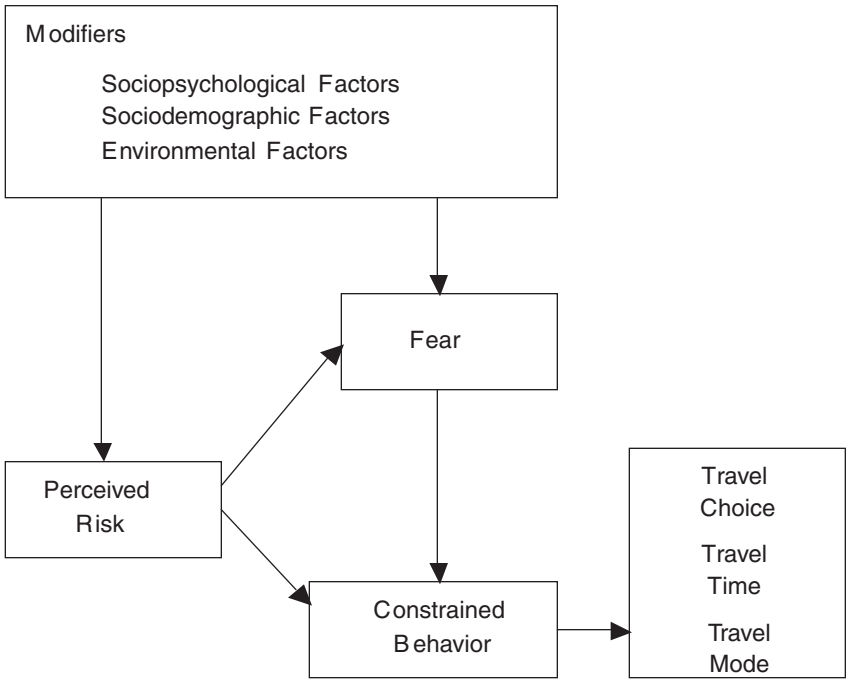

FIGURE 1 Conceptual relationship of perceived risk, fear, and travel behavior.

Women's Restricted Mobility

Historically, and in most societies, women's mobility in the city has been much more restricted than men's, as a sharp division between public and private domains relegated women to a limited domestic role. This was the case in American cities of the 19th century, where the public and private spheres were rigidly separated. While men moved from private realms into public spaces and were expected to easily navigate both spheres, women who wished to maintain middle-class propriety were confined to the private edifices of their homes (Loukaitou-Sideris and Ehrenfeucht 2009). Public and private boundaries were maintained by stigmatizing women who acted improperly (Franck and Paxson 1989). Indeed, no respectable 19th-century middle- or upper-class woman would be seen in public unescorted. In the daytime, only working-class women walked alone on the street as peddlers, and at night a woman alone was considered a prostitute (Baldwin 2002). Harassment and, at times, violence greeted women on the streets. Men intimidated them with "lecherous gazes" and followed, insulted, and abused them with sexual comments (Ryan 1990, p. 69).

While men's rambling and visual exploration of the city were completely accepted, even romanticized as *flaneurie*, women's presence and movement on streets and sidewalks was a source of public anxiety. As Rendell (1998, p. 88) explains, "In streets, the threat to social order posed by a mixing of classes and genders was caused for middle- and upper-class angst. So too was the worry that female forms of male property (mothers, wives, daughters) would be visually and sexually available for other men."

By the late 19th century, when paid labor and paid leisure started contributing to an increasingly heterosocial public life, women's presence in public spaces and movement around the city started expanding. Downtown department stores gave a justification to women to venture downtown. Their window displays extended women's realm to the sidewalks, which were under the purview of the stores, and therefore clean and controlled (Loukaitou-Sideris and Ehrenfeucht 2009).

In the 20th century, women's increasing entrance into the paid labor force increased their presence on the streets and sidewalks and their use of public transportation. As streetcars, elevated trains, and subways started traversing the early-20th-century city, some women riders also appeared but were decidedly a minority. The proximity of bodies in the enclosed space of buses and train cars immediately generated uncomfortable circumstances for women. Referring to the experiences of female riders on New York's Interborough Rapid Transit, which began operating in 1904, *Outlook* magazine complained in 1912 that "a crowding at best is almost intolerable and at its worst is deliberately insulting. . . . Males were often not too chivalrous, and sometimes coarse-grained,

vulgar or licentious" (*Outlook* 1912). The magazine's article and publications by the *New York Times* referred to the sexual harassment and fondling of women riders on the subway as "the Subway problem" (*New York Times*, March 10, 1905; see Hood 1996).

Although societal expectations about the presence of unaccompanied women on public streets and public transportation slowly changed in the 20th century with the increasing entrance of women into the labor force, women's mobility still remained more restricted than men's, for a variety of reasons. For one, women always have been and remain the primary caregivers for children, and they are mostly responsible for domestic chores and shopping. Both sets of responsibilities affect women's mobility patterns, as these activities reduce the amount of time for discretionary activities and travel, increase the number of obligatory short trips related to household chores (trip chaining), and at times force women to look for jobs closer to home, even if these are less well paid or part time (Women's Planning Network Inc. 1995).

Women's travel typically involves more other people and activities than that of men, which also hinders women's mobility (Franck and Paxson, 1989). Empirical surveys of transit riders have often reported the hurdles encountered by women riders who are accompanied by young children in strollers and who have to carry large shopping bags on the buses and trains (Hamilton et al. 1991). Women are also more likely than men to be the caregivers of elderly family members, which may confine them to the home.

While the number of women who own and drive private automobiles has increased consistently over the years, women in many countries still remain more dependent on public transportation than men. This is partly because of the higher poverty levels encountered among women, but also because men are the primary drivers in households that own only one car. Women's greater dependency on public transportation necessarily reduces the time and range of their trips. Similarly, the fear of rowdy behavior and unwanted sexual advances and harassment that can easily take place on crowded buses and trains may act as a deterrent to women traveling at all (Hamilton et al. 2002).

Indeed, one of the biggest hurdles of women's unobstructed mobility in the city remains their fear and anxiety over their possible victimization in public spaces and transit environments. The situation seems to be particularly aggravating for low-income and minority women, who tend to live in high-crime neighborhoods, often return home from work at odd hours, and typically have fewer transportation options than more affluent women (Evenson et al. 2002; Eyler et al. 1998; Thompson et al. 2002; Wilbur et al. 2002).

The relationship between women's fear and the built environment has been the subject of much scholarly research with clear findings that women feel unsafe in a variety of public settings. Whether they are walking alone on the streets or traveling by bus, train, or private automobile, women's fear of public spaces and transportation settings and facilities in turn affects the way they engage in travel. This fear may preclude them from a basic right of the city—the ability to move carefree from origin to destination without worrying that a "wrong choice" of mode, transit setting, or time of travel could have consequences for their safety. The next section examines what is known about women's fear of public spaces and outlines a series of facts and fallacies associated with this fear.

Women's Fear of Public Spaces: Facts and Fallacies

Crime surveys and empirical studies from different parts of the world show that a majority of women fear potential violence against them when they are in public spaces. A number of explanations have been given to this phenomenon. These explanations include the perceived vulnerability of women because of a lesser physical ability to defend themselves (Junger 1987); the influence on them of parental advice and societal admonitions (Loukaitou-Sideris 2005); their greater propensity to transfer past experiences and memories of victimization to present situations (Warr 1984); the additional concern for their children, who often accompany them; and the persistent sexual harassment that they suffer on streets and in public transportation vehicles [United Kingdom (UK) Department for Transport 2002]. Whatever its root causes, women's fear for their security in public places is often amplified by media accounts and the public representation and sensationalization of crime (Loukaitou-Sideris 2005).

Women's high level of fear of victimization and crime does not seem to be justified by statistics, which consistently show low rates of reported crime against women in public spaces. This paradox has led to the fallacy that women's fear of crime is irrational and more of a problem than crime itself (Bennett, in Pain 2001). What the official statistics do not show, however, is that significant numbers of intimidating and even violent acts against women go unnoticed and underreported, and at times may not even be considered as criminal by the police or society (Pickup 2001). Additionally, different types of crime seem to be more prevalent against women than men. Women suffer higher victimization from sexual and harassment crimes as well as snatch thefts and, in certain places, pickpocketing (Smith 2008), and seem to be more intimidated by civil offenses such as drunkenness, obscene language, and verbal threats (Loukaitou-Sideris 2005).

Thus, a second fallacy seems to disregard or render invisible some crimes and acts of sexual harassment (verbal or physical conduct of sexual nature such as groping or fondling) that often take place in transportation settings such as overcrowded buses and trains. Such behavior against women is quite pervasive, as studies in different cities of the world (from New Delhi to New York and from London to Jerusalem) seem to indicate (Fenster 2005; Stringer 2007; Viswanath and Mehrotra 2008). Indeed fear of harassment "cuts across the experience of women in cities and across identities of marital status, nationality, and sexual orientation" (Viswanath and Mehrotra 2008, p. 22). In a public culture that often puts blame on the victims of sexual assault, women are often embarrassed and reluctant to report sexual offenses against them. More empirical and qualitative research justifies women's concerns by contradicting the official statistical numbers and showing that levels of violence against women are significantly higher than those reported by the police (Hall 1985; Loukaitou-Sideris, 1999; Viswanath and Mehrotra 2008).

A third fallacy identified by criminologists is a "spatial mismatch" between the locations in which most violent acts against women usually occur (private spaces) and the locations that women fear most (public spaces). The majority of violent crimes against women are committed by familiar and familial persons at home or in other private settings, not by strangers in public spaces. Yet, the social production of fear, which includes parental admonitions, highly publicized media stories, crime prevention classes at schools, and advice and warnings by the police, tends to emphasize the threat that women face in the public realm. Feminists argue that this fallacy, which underestimates domestic violence, leads also to women being misinformed about the main location of danger and to their avoidance of public settings (Pain 2001).

