FINAL REPORT

Travel Patterns of People of COLOR

Prepared for

U.S. Department of Transportation
Federal Highway Administration
400 Seventh Street, SW
Washington, D.C. 20590

By

Battelle
505 King Avenue
Columbus, OH 43201-2693

June 30, 2000

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Foreword

Under Title VI of the 1964 Civil Rights Acts and related statutes, each federal agency is required to ensure that no person is excluded from participation in, denied the benefits of, or subjected to discrimination under any program or activity receiving federal financial assistance on the basis of race, color, national origin, age, sex, disability, or religion. To properly plan and analyze these conditions for transportation systems and services, one must have an understanding of how people travel.

This report, *Travel Patterns of People of Color*, is the first compendium on travel behavior in the United States that directly examines race and ethnicity. In this report, "people of color" includes African Americans, Hispanic Americans and Asian Americans, and immigrants from Latin America and Asia. Because the Nationwide Personal Transportation Survey (NPTS) does not include a large enough sample of Native Americans/American Indians to be tabulated as a separate category, they are not specifically identified, but are included in the "other" race category.

The existing literature on travel patterns of people of color is limited. However, by using the NPTS from 1983, 1990, and 1995, along with 1990 Census data, we can begin to examine trends. People of color are a growing proportion of the total U.S. population, and although there are some indications that travel patterns by the majority population and people of color are converging, there are still significant differences.

This project's goal is to provide information on basic characteristics of travel by people of color. It is a starting point in developing literature to promote better understanding of how Americans of all races and ethnic backgrounds are using our transportation system and to initiate further dialogue on how to improve mobility for all Americans. This report is a compendium of individual papers, expressing individual viewpoints, and they may not agree with one another.

Too often, we try to group people into categories to help us understand patterns, but in doing so, we run the risk of making the groups "too large" and missing important differentiating characteristics of travel. One example of the need to pay attention to smaller groups is indicated by the fact that the proportion of households without any private vehicles has declined from 11.5 percent in 1990 (U.S. Census) to 9.5 percent in 1997 (American Housing Survey). While this is true for the White population, nearly a quarter of African-American households are still without vehicles.

This project shows that not only do we need to look at race and ethnicity (especially as it reflects the time from immigration for many Hispanic and Asian residents), but also the combination of gender with race and ethnicity. These variables reflect larger issues, such as educational attainment, occupation choice, as well as family and household responsibilities such as child care and shopping.

African-Americans, especially African-American women, rely heavily on public transit. They are nine times as likely to use public transit as White men or women. While "riding the bus" appears to be less favored by the general population, African-American women continue to be an important market for both choice and captive transit riders. Also, current data show that Hispanic women are much less likely to have a driver's license and also are more likely to use transit, particularly those who are not native-born.

We would like to express our appreciation to Gloria J. Jeff who initiated and supported this project during her tenure as Deputy Administrator of the Federal Highway Administration. Ms. Jeff has been a long-time champion of equality and civil rights with a strong focus on assuring that transportation programs be more inclusive. Ms. Jeff also has been an avid proponent of the NPTS because it links the measurement of travel to people, and more specifically, allows the analysis of the transportation needs of unique demographic groups. NPTS provides not only a reporting of vehicle miles of travel (VMT) or peak travel times, but also links who is traveling, and why they are traveling, to these travel characteristics.

We invite you to visit the NPTS website at http://www.fhwa.dot.gov/ohim/nptspage.htm, where you will find other papers that have used the NPTS, as well as tools for doing your own analysis of the 1995 dataset.