Additionally, the perception of danger in public spaces has been accentuated in more recent decades by the increasing privatization of public life and the growing preoccupation with control and surveillance of public spaces. This has been reflected in the proliferation of gated communities in the United States and the installation of digital and security technologies in many public spaces of the Western world. Such actions, while intending to serve as deterrents and countermeasures to a perception of crime and disorder, have arguably generated the counter-effect of more insecurity and fear (Graham 2008). Some have even talked about an "inflationary logic" that is inherent in increased patterns of surveillance and protection and in the omnipresence of security hardware and that augments fear and stimulates enhanced demands for protection (Newburn 2001).

Finally, another fallacy equalizes all women and their perceived agoraphobia under a broad and uniform category, ignoring important differentiations of age, race, class, cultural and educational background, sexual orientation, and disability status. This generalized, "one-size-fits-all" approach has been criticized by some, who rightly argue that the fear of crime can be profoundly affected by the aforementioned factors and a series of modifiers (Koskela and Pain 2000; Loukaitou-Sideris and Eck 2007) (see also Table 1). Empirical studies typically find that older women generally feel less safe than younger women (Brownson et al. 2001) but also that different age groups differ in their fear of particular crimes. Thus, younger women (those under age 35) are more afraid of rape than older women (those over age 65) (Silverman and Della-Giustina 2001). Lower socioeconomic status is often shown to be associated with unsafe neighborhoods and transient domiciles (Seefeldt et al. 2002). Therefore, women in poor neighborhoods are typically afraid of being assaulted on the street (Ross 2000). Women from nonwhite and ethnic backgrounds often experience higher levels of fear in their neighborhoods than white women (Ross 2000). Similarly, women with physical or mental disabilities and lesbian women are more fearful of assault in public spaces (Morrell, 1996; Valentine 1996). Sociopsychological factors such as prior victimization, familiarity with a setting, admonitions, and media stories can affect levels of fear. Nevertheless, researchers also warn us not to fall into the trap of considering social groups as uniform or stereotypical, urging a more nuanced analysis of the causes of fear of victimization and crime (Gilchrist et al. 1998).

Although women's fear of public environments often has social connotations, it also appears to be firmly situated in particular settings and physical conditions. Empirical studies such as the analysis of crime data from Chicago show that women tend to be more sensitive

TABLE 1 Modifiers of Fear and Perceptions of Risk

Sociopsychological Factors	Sociodemographic Factors	Environmental Factors
Experiences and memories	Gender	Geographic setting
Prior victimization	Race/ethnicity	Physical incivilities
Familiarity with setting	Age	Social incivilities
Media stories	Poverty	Boundedness
Admonitions	Disability	Surveillance opportunities
		Lighting level

Source: Loukaitou-Sideris and Eck (2007).

than men to signs of danger and social disorder, graffiti, and unkempt and abandoned buildings (Wekerle and Whitzman 1995). A Swedish study using crime data from Stockholm found that women and men respond to similar environmental conditions differently. Women are typically more fearful in public settings because they tend to perceive a higher risk there than men. The researchers attributed that finding to the threatening sexual behavior that many women often encounter from men in public settings (Smith and Torstensson 1997).

Gil Valentine (1990) emphasizes two general categories of spaces as particularly frightening to women: (*a*) enclosed spaces with limited exit and natural surveillance opportunities such as multistory parking structures, underground passages, and subway stations; and (*b*) anonymous and deserted open spaces such as desolate transit stops. The first provide opportunities for criminals to trap and attack women, while the second may allow potential offenders to conceal themselves and act outside the visual range of others.

Finally, as Pain (2001, p. 905) argues, "fear and boldness, although they may be gendered, are not essentially female and male qualities." While many women tend to feel unsafe in certain environmental settings, fear is not inherent in women but, rather, socially constructed. The conceptualization of women as victims entails a certain danger of increasing women's fears or perpetuating the notion that they must "operate under some kind of curfew" (Trench et al. 1992, p. 283).

Women's fear of crime in public spaces has been adequately documented in the past two decades (Gilchrist et al. 1998; Gordon and Riger 1989; Hall 1985; Koskela and Pain 2000; Pain 2001; Valentine 1990). Many of the feared spaces include transportation settings. The next section turns to examine what is known about women's fear of transportation settings.

Fear of Transportation Environments

Research on passengers' perceptions of transit safety has intensified in the past three decades in response to the recognition that anxieties about crime are impeding travel choices and affecting transit ridership and revenue (Atkins 1989; Austin and Buzawa 1984; Ingalls et al. 1994; Loukaitou-Sideris 1999; Reed et al. 1999; Thrasher and Schnell 1974; Wallace et al. 1999). Indeed, studies have consistently shown that fear and anxiety about personal security are important detractors from using public transit (Needle and Cobb 1997). People avoid specific transit routes or bus stops, use them only during the daytime, or do not use transit at all if they believe that they may be harassed or victimized when on the bus or train or at the station or stop. Empirical research in different cities of the Western world has confirmed that fear about crime affects transit ridership. Indeed, a survey conducted by the UK Department for Transport in 2002 showed that "an extra 10.5% of journeys would be generated if the public felt more secure when traveling, particularly when waiting at stations" (Carter 2005, p. 100). Similarly, Wekerle and Whitzman (1995) found that the negative perception of passengers about transit security influenced their decisions to use transit in London, New York City, and Toronto, Canada. Loukaitou-Sideris (1997) found that the majority of car owners who responded to a Los Angeles inner-city survey would use public buses if they perceived them to be clean and safe.

Empirical studies have shown that the presence of certain environmental factors in a transportation setting (e.g., bus stop, train platform, parking structure) is in general associated with greater fear. These factors include darkness, desolation, lack of opportunities for informal surveillance by the general public or the residents of surrounding establishments, lack of maintenance, and poor environmental quality (Atkins 1989; Valentine 1990). Therefore, the physical characteristics of the immediate neighborhood where a bus stop or station is located can affect people's perception of risk and fear. Criminologists have long talked about the relationship between physical incivilities (such as run-down vacant buildings, litter, or graffiti) and fear (Wilson and Kelling 1982). The specific design characteristics of a transportation setting can induce fear among passengers. People are mostly fearful in places where they do not have a clear line of sight of their surroundings; where there are many nooks, corners, or objects behind which someone can hide; and where they may feel trapped with no possibility of escape. Underpasses, tunnels, and dark underground stations are typically more feared than open, ground-level transit facilities (Day in Zelinka and Brennan 2001, p. 7).

Desolation and general lack of people and activity in a transportation setting contribute to anxiety and the fear that no one will be there to help if a crime occurs. The absence of visible staff and other passengers on station platforms and in train wagons contributes to concerns about safety. Women in particular have been found to be quite fearful of empty train cars (Crime Concern and Transport and Travel Research, 1997). At the same time, many women feel that having only one other passenger around while waiting for the bus or train is more threatening than being alone (UK Department for Transport 2004). Although most passengers typically feel safer in the presence of other passengers, drunks, beggars, homeless individuals, and rowdy crowds (often referred to as "social incivilities") in the vicinity of a transit stop or station or on the vehicle can also have a chilling effect on transit riders. Surveying a national sample of 1,101 randomly selected adults, LaGrange at al. (1992) noted

a significant relationship between neighborhood incivilities and perceptions of risk. Rohe and Burby (1988) found that social incivilities were more predictive of fear than physical incivilities, while LaGrange et al. (1992) did not find one type of incivility more predictive of fear than the other.

Almost every survey of transit passengers has found that they feel more unsafe walking to their stops or waiting for the bus or the train after dark than they do during the daytime (UK Department for Transport 2002). Indeed, very few respondents of a 1997 survey administered by the UK Department for Transport felt unsafe waiting at the bus stop alone during the day, but this number increased significantly for nighttime waiting, when 44% of women and 19% of men felt unsafe (Crime Concern and Transport and Travel Research, 1997). Similarly, the British Crime Survey, an annual national survey that gathers information on residents' concerns about crime, found that the majority of residents feel unsafe walking alone after dark (UK Department for Transport 2002). Table 2 shows the significantly higher percentages of British women who feel unsafe after dark in various transportation settings.

Passengers are typically more fearful during their journeys to and from the stop or station and during their wait for the bus or train than when they are on the transit vehicle (Crime Concern and Transport and Travel Research, 1997; Loukaitou-Sideris 1999). Presumably the presence of a bus driver or train operator and the structured setting of the transit vehicle are more reassuring to passengers than the unpredictability of the more public and open environment of the bus stop or station platform.

These sentiments seem to be justified by empirical research. Indeed, in a survey of 10 transit agencies, Shen et al. (1997) found that most crime incidents took place either in the near vicinity of or at the transit station or stop (42% and 36%, respectively), while only 22% of the incidents happened in the transit vehicle.

This fear of transportation settings affects mobility. Empirical studies have shown that women take precautions and make behavioral adjustments to the perceived risk in transit settings. If their financial situation allows, they often prefer to use their car or take a taxi rather than walk or use public transit because of fear for their safety (Loukaitou-Sideris et al. 2009; Stanko 1990; Wekerle and Whitzman 1995). Interviews with leaders of women's advocacy groups in the United States revealed that U.S. women consider riding on the metro safer than riding on the bus, which is in turn preferred to walking or waiting at a bus stop (Loukaitou-Sideris et al. 2009). A survey of Canadian women indicated that about half avoided public transportation and parking structures because of fear of victimization (METRAC 2006). Women more than men also tend to confine their use of public transit to certain hours of the day or to use transit only if they are accompanied by boyfriends, spouses, or friends (Atkins 1989; Ross 2000).

Early studies of transit security did not specifically focus on women's needs. Some have argued that "this is partly due to the imperceptibility of women, for which female researchers criticize most of the existing research. It applies a universal human concept based on the assumption that women and men are in the same situation, and therefore, have the same needs and attitudes" (Larsen and Topsøe-Jensen 1984, p. 2). Increasingly, however, an emerging literature is focusing on women's concerns and fears about personal safety in transit environments (Hamilton et al. 2002; Loukaitou-Sideris 2005; Loukaitou-Sideris and Fink 2009; Lynch and Atkins 1988; Schultz and Gilbert 1996; Smith 2008; Trench et al. 1992). Has our increased knowledge about the causes of women's fear led to more focused research and efforts to understand and address women's safety and security needs? Have more targeted interventions and nuanced policy responses emerged that are tailored to the particularities of different groups of women? The next sessions address these issues.

Women's Distinct Safety and Security Needs

As already discussed, empirical research has clearly established that the transportation needs and travel behavior

TABLE 2 Transportation Settings Where British Women and Men Feel Unsafe After Dark

Setting	Women (%)	Men (%)
Walking in multistory parking structures	62	31
Waiting on underground station platforms	61	32
Waiting on train platforms	60	25
Traveling on the Underground	60	32
Walking from a bus stop or station	59	25
Traveling on a train	51	20
Walking in a surface parking lot	51	21
Waiting at a bus stop	49	20
Walking to a bus stop or station	48	20
Traveling on a bus	40	18

Source: UK Department for Transport (2004), p. 28.

of women are different from those of men (Bianco and Lawson 2000; Rosenbloom 1995), and women typically have more concern for their safety during travel. Nevertheless, as Hamilton and Jenkins observed,

> As consumers of transport, women have too often been assumed to have identical needs to men's. However, it is clear that women have travel needs as significant as those of men and in many respects distinct from them. We do not believe or assume that all women are the same or feel the same about public transport. . . . However, there are sufficiently significant differences between women's transport demands and experience as opposed to men's—differences in access to private transport, in patterns of commuting and employment, in child- and elder-care responsibility, in basic attitudes to private and public transport—to justify treating women separately. (Hamilton and Jenkins 2000, p. 1794)

While scholars agree that women have diverse and specific travel needs, few researchers, transit agencies, or policy makers have directly asked women riders about their safety needs or sought to identify women's proposals and preferences regarding safe and secure travel. The limited information we have on this topic comes primarily from surveys of women in the United Kingdom and Canada as well as safety audits undertaken by women in these two countries and other parts of the world (Whitzman 2008). In safety audits, women walk around a transportation setting or public environment noting their fears and concerns and making suggestions for improved safety. From such surveys and audits, we know that women passengers generally prefer staffing to technological solutions and are very skeptical of the tendency of transit agencies to replace staff from trains or buses with automated machines. Thus a study of women's transport needs in Great Britain's West Yorkshire conducted in the late 1980s found that women wanted the reinstatement of conductors in buses, mostly for reasons of security (Hamilton et al. 2002). Discussing the findings of a 2002 survey by the UK Department of Transport, Carter explained that

> When traveling by bus, women prefer an additional staff member and the refusal by the driver to board those influenced by alcohol or drugs, whereas men prefer CCTV [closed-circuit television] and in-vehicle radio contact for the driver. On trains, women and men both prefer to have a staff member walking through a train, although for women the preference is more marked. (Carter 2005, p. 100)

Similarly, an earlier survey of women in Southampton, England, found that they repeatedly favored more staff and police officers as measures to improve their perceptions of safety while on buses, in parking lots, or on the streets (Lynch and Atkins 1988).

The tendency of many transportation agencies to retrofit their station platforms and bus stops with CCTV cameras seems to offer little comfort to women. Female participants in focus groups and workshops in Nottingham, England, argued that they "do not feel more secure in the knowledge that someone, somewhere is supposed to be watching them" (Trench et al. 1992, p. 291). Similarly, a study of transit passenger reactions to implemented safety measures in Ann Arbor, Michigan, found that while CCTV cameras were the most noticed of the various security improvements, they did not have a significant impact on passengers' feelings of safety (Wallace et al. 1999).

Certain design measures seem to have a positive effect in reducing women's fear. Surveys of women passengers in the United Kingdom (Lynch and Atkins 1988; Trench et al. 1992), Canada (Scarborough Women's Centre–METRAC 1991), and the United States (Wallace et al. 1999) showed that good lighting has a positive role in reducing women's fear. Women conducting safety audits in Scarborough, Canada, indicated, however, that good lighting should extend from the bus stops to the adjacent streets so that bus stops avoid the "fishbowl effect"[1] (Scarborough Women's Centre–METRAC 1991). Good visibility and natural surveillance opportunities of transit stops and stations from surrounding establishments emerged as a positive feature in the 1997 national perceptions study conducted in the United Kingdom. In contrast, survey participants argued that they often felt unsafe and entrapped in corridors and ramps leading to underground stations (UK Department for Transport 2002). Similarly, interviews with representatives of women's advocacy organizations in the United States showed that the location of transit settings (particularly bus stops) near people and activities was deemed essential to achieve the "safety in numbers" dictum (Loukaitou-Sideris et al. 2009). Some respondents in the same study also argued for bus shelter designs that allow good visibility from the surroundings.

Surveys in the United Kingdom revealed that general maintenance and upkeep of transit facilities and the regular cleaning of graffiti and litter received high marks from women riders. In contrast, the presence of graffiti and litter at transit settings, the absence of visible staff, the inadequacy of travel information, long wait times, and infrequent service contributed to feelings of insecurity (UK Department for Transport 2002).

[1] The "fishbowl effect" describes the situation in which a setting (e.g., a bus shelter) is brightly lit, but the surrounding environment is dark. In such a case, the passenger is seen, but he or she is unable to see others outside the bus shelter.

Women seem to have mixed reactions to segregated transport schemes that establish women-only services or women-only cars on commuter trains and subways. Female transit riders in Brazil seemed to appreciate them (Khimm 2006), while women in Southampton, England, were concerned that such segregated transport facilities would draw attention to them as targets (Lynch and Atkins 1988). Policies viewed positively by women passengers include request-stop programs, allowing women to disembark from the bus at locations closer to their final destination during late evening hours, taxicab vouchers for low-income women, real-time information on bus schedules to minimize long waits (which are perceived as unsafe), public awareness campaigns against violence, and visible signs in public places denouncing sexual harassment and groping (Figure 2) (Loukaitou-Sideris et al. 2009; Schulz and Gilbert 2000; Trench et al. 1992).

(Lack of) Response of U.S. Transit Operators

While research clearly indicates that women have distinct security needs, the response of transit operators around the world has been uneven.[2] U.S. transit agencies have largely failed to develop particular programs and interventions and tailor safety and security strategies to the specific needs of their female clients. Indeed, a recent survey of 131 U.S. transit agencies found that while two-thirds of the agencies indicated that female passengers have distinct safety and security needs, only about one-third believed that transit agencies should institute specific programs for them. Only three of the surveyed agencies had instigated programs targeting the security needs of women riders. Interestingly, a significant number of agencies rightly provide special services to other subgroups of vulnerable customers (senior citizens, handicapped individuals) but are worried that they may be accused of "reverse discrimination" if they develop specific security strategies for women (Loukaitou-Sideris and Fink 2009).

Additionally, the study showed a serious mismatch between the existing safety and security practices of transit operators and the needs and desires of women passengers as identified in scholarly research and interviews with representatives of women's interest groups. For example, U.S. transit operators tend to concentrate their security measures on the more enclosed and easily controllable parts of their system (buses, trains, and station platforms) and generally neglect the more open and public parts (bus stops and parking lots) (Figure 3). This pattern does not serve women's needs well. Women passengers are typically more fearful of desolate bus stops and empty parking lots than being seated among other passengers on the bus or train. Similarly, most agencies seem to privilege technological over human security measures, which goes contrary to women's wishes.

There seem to be important reasons why the response of U.S. transit operators to the particular safety and security needs of women is less than satisfactory and why there is a mismatch between research findings and policy. For one, unlike in some other countries, there has been no funded mandate or support from the federal or state governments to address women's safety and travel needs.

Second, only limited financial resources are available to public transit operators. As indicated by Taylor et al. (2005, p. 8), especially after September 11, 2001 (9/11), "transit managers have struggled to balance the costs and uncertain benefits of increased transit security against the costs and certain benefits of attracting passengers." There is no doubt that transit agencies do not have the resources to install a police officer at every transit stop in their system. Security strategies generally favored by transit operators, such as the installation of cameras, are decidedly less expensive than instituting police patrols or employing security personnel on transit vehicles and at stops.

Third, the overreliance on technological responses to crime is also influenced by the aggressive post-9/11 marketing of "antiterrorist" technologies and security hardware by the security industry as well as by the example of British and Japanese cities, which have extensively retrofitted their stations with security cameras and CCTV technology (Cherry et al. 2008).

[2] This section is drawn from Loukaitou-Sideris and Fink (2009).

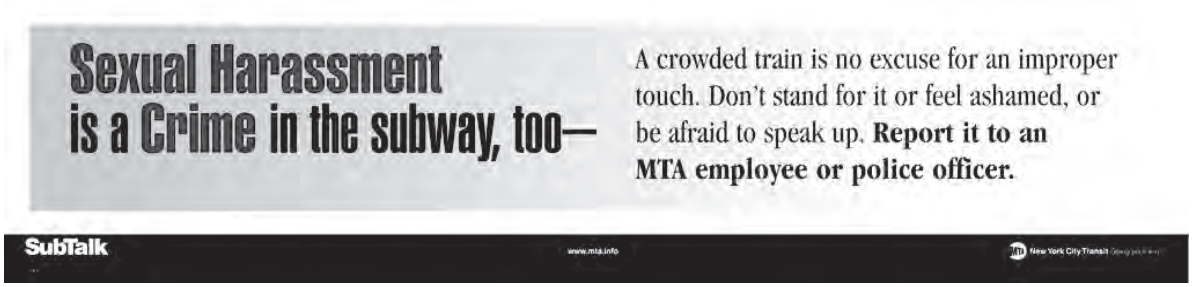

FIGURE 2 Sign installed at New York City stations by Metropolitan Transportation Authority.