Barna Juhasz
Director
Office of Highway Policy Information

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Acronyms

BART	Bay Area Rapid Transit
CBD	central business district
CIA	Commuting in America
HUT	high urban transit
LACMTA	Los Angeles County Metropolitan Transportation Authority
LUT	low urban transit
MSA	Metropolitan Statistical Area
MUT	medium urban transit
NPTS	Nationwide Personal Transportation Survey
NU	New Urbansim
OCLC	Online Computer Library Center, Inc.
POV	privately operated vehicle
PUMS	Public Use Microdata Sample
SOV	single occupant vehicle
TRIS	Transportation Research and Information Services
VMT	vehicle miles of travel

Introduction

Over the decades, public and private travel among Americans has increased significantly, making America one of the most mobile of societies. However, many policy-makers are concerned that the nature and distribution of travel are uneven, especially with regards to people of color. Developing a broader understanding of travel behavior of people of color, which includes African-Americans, Hispanics, Asians, and others, is essential to create a more equitable distribution of transportation system options. This understanding involves many aspects, including why, when, and how people travel, and how each of these aspects varies with time, geography, and population characteristics. There is still very little known about the travel patterns of people of color. Only recently have significant efforts been made to better understand travel behavior among racial and ethnic groups. This topic joins a small but growing field in transportation research that analyzes other issues of equity in travel including gender, age, disability, and wealth.

The population of people of color is growing and this growth is expected to grow much faster than the population of Whites well into the 21st century. Thus, this is an increasingly important share of total travel demand. Travel by people of color is changing rapidly, with significant increases in travel and changes in mode choice. A high level of mobility is essential to the lifestyles and economic well-being of all people; historically, many people of color have not enjoyed as high a level of mobility as the White population. In many ways, people of color have yet to experience some of the shifts in travel that have occurred for Whites. The trends may be converging in some important measures of mobility, but the speed of convergence is slow. Some of the delay is caused by the wide range of incomes, education, and travel choices within these populations.

This report begins to develop a body of literature on travel by people of color to better understand how Americans of all ethnic backgrounds are using our transportation systems today and to generate ideas to improve transportation mobility. The majority of the data used in these papers is from the Nationwide Personal Transportation Survey (NPTS) and the U.S. decennial Census. This report is a compilation of seven separate papers, each with its own specific focus and point of view. The topics include race, inequality, and travel patterns; demographics; commuting; residential location; mode choice; and gender differences.

The first chapter, "Race, Inequality, and Travel Patterns Among People of Color," was written by Abel Valenzuela Jr., associate director for the Center for the Study of Urban Poverty, Institute for Social Science Research, University of California, Los Angeles. The chapter provides a context for understanding social and economic inequality in the U.S. among people of color and how this inequality is connected to transportation patterns. Valenzuela addresses two key issues: the nature of inequality in the U.S. and travel patterns as they relate to inequality. He provides a broad overview of inequality, highlighting three particular areas of importance: immigration and rapid demographic change; economic restructuring and persistent inequality; and persistent racial residential segregation.

Valenzuela finds that uneven outcomes exist by race, ethnicity, gender, and age on a number of social indicators, including the distribution of transportation resources and travel patterns. As travel patterns have changed, so have the contours of race and inequality in the U.S. Travel patterns among people of color are complex but clearly differentiated from the White population and other subcategories such as gender and age. Understanding inequality is part of the solution, as is understanding the role that uneven

transportation opportunities, investments, and uses have in maintaining dichotomous relationships among different socioeconomic indicators.

The next chapter, entitled "Demographics of People of Color," is by Steven E. Polzin, Xuehao Chu, and Joel R. Rey from the Center for Urban Transportation Research. Several socio-demographic traits that are known to affect travel behavior such as age, household composition, income, education, residential location, vehicle availability, and length of time in the U.S. are described. There are significant differences between the racial and ethnic groups for many of these traits.

Chapter 3, by Ravindra Krovi and Claude Barnes from the North Carolina A&T State University, addresses work-related travel patterns of people of color. The U.S. is an extremely mobile society, and work trips constitute nearly one-quarter of this travel (in miles) and often have significant impact on where and when other trips are made. Krovi and Barnes examine trends and differences in means of transportation to work, controlling for socioeconomic and demographic factors. Variables such as travel time, mode choice, age, race, education, hours worked, type of worker, departure time, income, and number of children are considered.