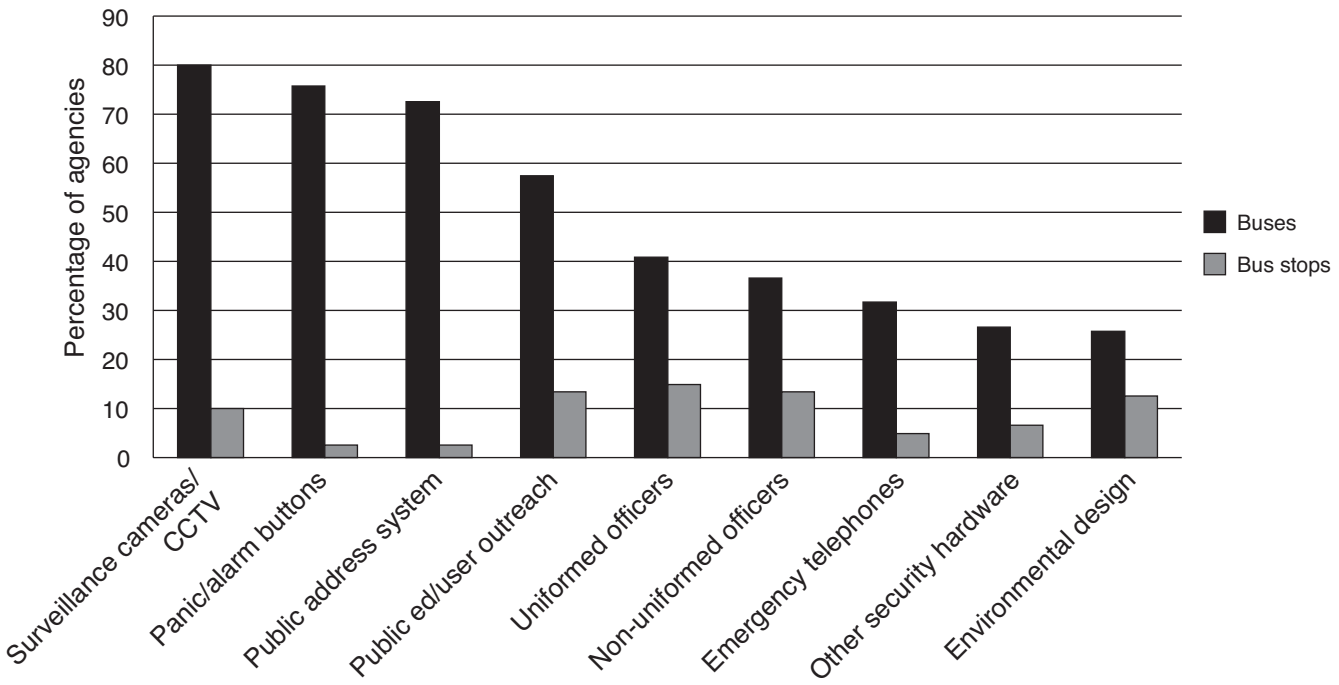

FIGURE 3 Security measures on buses and at bus stops. [Source: Loukaitou-Sideris and Fink (2009)].

Fourth, transit operators are facing a risk-management dilemma, as the courts are not inclined to find against them when passengers are accosted while travelling to and from bus stops and stations. On the other hand, if a transit agency institutes an on-street security program and then fails to provide accurate security measures, and an incident occurs, it may be found liable by the court.

Fifth, the concentration of male planners in transportation planning is arguably higher than in other planning subfields. Therefore, it is likely that men are overrepresented in the gender mix of management in public transit agencies, and they may not be knowledgeable about or responsive to the particular needs of their female transit customers. In our survey (which was sent to the general managers of transit agencies) 76% of the respondents were male. As already mentioned, a higher percentage of female than male survey respondents indicated that women passengers have distinct needs; however, this difference was not statistically significant (Loukaitou-Sideris and Fink 2009).

In contrast to the situation in the United States, during the past decade, municipal governments and transit operators in other parts of the world have started responding to the different travel needs and concerns of women by initiating specific policies and plans. Australia, Canada, Germany, Japan, Mexico, Sweden, and the United Kingdom, among other countries, have initiated a variety of measures to ease the fear of women passengers and provide them with more safe and secure public transportation. For example, the municipal government of Mexico City started the WE TRAVEL SAFE program in 2007, with the goals of responding to women's needs and preventing physical and sexual violence in the city's public transportation system. In Canada, a number of municipal governments have funded the nonprofit Metropolitan Action Committee on Violence Against Women and Children (METRAC) to train community and women's groups to conduct safety audits of transportation settings. In 2005, the Government of South Australia's Minister for the Status of Women launched a program called Our Commitment to Women's Safety that explicitly focuses on improving the safety and security of transportation settings. Transport for London (TfL), one of the largest transport operators in the world, has initiated plans targeting the needs of its women riders, while the government of Great Britain issued the Gender Equality Duty in 2007, a mandate to all public agencies to promote gender equality and eliminate sexual discrimination and harassment. During the same period, some grassroots groups in the United States and overseas have also developed initiatives that seek to enhance women's mobility and unobstructed travel in the city and reduce their fear. The next section highlights some of these efforts.

Initiatives Tackling Women's Transportation Needs

This section presents four indicative examples of initiatives and programs that seek to address women's concerns for safe travel. The examples are quite

varied in terms of scope and means. They include a comprehensive planning effort undertaken by a large transportation agency in the United Kingdom; a partnership between a nonprofit organization, municipal governments, and communities in Canada; and two grassroots efforts in the United States. They all have the common goal of providing safer transportation options for women.

TfL's Initiatives for Women Passengers

TfL has initiated a large effort of understanding and responding to the distinct needs of its women riders, reasoning that "once TfL has improved London's transport system to a standard that meets the needs of every woman, then everyone in London will benefit" (TfL 2007, p. 9). TfL is supported in such efforts by the Women's Transport Network (WTN), which is facilitated by the Accessibility and Equalities Unit of the UK Department for Transport. The WTN was established in 1995 "to bring together like-minded women who work in the transport sector in the UK" and now has about 200 members (Annette Lewis, quoted in Loukaitou-Sideris et al. 2009). The WTN was influential in helping the Department for Transport initiate and support research on gender auditing that led to a significant publication in 2000 titled *Women and Public Transport: The Checklist* (UK Department for Transport 2000). This publication, which was distributed to all municipal governments and transport operators in the United Kingdom, urges them to conduct regular gender auditing of the vehicles and waiting areas of their transportation facilities and provides a detailed checklist for doing so.[3] As reasoned in the document,

> Gender auditing is a means by which public transport operators and other providers can assess whether the services within their responsibility take account of the specific needs of all their passengers: men, women, and children. . . . While gender auditing seeks to benefit both men and women passengers, the emphasis is on women. . . . The Gender Audit pack has been prepared for use by managers to: 1) raise awareness of the gender differences in use and experience of public transport by men and women; 2) assess how well the organization meets women's needs; 3) identify priorities for improvement; and 4) measure progress towards targets. (UK Department for Transport 2000, pp. 1–4)

TfL issued in 2004 its first Women's Action Plan for London, titled *Expanding Horizons,* which is a far-reaching document that includes a total of 21 actions to better address the needs of women riders. The plan is motivated by the realization that

> There are recognizable differences between women's transportation demands and experiences, as opposed to those of men. . . . Women are heavy users of public transport. However, the message that we regularly hear from women is that they have to overcome several barriers to use the system. It also seems that women are increasingly more prepared to turn to the car as a means of meeting their specific transport needs. In order to build or renew women's confidence in public transport TfL wants to understand the barriers women face and address their needs. (TfL 2004, p. 4)

TfL's Women's Action Plan has the following four goals (TfL 2004, pp. 6 and 7):

- Improve levels of real and perceived personal security;
- Provide a transport system shaped by women's lifestyles and needs in terms of flexibility, cost, and accessibility;
- Develop TfL's relationship with women by proactively engaging with them to better comprehend their travel preferences and the barriers they may face; and
- Increase the number of women employees at TfL.

To increase levels of security, the plan initiates or enhances a series of actions and offers a time frame for their implementation. These actions include the following:

- Transport Policing Initiative, which calls for the hiring of additional uniformed officers for London's bus network and London Underground.
- Safer Travel at Night Initiative, which includes personalized night travel information at college campuses and the designation of "hub stops" with safe waiting areas along night bus routes.
- Real Time Information Initiative with electronic displays at stations and bus stops, showing arrival times of services. At the time that the Women's Action Plan was issued, about 2,000 bus stops (out of approximately 17,500) already had such displays installed.
- Secure Stations Scheme, a national accreditation scheme setting standards for safety that was launched in 1998 to improve security at Great Britain's railway sta-

[3] The checklist includes 96 items that require a response of yes or no. The items are grouped into 12 categories: 1) Gender Equality: Policy and Commitment; 2) Staff Recruitment and Training; 3) Service Planning; 4) Passenger Research; 5) Consultation; 6) Passenger Complaints; 7) Fares and Ticketing; 8) Service Information; 9) Getting to the Stop or Station; 10) Getting on Public Transport; 11) Information; and 12) Comfort and Security.

tions.[4] By 2004, 20 London Underground stations had been accredited and more were in the pipeline for accreditation. Additionally, security enhancements for the above-ground network of stops and stations have been launched on pilot routes. These included 24-hour CCTV; better lighting, signage, and customer information; reduced waiting times; the availability of staffed Help Points at stations; and the removal of graffiti and vandalism damage from bus shelters and transit vehicles.

To achieve the goal of providing a transport system shaped by women's lifestyles, the Women's Action Plan calls for a series of actions that include the promotion of alternatives to car use, so that parents do not always have to drive their children to school. Since many women are working part time, the plan proposes discounted fares for part-time employees. It also calls for more research to evaluate the success of providing child-care centers at transit stations. The plan calls for a fleet of buses that are low-floor and step-free, allowing easy access by disabled individuals and women carrying strollers and young children. Additionally, the plan calls for an upgrading of bus stops to ensure that they are compatible with the low-floor, step-free transit vehicles (TfL 2004).

A number of actions are also proposed in the plan to improve TfL's interaction with its women customers. The agency has started consultation with women's focus groups across London to find out about their specific travel needs and has plans to commission research studies investigating the various lifestyles of London women and their impact on travel patterns. TfL has started reviewing its passengers' correspondence by gender to gain a better understanding of the complaints raised by women riders. The agency is also in the process of reviewing and determining standards that safeguard against advertising that is offensive to women. Finally, the plan sets recruitment targets to increase participation of women in its labor force from the current 22% to 52%, which is in alignment with London's population (TfL 2004).