Krovi and Barnes find that, in a preliminary analysis of work-related data, Asians and African-Americans take at least 15 percent longer on average to travel to work than Hispanics and Whites. A common theme underlying the work-related travel patterns of people of color is the degree of private vehicle use. Those using private vehicles have a shorter travel time than those using the public transit systems. Travel time also varies with income and educational level attained. High education groups may opt to travel more to pursue high-income opportunities. There are also several race-related specific patterns that cannot be attributed only to variables such as age, income, and gender. For example, young African-Americans and Asian workers have longer commute times than their White or Hispanic counterparts despite similar income profiles. It is also important to note that there are race-related patterns specific to certain regions of the country. Transportation planners should design and enhance transportation infrastructure taking into account such disparities.

The next chapter, by Nancy McGuckin, also discusses work and commuting. McGuckin focuses on the impact of race and ethnicity combined with income, gender, and geography in analyzing travel to work. She examines work trips made on an assigned travel day using the NPTS, rather than the "usual" travel mode, for which data are available from the decennial census. The data show that women of color often work in low-paying service jobs which may limit their travel mode choices, and also affects where and when they need to commute. Improving access to jobs, job flexibility, and affordable child care options are important aspects of the public policy debate. The data show that people of color are less likely to live in a household with a car. But, similar to White workers, over time, driving alone is increasing in the share of commute trips by people of color. Still, people of color are much more likely than Whites to use transit for their daily commute. Traveling on public transit takes nearly twice as long for the same length trip by personal car.

Chapter 5, by Genevieve Giuliano from the University of Southern California, examines residential location differences among people of color and how these relate to travel patterns. She examines total daily travel, effects of metropolitan location, and local neighborhood characteristics. Understanding the interplay between travel, minority status, and residential location is important for several reasons. First, there is growing public concern that transportation resources be equitably distributed. Second, ethnic minorities are disproportionately represented among the unemployed, and access to jobs is critical to achieving the goals of the new federal welfare policy. And third, ethnic minorities tend to be concentrated in inner city areas and central parts of older suburbs. It is of interest to determine whether such spatial segmentation leads to related mobility constraints.

Giuliano's research finds that racial/ethnic differences are not limited to effects explained by different location patterns, but rather by fundamental differences in travel motivation and location choices. Location is a factor, but the effect is observed in different ways for different population segments. Also, there seems to be more consistency in work travel than in total travel across the ethnic groups.

The chapter, "Mode Choice by People of Color for Non-Work Travel," was written by Xuehao Chu, Steven E. Polzin, Joel R. Rey, and Eric T. Hill from the Center for Urban Transportation Research. Non-work travel which includes travel for personal and family business, school and religious activities, health care, and social and recreational activities, is an increasingly greater proportion of daily travel.

Chu et al. find that, to the extent that the economic and household characteristics of racial/ethnic group populations are similar to those of the White population, so too is travel behavior similar to that of the White population. Minority group traits critical to influencing travel behavior are moving quite rapidly to match those of the White population. Perhaps with the exception of some critical characteristics such as an apparent greater willingness to use transit by African-Americans, there is overwhelming evidence of a trend toward more comparable mobility levels across population segments. The data also suggest that the use of the automobile is not unique to only some segments of the population but rather quite inherent in the full population, or at least rapidly cultivated once someone resides in the U.S. Thus, the fundamental nature of the population's values relative to mode choice decisions is quite constant given similar situations.

The last chapter, by D. Gregg Doyle and Brian D. Taylor from the UCLA Institute of Transportation Studies, addresses the variation in metropolitan travel behavior by sex and ethnicity. Researchers have long observed that travel behavior varies systematically by sex and by ethnicity. However, the underlying causes of these differences and their policy implications have been subject to ongoing debate. This study addresses three aspects of this topic: the choice of travel mode, commuting to and from work, and the purpose of travel.