A number of the proposed actions are under way or have been completed. More specifically, by 2005 all London buses had become low floor and step free. The new London buses have large designated spaces for people with strollers, and this space also accommodates wheelchairs. There are also designated areas on the bus for packages and groceries, which are also useful for the elderly and infirm. Of London Rail's above-ground stations, 172 have been retrofitted with CCTV, while 160 stations have monitored Help Points. Two-hundred additional transit police officers have been hired for the London Underground and Docklands Light Rail network, and 89 extra officers have been hired for the above-ground network. TfL completed the installation of real-time information on buses, bus stops, and stations by the end of 2008 (TfL 2007).

In 2007, in response to the government's Gender Equality Act of 2006, which required all public authorities in Great Britain to produce a gender equality scheme,[5] TfL published the Gender Equality Scheme 2007–2010. This process involved extensive consultation with 140 different women's groups in London's 24 different boroughs. The consultation informed the proposed action plan, which falls into five broad categories: accessibility, safety and security, affordability, information, and employment in the transport sector. The 2007 plan extends the plan of 2004 by presenting all the key concerns women riders identified in TfL's many consultations; it also outlines a specific timetable as well as the responsible agency unit charged with the implementation of each proposed action.

TfL's Women's Action Plan and Gender Equality Scheme constitute what is arguably the most comprehensive effort by a transport operator to respond to the needs of women riders. The effort is notable and represents a best practice not only because of its wide-ranging initiatives but also because it involved an unprecedented inclusion of women's voices in the planning process.

Safety Audits by METRAC

METRAC was founded in the early 1980s as a reaction to a series of sexual assaults and rapes that had occurred in Toronto parks. There was an outcry from many women's groups, as well as support from counselors and police, to form a specific body and committee to address violence against women in public spaces. Since that time, METRAC has grown into a nonprofit, community-based organization that partners with municipal agencies and community groups to increase women's safety and provide safer public spaces for women. According to METRAC's website,

> We work collaboratively with a broad range of partners to develop strategies to end violence against women and build safer communities for everyone. METRAC has three main program areas: Community Safety, Community Justice, and Community Outreach and Education. . . . The Community Safety Program provides training, workshops, and

[4] To achieve accreditation as a Secure Station, the operator of the station must demonstrate that "1) the design of the station conforms to standards which prevent crime and improve passenger perceptions; 2) the station is managed so as to prevent crime, respond to incidents, and communicate effectively with passengers; 3) the crime rate at the station is evidence that crime is being managed; and 4) passengers feel secure when using the station" (UK Department for Transport 2000, p. 15).

[5] The Equality Act of 2006 in Great Britain stipulates that all public authorities enact the "gender equality duty" as of April 2007 to eliminate sexual harassment and discrimination and promote gender equality.

> educational materials on personal and community safety in the diverse communities of Toronto. . . . We work with individuals, community groups and organizations, government agencies, police, educational institutions, development companies, and the medical profession in drafting recommendations and developing long term safety plans and actions for safer communities. (METRAC website, http://www.metrac.org)

A major contribution of METRAC is the invention of the safety audit process. This is a tool that can be used by a group to document a variety of physical and social factors in its environment. Safety audits provide a method of evaluating space from the perspective of those who feel threatened and lead to improvements that reduce the risk of assault. METRAC developed the tool as a grassroots approach that could empower community members and women. According to METRAC's safety director, Narina Nagra,

> METRAC was the first organization to create safety audits in 1989. METRAC pioneered the idea of safety audits and the concept that a group of women, who live in and frequent an area, can assess the physical elements of a neighborhood and help improve safety and prevent assaults. Through the safety audit process, METRAC developed best practices around physical features and standards for safety. Since that time the safety audit has become a global resource that has been translated around the world. Different governments use it in different capacities. (Narina Nagra, quoted in Loukaitou-Sideris et al. 2009)

Indeed, a recent survey of organizations working on women's safety around the world, commissioned by the UN–Habitat Safer Cities Programme and the Huairou Commission (2007, p. 19), found that the safety audit was the "single specific tool most often mentioned." It has been translated into different languages and adapted and replicated worldwide and is generally recognized as a best-practice tool. The tool has been used extensively by the city of Toronto, where women, youth, and community groups audited more than 150 neighborhoods between 2000 and 2004 (METRAC website, http://www.metrac.org).

METRAC collaborated with Toronto's Transit Commission to conduct a comprehensive safety audit of the city's transit system. The goal was to assess the Toronto transit system and define ways it could be made safer for women riders. METRAC made the following recommendations:

- Transparent bus shelters for better visibility,
- Emergency intercoms in transit settings with little or no staff,
- Elevators for safer and easier access of under- or above-ground transit settings,
- Designated waiting areas at subway stations that are well lit and equipped with CCTV cameras and intercoms, and
- A request-stop program on buses between 9 p.m. and 5 a.m. for women traveling alone.

Most of these recommendations, including the request-stop program, were implemented (METRAC website, http://www.metrac.org).

Through the safety audit structure, METRAC hopes that communities are becoming more centrally involved and empowered, not only to identify safety issues, but also to make more connections within their community and to affect change. As Nagra argues,

> The process gives community members an opportunity to discuss safety, which has become obsolete in our society in so many ways. In particular, it has become normalized that women should be fearful at night. . . . The [safety audit] benefits are around empowering communities to address public safety and for individuals to connect with their community. Safety audits are a community development tool in many ways, because they can foster dialogue around these issues and provide an opportunity for staff and residents to come together to address these issues. A lot of times we don't feel that we have a say in what kind of safety we should have. And our tool provides a way to say, "yes we can address these issues together." (Narina Nagra, quoted in Loukaitou-Sideris et al. 2009)

Using the community as safety experts is not without challenges, however. As Nagra explained, "because we put the responsibility back in the hands of the community, lack of resources and time can make it difficult to get information back or keep the process moving forward. There is also a lack of funding at the municipal level to make changes and implement community suggestions" (quoted in Loukaitou-Sideris et al. 2009). Another challenge comes in the form of gentrification, as safety audits have been used at times to gentrify an area or push people out. Low-income or homeless individuals, sex workers, and drug addicts are often identified as safety concerns by neighborhood groups who seek their removal. METRAC believes that space should not be made safer for some at the expense of others by simply calling the police and getting rid of certain groups; rather, communities should work toward identifying safe places and fostering more resources for these marginalized groups.

RightRides

RightRides is a grassroots nonprofit organization that offers women, transgendered people, and gender-queer individuals a free, safe, late-night ride home on Saturday nights and early Sunday mornings in 45 New York City neighborhoods. The RightRides motto reflects the heart of its goals: "Because Getting Home Safely Shouldn't Be a Luxury."

The organization began in 2004 as a response to increased assaults against women who were walking home alone at night in Brooklyn. The free service provides secure transportation for individuals who feel threatened walking the streets and who find that other transportation modes, such as cabs, private cars, or public transit, are financially unviable or otherwise risky. The organization relies on volunteer drivers and has partnered with Zipcar (a car-sharing service), which provides six vehicles for free use during RightRides operating hours as well as discounted Zipcar memberships for the RightRides volunteers. For each shift, volunteer drivers are paired with volunteer navigators. The responsibility of these teams is to "see our riders home safely and help advocate for their increased personal safety." (RightRides website, http://www.rightrides.org). Driver–navigator teams are dispatched by a volunteer dispatcher with the aim of reaching the rider within a 20-minute window. All driving teams go through a screening process to assure a safe and supportive environment for all riders and volunteers, and at least one person on each team has to be female.

Since September 2004, when RightRides started, it has grown from its two founders using their own private car to an award-winning organization with a fleet of six cars and more than 100 active volunteers. A larger organization, RightRides for Women's Safety, Inc. (RRWS), has also been established. In addition to the RightRides program, RRWS operates initiatives that encourage empowerment and awareness in an effort to reduce the risk of harassment and assault in New York City. Such initiatives include the Neighborhood Safety Meetings Program, which organizes panel discussions with local leaders in crime prevention to hear the concerns of participants and generate discussion regarding neighborhood street safety. RRWS also supports a Safe Walk program that provides walking escorts and educational programs that hope to "empower and educate people of all ages and backgrounds to increase their personal safety awareness to reduce the risk of harassment and assault" (RightRides website, http://www.rightrides.org).

RRWS assisted in conducting a Subway Safety Survey in 2007 that was undertaken by the Manhattan borough president's office. Nearly two-thirds of the 1,780 survey respondents reported some version of sexual harassment on the subway, and one-tenth reported sexual assault. RRWS uses this study, titled *Hidden in Plain Sight: Sexual Harassment and Assault in the New York City Subway System* (Stringer 2007), to encourage the transit police and the Metropolitan Transportation Authority to take the issue more seriously. RRWS is a central organizer leading a new effort, the Subway Safety Coalition. Formed in 2008, the coalition is pursuing the recommendations of the Manhattan borough president's report by collaborating with civic groups and other community organizations, such as Hollaback NYC, to pursue further work in this area (RightRides 2008).

If there is any criticism of RightRides, it is that many are unaware of the program despite ongoing outreach efforts, such as posting flyers and distributing the dispatch number on palm cards. Primarily known through a strong word-of-mouth network, RightRides would benefit from better publicity, especially in the neighborhoods that it covers. The founders, however, are optimistic and see the program as "a seed for further action."

Hollaback NYC

Hollaback NYC is a grassroots website (http://www.ihollaback.org) that provides a forum for victims of street harassment in New York City, who contribute verbal and visual postings that document their assaults. The goal is to offer a virtual public space for women to reclaim power from perpetrators by providing a collective location for the victims' stories to be told and their assaulters to be recorded. According to the Hollaback NYC website, the "larger goal of the program is to support women's rights to exist in public in safety and without fear of harassment, particularly on the street" (http://hollabacknyc.blogspot.com).

Hollaback NYC was founded by four women and three men in September 2005, following a well-publicized sexual harassment incident on the New York City subway. In the summer of 2005, a young woman riding the train used her cell phone to snap a picture of her harasser as he was performing a lewd act in front of her. She took the picture to the police who did not show interest in the evidence presented. She then posted the image on the Web, warning other women to watch out for this guy. The *New York Daily News* picked up the story and published the image on its front page. This led to further identifications of and accusations against the perpetrator by more women victims and, subsequently, to his arraignment in court on four counts of public lewdness (Clift 2006). Motivated by this incident, a group of young people established the site to allow women to tell their stories and post pictures of their harassers in an effort to stop them.

According to Emily May, one of the Hollaback NYC founders, "street harassment happens to women on a daily basis. Men don't understand the extent or effect

of the harassment, and women are in denial like other women who are coping with violence against women. That's why we wanted to give them a safe space to talk about it" (quoted in Clift 2008). May also sees the site as an opportunity for women who are victims of street harassment to find others in similar situations who are sharing their stories. This helps combat the fear of confronting abuse and harassment and promotes simple recognition of what constitutes appropriate behavior and what crosses an acceptable line. Obviously, the proliferation of the Internet is necessary for the successful operation of Hollaback, as are cell phones with photo (and now video) capabilities. The down side of this, however, is that those with access to technology have a greater opportunity to join the group's community than those without.

Since its establishment, the website has accumulated multiple postings and has on average 1,500 hits per day (Agrell 2007). As the original website started receiving significant media attention, several national and international branches of Hollaback emerged in Boston, Massachusetts; Charleston, South Carolina; Chicago, Illinois; Miami, Florida; San Francisco, California; Seattle, Washington; Washington, D.C.; and Toronto, Canada, among other cities. The founders believe that all this attention and visibility have helped to bring awareness to the severity and seriousness of street harassment.

Hollaback's NYC founders also hope that their site has made transit police more sensitive and attentive to the security issues faced by women riders, as evidenced by the aforementioned sting operation and the posting of signs and posters at New York's subway stations. On the other hand, the organization has also raised criticism by those who are concerned that it perpetuates a surveillance society, mutual suspicion, or even paranoia, and may open the door to misuse and defamation (Belgiorno 2006).

Taking Stock: What Is Promising; What Needs to Happen

> Safe transportation will get you to work, get your kids around. So access to safe and affordable transportation anywhere, at any time, is a legitimate feminist concern. (Rev. Della Fahnestock, Alliance of Faith and Feminism, quoted in Loukaitou-Sideris et al. 2009)

In the past few decades, a number of promising trends have appeared that work to increase women's safe travel and unobstructed movement in the city. On the research front, we have witnessed a significant increase in scholarly activity on issues relating to women's safety, travel patterns, and health. At the same time, advances in environmental criminology have promoted the concept of "situational crime prevention" as a way of reducing opportunities for crime. This concept asserts that the physical and social characteristics of spaces determine offenders' decisions and suggests that prevention will be more effective if a careful analysis of the microenvironment is undertaken before developing prevention programs (Loukaitou-Sideris and Eck 2007). Situational crime prevention is largely compatible with earlier crime prevention strategies, such as crime prevention through environmental design, and seems "particularly well suited for a public transport context where large numbers of strangers come into close contact with each other across a wide variety of settings" (Smith 2008, p. 125). This approach, which stresses the importance of focusing on the particular sociospatial characteristics of the microenvironment of crime, rejects the "one-size-fits-all" model in favor of a better understanding of specific needs, contexts, and situations. In parallel to these developments, research toolkits such as safety audits have been developed and disseminated across different global contexts, allowing groups affected by fear and crime to document and convey their concerns to policymakers.

From the policy perspective, the past decades have witnessed a progressive transformation of crime prevention from approaches focusing almost exclusively on criminal justice and policing to broader, multiprong strategies that include education and outreach, environmental design, security technology, and problem-oriented policing components. At the same time, an understanding is emerging that responses to crime and violence against women require coordinated approaches at different scales, from international and national directives and plans, to local government initiatives, to community and grassroots efforts (Whitzman 2008). A number of agencies around the world (though, woefully, not extensively in the United States) have started incorporating a gender perspective in crime prevention, enacting "gender audits." These recognize the differences in the needs of men and women and assess the implications of planning interventions as well as the safety of spaces from the perspectives of both groups.

Finally, from an activism standpoint, we have witnessed the emergence of robust movements and coalitions in different parts of the world fighting to decrease and eliminate violence against women. Globalization and digital technologies assist in the spreading of information and the building of coalitions across national borders. Even the powers of cellular technologies and the World Wide Web are being mobilized to lessen harassment against women, as the Hollaback initiative demonstrates. As Whitzman argues (2008, p. 252) "there is a greater stress on grassroots ownership, participatory processes, and leadership skills in capacity building in community safety."

While the aforementioned trends are very promising, the example of U.S. transit operators and many other public agencies around the world shows that ambiguities among transit operators still exist regarding the security needs of and the appropriate security measures for female passengers. There is an almost complete lack of implemented programs in the United States. This finding points to a significant gap between research and practice and to a mismatch between the needs of women and the practices of many transit agencies. Researcher–practitioner dialogues and incorporating women's voices in the planning process may help close this gap.

Researcher–Practitioner Dialogues

The initiation of researcher–practitioner dialogues in professional and academic conferences would help make research on women's issues in transportation more accessible to transit professionals. Initiatives, programs, and policies targeting women's safety in Australia, Canada, Germany, Japan, Sweden, and the United Kingdom remain largely unknown in the United States. The compilation, publication, and dissemination of best practices from the American Public Transportation Association and the Transit Cooperative Research Program would allow operators to access information about the lessons learned from successful programs in other countries.

Incorporating Women's Voices in the Planning Process

Women are often the real experts of their neighborhoods, and they are the best to articulate their own needs and to identify the barriers they may encounter that limit their mobility. The incorporation of women's voices in planning and policy making regarding transportation issues through regular consultation with focus groups, targeted surveys of women passengers, and safety and gender audits would help diminish the current ambiguity of transit operators regarding gender-appropriate safety and security measures.

Partnering with Local Nonprofits

As the examples of RightRides, Hollaback, and METRAC indicate, community, grassroots, and nonprofit groups have an important role to play in promoting women's safe travel. Such groups are often hampered by a lack of resources and organizational structure. A partnership of such nonprofit, community, and volunteer groups with municipal departments and transit agencies can be beneficial for both parties and, most of all, for women's safety.

Prioritizing Needs

The issue of funding safety and security initiatives is always challenging for transit operators. At the same time, particular transportation settings in a city may be less safe than others. A recent survey of U.S. transit agencies showed that less than one-third of them assess the different safety and security needs on their systems and allocate security resources accordingly (Taylor et al. 2005). A careful monitoring of incident reports, coupled with regular safety and gender audits and situational crime-prevention techniques, could help agencies make the best use of their limited security budgets.

Adopting a "Whole-Journey Approach"

Although transit agencies have to prioritize their needs, they should not focus their resources solely on improving the safety of their vehicles or transit stations. It is clear from empirical studies (Loukaitou-Sideris et al. 2002; Smith 2008) that in addressing crime and fear of crime, a whole-journey approach should be adopted. Block and Davis (1996) have found that areas in close vicinity of Chicago transit stops were more susceptible to street crime than station platforms, while Loukaitou-Sideris et al. (2002) found that a significant percentage of crime incidents occurred at parking lots adjacent to Green Line stations in Los Angeles. A holistic approach is challenging, however, as it requires a better coordination between transit agencies and other entities responsible for public environments (e.g., bureaus of street services and sheriff's departments).

Tailoring Safety and Security Initiatives to Particular Needs of Communities

Different groups have different needs as well as different levels of vulnerability. It is therefore important that interventions be tailored to the needs of particular subgroups as well as to the characteristics of the neighborhood and its various transportation settings. It is also important to evaluate whether proposed interventions are reaching the populations who seem to display higher levels of fear and vulnerability, may be more susceptible to crime and harassment, and may have the fewest mobility options, such as the elderly; low-income, minority women; and individuals who are lesbian, gay, bisexual, or transsexual.

Adopting a Multipronged Approach to Safety

Crime prevention interventions from different parts of the world point to the need for a multipronged approach

to women's travel safety. Environmental design strategies should be complemented by policing and neighborhood watch groups, the use of security technology in transportation settings, information and media campaigns (e.g., antiharassment messages on bus shelters and stations), and specific policies (e.g., escort programs, cab vouchers, request-stop programs) that intend to decrease the fear of women riders. The balance and particular mix of these strategies should depend on the particularity of each setting, women's expressed needs, and available resources.

Initiating Pilot Programs

The creation of certain pilot programs with the explicit goal of enhancing the safety of women riders, supported though targeted and competitive funding from the Federal Transit Administration, could go a long way toward implementing initiatives "on the ground" and measuring their impact and success.

Safe travel is extremely important for both men and women. Being able to access desired destinations safely and with comfort is not only an aspect of the quality of life in cities, but also relates to one's economic security and well-being. Safe travel and unobstructed mobility should, therefore, be seen as an important right of citizens. This right is at times compromised for women, who feel that their paths in the city are blocked because of crime or fear of violence. The above initiatives would be the necessary first steps toward a transportation system that serves the needs of female passengers and achieves what the quote of the introduction referred to as nothing less than transportation justice.

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Appendices

APPENDIX A

Technical Papers in Volume 2

Female Involvement in U.S. Fatal Crashes Under a Three-Level Hierarchical Crash Model: Mediating and Moderating Factors

Eduardo Romano, Tara Kelley-Baker, and Pedro Torres

Spatial Variation in Motor Vehicle Crashes by Gender in the Houston, Texas, Metropolitan Area

Ned Levine

Investigation of Differences in Crash Characteristics Between Males and Females Involved in a Fatigue-Related Crash or Close-Call Event

Kerry Armstrong, Patricia Obst, Kerrie Livingstone, and Narelle Haworth

Postpartum Fatigue and Driving: Relating Experiences, Thoughts, and Opinions 12 Weeks After Birth

Kerrie Livingstone, Kerry Armstrong, Patricia Obst, and Simon Smith

Older Women's Travel Patterns and Road Accident Involvement in Britain

Christopher G. B. Mitchell

Traffic Violations Versus Driving Errors: Implications for Older Female Drivers

Sherrilene Classen, Orit Shechtman, Yongsung Joo, Kezia D. Awadzi, and Desiree Lanford

Gender Differences in Attitudes to and Mobility Impacts of Driving Cessation

Jennifer Oxley and Judith Charlton

Abandon All Hope, Ye Who Enter Here: Understanding the Problem of "Eve Teasing" in Chennai, India

Sheila Mitra-Sarkar and P. Partheeban

How Does Fear of Sexual Harassment on Transit Affect Women's Use of Transit?

Hsin-Ping Hsu

Women's Safety and Security Issues with Bicycling and Walking: Examination of Potential Planning, Design, and Technology Solutions

Stephen Vaughn

Youth Transport, Mobility and Security in Sub-Saharan Africa: The Gendered Journey to School

Gina Porter, Kate Hampshire, Albert Abane, Alister Munthali, Elsbeth Robson, Mac Mashiri, and Augustine Tanle

Privacy and Gender: Reviewing Women's Attitudes Toward Privacy in the Context of Intelligent Transportation Systems and Location-Based Services

Caitlin D. Cottrill and Piyushimita (Vonu) Thakuriah

Gender Differences in Self-Reported Evacuation Experiences: Analysis of the City Assisted Evacuation Program During Hurricane Gustav

Pamela Jenkins, John L. Renne, and John Kiefer

Driving Miss Daisy: Older Women as Passengers

Nancy McGuckin, Heather Contrino, Hikari (Yuki) Nakamoto, and Adella Santos

Effects of Gender on Commuter Behavior Changes in the Context of a Major Freeway Reconstruction

Patricia L. Mokhtarian, Liang Ye, and Meiping Yun

A Commitment to Continue? Comparing Women and Men Commuters Who Choose Transit over Driving Alone

Jane Gould and Jiangping Zhou

What Is the Role of Mothers in Transit-Oriented Development? The Case of Osaka–Kyoto–Kobe, Japan

E. Owen D. Waygood

Changing Travel Patterns of Women in the Netherlands

Marie-José Olde Kalter, Peter Jorritsma, and Lucas Harms

Travel Time and Distance Regarding Gender Patterns in the Paris Region: Past Trends and Forecasts to 2030

Ariane Dupont and Zoran Krakutovski

Gender Differences in Adolescent Travel to School: Exploring the Links with Physical Activity and Health

Kelly J. Clifton, Gulsah Akar, Andrea Livi Smith, and Carolyn C. Voorhees

What Do Existing Household Surveys Tell Us About Gender and Transportation in Developing Countries?

Julie Babinard and Kinnon Scott

Gender Equality as a Subsidiary Objective of Swedish Transport Policy: What Has Happened Since 2004?

Åsa Vagland

Women and Men in Public Consultation of Road-Building Projects

Lena Levin and Charlotta Faith-Ell

Appreciation of Gender Difference in Development of Qualitative Level of Service for Sidewalks

Purnima Parida and M. Parida

Gender Considerations in Performance Measures for Bicycle Infrastructure

Catherine R. Emond

Gender Mainstreaming in Transportation: The Impact of Management Control

Eva Wittbom

Young Women's Transportation and Labor Market Experiences

Piyushimita (Vonu) Thakuriah, Lei Tang, and Shashi Menchu

APPENDIX B

Special Workshop on the History of Women in Transportation

How Can We Plan for the Future If We Don't Understand the Past?

Sandra Rosenbloom, *University of Arizona, Presiding*
Jennifer Dill, *Portland State University*
Asha Weinstein Agrawal, *San Jose State University*
Georgina Hickey, *University of Michigan–Dearborn*

This entertaining and informative workshop provided historical perspectives on women in transportation in the 20th and 21st centuries. Featured speakers incorporated the use of multimedia presentations to discuss the evolution of women as transportation users, from bloomer-clad bicyclists to race-car drivers.

From Spokes to Sprockettes: A History of Women and the Bicycle

Jennifer Dill provided a unique perspective of the role of the bicycle in women's lives. The presentation revolved around four themes: independence, health and safety, technology, and fashion. Bicycles have provided a way for women to move around easily and at low cost. According to Susan B. Anthony, in 1889 bicycles had done more to emancipate women than anything else in the world.

Women as Drivers: A Movie History

Asha Weinstein Agrawal presented an interesting view of "the woman driver" through the lens of American cinema. Looking at 60 movies produced from 1914 to 2008, she explored two research questions: (1) Do women drivers fit the popular "bad driver" stereotype? and (2) Is there a link between driving skill and character? (Are good drivers "bad" women?) The collection of movies showed that women are not always portrayed as incompetent drivers—in fact, some are skilled and daring drivers. However, the collection of movies as a whole reveals a tendency to portray women who drive well as lacking some key quality of the stereotypical "good" woman.

Standing on the Corner: How Girl Watching Became Street Harassment in Postwar United States

There was a time when women initiated contact and interaction, but the "girl watcher" movement changed the world, Georgina Hickey noted. Girl watching emerged in the middle of the 20th century and was challenged by feminists beginning in the 1970s. Commercialization moved the needle and women were supposed to appreciate being "admired." The change opened a new era characterized as street harassment. Street harassment left women needing a way to regain confidence and feel empowered. To take back some control, Ogle Days were organized around the United States. Women walked the streets commenting and making sounds or gestures to men to give them a taste of the "watching" experience. Current efforts to take back control were discussed, such as Hollaback NYC (http://www.ihollaback.org).

APPENDIX C

Poster Session

The conference reception provided an opportunity for authors to present their research and findings in a poster format. The authors were able to have robust and constructive one-on-one conversations with attendees to share their methodologies and findings. This section includes summaries of research papers displayed as posters.

Environmental Justice, Gender, and Conflict in California Climate Policy

Alex Karner, Dana Rowan, Jonathan London, Julie Sze, and Debbie Niemeier, *University of California, Davis*

The California Global Warming Solutions Act of 2006 (commonly referred to as AB 32) mandates a reduction in greenhouse gas emissions in the state to 1990 levels by 2020. This paper examines an emerging conflict between the California Air Resources Board and environmental justice advocates over certain provisions and processes included in the regulations, specifically, the use of a cap-and-trade mechanism. Drawing on insights from feminist economics and women's studies and using data gleaned from the public documents produced to support AB 32 and interviews with participants in the implementation process, this study provides evidence that the discourses evidenced by market proponents and environmental justice advocates as they debate the merits of market and nonmarket approaches are gendered in important ways. Discussions of climate change policy draw on social or cultural ideas and constructs associated with male and female characteristics. In the context of climate change regulation, a masculine bias may disadvantage nonmarket approaches. Therefore, to ensure the climate change policy does not reproduce inequitable distributions of environmental burden and an unjust social order, additional care must be taken to fully evaluate environmental justice concerns alongside those of market proponents inside and outside of the implementing agencies. Applying a "gender lens" is a potentially powerful method for understanding conflicts within climate change policy and could point toward positive alternative paths.

Gender Mainstreaming Through Gender Research

Åsa Vagland and Ulla Goranson, *VINNOVA*

In international surveys, Sweden is considered to be the *locus classicus* for gender mainstreaming. At a macro level, the picture is clear, as governmental directives include specific goals for gender equality and expect public agencies to mainstream gender into their core businesses. At a micro level, the situation is more complex. Formal governance meets with equally strong gendered norms and cultures, but informal, driving forces among civil servants. The question raised in this paper is how the management control system functions under pressure from mainstreaming gender. With an interpretive approach, research has been conducted to disclose constructions that tend to enable or hamper gender equality in the practice of management control at a micro level. The evidence stems from a case study of the Swedish Road Administration and the Swedish National Rail Administration that was conducted through interviews, observations at meetings, and close reading of documents. The data cover the years between 2002 and 2007 with regard to the policy goal of a gender-equal transport system. Application of a gender perspective together with a sociological institutional perspective makes gendered rules, norms, and culture visible. The results show how management control is involved in gender integration processes by assimilation and by decoupling and obstructing transformative gender mainstreaming. The administration presents itself as fulfilling the goal. It legitimizes its activities by reporting relative fulfillment in accordance with the rules of the control system, regardless of the relevance connected to the norms of gender equality. The management control system perpetuates a culture in which reliability lies in measurability; therefore the goal of gender equality results in a quantitative perspective on

women and men instead of a qualitative gender perspective on the transport system.

Women's Safety and Security Issues with Bicycling and Walking: An examination of Potential Planning, Design, and Technology Solutions

Stephen Vaughn, *University of Illinois at Chicago*

In the nonmotorized transportation field, gender differences in bicycling and walking are well documented and personal safety has been identified as a deterrent to their increased use. This concern for safety is not limited to the physical environment of the roadways, but includes the individual's perception of safety in the surrounding neighborhoods and in the environment of multiuse paths and lanes. This paper explores application of crime prevention through environmental design to address safety concerns. It also examines gender issues using data from the National Crime Victimization Survey and the FBI's National Incident-Based Reporting System to identify major safety and security concerns. The study results recommend the Safety, Education, Marketing, and Information approach, which focuses on improving nonmotorized user safety with technology while educating vehicle drivers and nonmotorists and increasing public awareness through marketing campaigns. Successfully integrating nonmotorized transportation within a vehicle-dominant environment requires major planning and policy changes. Planning recommendations include ensuring the continuity of the path and lane network; maintaining well-lit facilities; removing or minimizing areas and conditions that encourage loitering, public nuisance, and crime against women bicyclists and pedestrians; and other suggestions. Policy recommendations include aggressively enforcing laws to protect cyclists and pedestrians within and in the vicinity of the roadway and increasing spending to improve conditions in the nonmotorized transportation infrastructure.

Older Women's Travel Patterns and Road Accident Involvement in Britain

Christopher G. B. Mitchell, *Consultant, United Kingdom*

In European countries and in North America, fewer women than men are killed or injured in traffic accidents as pedestrians or car drivers. This paper reviews the safety of male and female car drivers as measured by the risk to the driver and the risk the driver imposes on other road users. In terms of casualty rates per population, where appropriate per driving license, per distance driven, and per journey, women younger than 60 have a lower risk than men of both injuring themselves and injuring other road users. Younger adult women make more journeys than men of the same age, but travel less far. Older women make fewer journeys than men. For both men and women, journeys for nonwork purposes increase for ages over about 60. Women travel more as car passengers than men and less as car drivers at all ages. Men make more journeys as pedestrians than women, but women make more journeys by local public transport. These patterns repeat in every country for which data are available. This paper uses British data as its primary source, supplemented with data from Sweden and the United States, to analyze the mobility and safety of female and male car drivers and pedestrians. Younger women are significantly safer drivers than men, but women cease to be safer drivers over the age of 60 or 70. The same applies to the risk they pose to other road users, as measured by their risk of killing a pedestrian.

Some evidence shows that older women voluntarily restrict the amount of driving they do at younger ages than men, but there is no evidence that in Britain they surrender driving licenses at a younger age than male drivers. The fatality rate per journey as a pedestrian is higher than that as a car driver. Any policy that caused car trips by those age 70 and over to become foot trips would increase total fatalities and serious injuries in traffic accidents.

Privacy and Gender: Reviewing Women's Attitudes Toward Privacy in Context of Intelligent Transportation Systems and Location-Based Services

Caitlin D. Cottrill and Piyushimita (Vonu) Thakuriah, *University of Illinois at Chicago*

Newer generations of Intelligent Transportation Systems (ITS) and Location-Based Services (LBS) technologies depend on inputs of personalized and localized information that may make individuals hesitant to share such information and raise locational privacy concerns. At the same time, such technologies have the potential to provide information that addresses women's complex and unique travel patterns, such as real-time itinerary planning or dynamic ridesharing with members of a women's social network. The objective of this paper is to examine gender differences in the propensity to reveal potentially sensitive information of the kind that would make ITS and LBS information highly personalized to individuals travelers. Based on findings from previous survey research that links question refusals in surveys to privacy, the study uses privacy indicators

based on response refusals to sociodemographic and location information in a household travel survey to evaluate if women have a significantly different attitude toward willingness to share data compared with men. The results show gender differences regarding privacy preferences are not statistically significant. This result is inconclusive, however, because the survey overall achieved low response rates and participating households may be more open to divulging sensitive travel and locational information.

Gender and Safety in Public Transportation: An Explorative Study in the Sub-Saharan African City of Lagos, Nigeria

Bashir Olufemi Odufuwa, *Olabisi Onabanjo University, Nigeria*
H. Geerlings, *Erasmus University, Netherlands*

Women constitute an important proportion of the general population in the world. In most developing countries, gender dimensions of transportation planning and management have been one of the least considered aspects of urban transportation and development. Harassment and loss of property are huge threats faced by women when using public transportation and transport infrastructure in cities. Hundreds of millions of women in developing countries lack reasonable access to an adequate supply of safe public transportation services. The problem manifests in countless cities in Nigeria. Observations from reviewed literature show that, with regard to mobility, most Third World cities offer few perspectives on women and that the general quality of life of women is substantially lower than that of the general population. This paper explores the ways the increasing wave of deteriorating public transport services and transport infrastructure is affecting women's general livelihoods. Among the research questions this paper addresses are the following: What is the travel pattern of women? What problem or difficulties do women face when using public transportation? What is the relationship between gender sensitivity in transportation service and livelihoods of women? What lesson can be learned from gender-sensitive transport policy and infrastructure? To provide answers to these research questions, primary and secondary data were used. Through the use of a stratified random sampling technique, 300 questionnaires were distributed among women using public transportation; 100 male users of public transportation were sampled as control group. In addition, operators of public transportation and transport management agencies were interviewed. The data were analyzed using simple descriptive statistics as well as correlation and regression analysis. The reliability of the research instrument was tested and retested, and triangulation of the data and research techniques were used to test validity.

How Does Fear of Sexual Harassment on Transit Affect Women's Use of Transit?

Hsin-Ping Hsu, *University of California, Irvine*

The purpose of this study is to understand how women's fear of sexual harassment on transit changes their transit use and travel behavior. This research was based on in-person focus groups, two online focus groups, and seven individual interviews. The findings reflect the experiences and perspectives of 18 female participants in their twenties and thirties. Six are white Americans, six are Taiwanese, and six are Taiwanese who live in the United States. By applying a qualitative research approach, the study found cultural differences are important for women's perceptions of sexual harassment and women's attitudes about adequate policy responses. Yet cultural differences are not as important as the availability of a car in influencing how women modify their use of transit in response to sexual harassment. A feasible and effective policy addressing this issue should take the cultural context into consideration.

Postpartum Fatigue and Driving: Relating Experiences, Thoughts, and Opinions 12 Weeks After Birth

Kerrie Livingstone and Karen Armstrong, *Centre for Accident Research and Road Safety, Australia*

Fatigue in the postnatal period is such a common experience for most mothers that the term "postpartum fatigue" (PPF) has been coined to describe it. When new mothers experience extreme fatigue, their physical health, mental health, and social well being are negatively affected. The link between fatigue and increased risk of road crashes is well documented, yet there is a distinct lack of empirical investigations that focus on the link between PPF and increased risk of injury. The purpose of this investigation was to undertake pilot research to develop an understanding of the duration of PPF and the performance impairments experienced by new mothers when involved in safety-sensitive activities such as driving a motor vehicle. Semistructured interviews were undertaken with 24 women in Southeast Queensland, Australia, 12 weeks after they had given birth. Key themes were identified,

with a particular emphasis toward understanding the link between the participants' experience of PPF and the impact this had on their overall cognitive and physiological functioning as well as their experiences driving. Sleep–wake data were also collected, and using the Karolinska Sleepiness Scale, the authors also examined the potential crash risk for this group of mothers. The findings of this investigation could be used to improve current knowledge among new mothers and practitioners regarding the mechanisms and consequences of fatigue and to inform interventions that lead to a decreased risk of injury associated with PPF.

Travel Time and Distance Regarding Gender Pattern Changes in the Paris Region: Past Trends and Forecasts to 2030

Ariane Nadia Dupont-Kieffer, *INRETS–DEST, France*

This paper investigates the specificities and the evolution of mobility patterns of women and ageing people in the most densely populated region in France—a region that includes Paris and surrounding administrative districts—with the highest gross domestic product per capita in France. Four household travel surveys available from 1976 up to 2001 allowed researchers to compare travel time over years and to forecast mobility up to 2030. The paper focuses on the distinction between constrained trips and nonconstrained trips. Constrained trips are defined as trips where the destination is work, university, or school. These trips increased recently in terms of time and distance, after a surge in the 1980s, except for women, whose travel time and distance budgets strikingly increased. Overall mobility increased during the same period, notably as a result of both men and women making nonconstrained trips. It appears that women's nonconstrained and constrained trips increased more significantly than men's.

Rereading Time and Geography from a Feminist Perspective: Gendered Mobility

Tora Friberg and Annika Sandén, *Linköping University*
Chiristina Scholten, *Malmo University*

The authors propose that time–geography provides a useful set of analytical tools for examining gendered travel. In particular, time–geography, time–space prisms, and concepts of "projects" serve as models for travel and activity patterns. Women tend to be more spatially restricted than men, carry out more care-giving activities, and have shorter commutes. These sorts of differences show that mobility projects exist in spatial and societal contexts, with space, time, gender, and class all serving as structuring principals. The authors explore how to connect time–geography, in a cohesive theory, to the gender system, gender contracts, and the role of power.

Travel Time and Quality of Life: A Framework for Assessing Gender and Socioeconomic Equity in Transportation Systems

Cassandra Elena Gekas and Lisa Aultman-Hall, *University of Vermont*

In the interest of moving toward transportation planning oriented to maximizing quality of life rather than economic efficiency, the authors use data from the 2007 American Time Use Survey to explore travel time differences between men and women of various socioeconomic groups and the relationship of travel time to time spent in activities corresponding to 11 different categories of human needs. The data show that although women spend more time traveling for the purpose of home production and caring for children, their overall travel-time burden is lower than that of their male counterparts. The same is true for low-income survey respondents.

Gender Considerations in Performance Measures for the Bicycle Infrastructure

Catherine R. Emond, *University of California, Davis*

That the number of men's bicycle trips in the United States surpasses the number of women's bicycle trips by a ratio of more than 2:1 may mean the bicycle infrastructure does not serve women's needs. Bicycle facility design is often guided by design cyclist categories that separate bicyclists by how well they ride in vehicular traffic. Since women have been shown to prefer more separation from vehicular traffic than men, this can lead to them having to choose to travel on bicycle facilities designed for safety at the expense of convenience to community services. Two indices commonly used to assess U.S. bicycle infrastructure, the Bicycle Compatibility Index and the Bicycle Level of Service, are compared with the Netherlands' Bicycle Cycle bicycle infrastructure survey in an effort to understand the association of gender-blind versus gender-sensitive policies on bicycle infrastructure design and assessment.

Parents' Perceptions of Children's Safety and Security in the Neighborhood Built Environment and Decisions about Their Mode of Travel to School

Danielle Fontaine, Clark University

The purpose of this study was to identify the elements of the neighborhood environment that matter most to parents and their decisions about how their children travel to school. To answer this question, the author conducted focus groups and individual interviews with parents of seventh and eighth grade children in Worcester, Massachusetts, living within 2 miles of school. Parental concerns included stranger danger, street crossings, volume and speed of car traffic, and children's potential temptation to get into trouble along the way. Parents had more concern for the physical safety of girls and the moral safety of boys.

The Role of Activity Attributes and Gender in Activity Participation and Travel

Kelly Clifton and Gulsah Akar, *University of Maryland, College Park*
Sean T. Doherty, *Wilfrid Laurier University, Canada*

One area of activity-based approaches to travel demand modeling still unresolved is the way activities are categorized. Because some activities previously subject to temporal and spatial constraints now have more flexibility, calls have been made to replace these traditional activity groupings with more salient attributes. The purpose of this study is to examine any gender differences in activity participation and travel when activities are regrouped in this way. In particular, the authors grouped activities by duration, weekly frequency, number of people involved, temporal flexibility, spatial flexibility, and personal flexibility, and found gender has important implications on activity participation rates. For instance, women participate in more temporally and personally flexible in-home activities and less long and spatially flexible out-of-home activities. Additional differences exist depending on employment and marital status, pointing to the need for greater attention to the potential travel implications of these sorts of trends.