Doyle and Taylor find that race/ethnicity appears to be a more important influence than sex on mode choice and commuting behavior, although sex differences persist, especially by household type. The analysis of non-work travel, however, reveals sharp distinctions between men and women across ethnic groups. Despite significant increases in paid labor force participation by women, these data suggest that women continue to shoulder far more responsibility than men for maintaining households. As a consequence, women, regardless of race/ethnicity, are more likely than men to chain trips together. The relative inflexibility of fixed-route transit service is often poorly suited to chaining multiple trips together across a metropolitan area. Public transit systems may need to develop new, more flexible forms to better adapt to the needs of trip-chaining travelers.

Their findings suggest that the important criteria for travel pattern grouping include not only race and ethnicity, but also the combination of gender with race and ethnicity. These variables reflect larger issues such as educational attainment and occupation choice. African-Americans, especially African-American women, still rely heavily on the public transit system. They are nine times more likely to use the transit system as White men or women. Although this appears to be associated with social stigma by the general population, African-American women continue to be an important market for transit. Based on these results, it is clear that ethnicity and gender both play an important role in the study of travel behavior.

As the U.S. population continues to change in terms of race, ethnicity, and other characteristics, a forward-thinking approach is necessary to best plan our future. This report is a first step in understanding the current differences and future needs of people of color within the U.S. transportation system. Understanding the travel behavior of all ethnic groups and the relationships of travel to lifestyle, economic and other factors, is essential to ensure that policy-makers can make informed decisions to ensure equitable

transportation investments. This report scratches the surface—expanding upon this initial step is the challenge to the research and policy-making communities. Although Americans enjoy unprecedented mobility today, ensuring that the advantages resulting from increased mobility are equitable remains an important national priority.

Chapter 1
Race, Inequality and Travel Patterns Among People of Color[1]

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INTRODUCTION

Over the decades, public and private travel among Americans has increased and travel patterns have changed significantly. As a result, many scholars and policy-makers are concerned that the nature and distribution of travel are uneven, in particular regarding the minority population. In addition, the nature and distribution of opportunity in U.S. society also are undergoing massive change. In part owing to steady waves of immigration, the United States also is rapidly becoming a more racially and ethnically diverse nation (McDaniel, 1995). At the same time, processes of technological innovation, intensified global integration, and deindustrialization are transforming the world of work. One central impact takes the form of a widening gap in pay between high skill and low skill workers (Danziger and Gottschalk, 1996; Wilson, 1996). Attendant to these changes has been a general worsening of inequality in the overall income distribution (Levy, 1995). These central factors directly influence other social indicators such as home ownership, residential location, educational attainment, and employment opportunities.

This chapter surveys what is known about travel patterns among people of color, paying particular attention to the latest body of scholarship. The chapter also provides a context for understanding social and economic inequality in the United States among minority groups and how this inequality is in part connected to transportation patterns. To make this argument palatable, attention is focused on two central questions: What is the nature of inequality in the United States, and how has transportation (travel patterns in particular) affected inequality in the United States?

In the sections below, race and travel are discussed, leading into an overview of travel patterns in general, and then more specifically, travel patterns among people of color. In the first section, particular attention is paid to a series of papers, the most recent research developments on travel patterns by people of color using Nationwide Personal Transportation Survey (NPTS) data. In the second section, a broad overview of inequality is presented, highlighting three areas of particular importance to the United States: (1) immigration and rapid demographic change, (2) economic restructuring and persistent inequality, and (3) persistent racial residential segregation. In the third and final section, connections between travel and inequality are made by focusing on two broad areas: economic opportunities and quality of life.

[1] Please do not quote this research without permission of author—comments are welcome and can be directed to abel@ucla.edu. The author gratefully thanks Armando X. Mejia for his research assistance. All errors and omissions are the responsibility of the author and should not be attributed to Battelle and the Department of Transportation.

RACE, ETHNICITY, AND TRAVEL

Despite the well-known fact that nearly 80 percent of all Americans live in metropolitan areas,[2] and that an even higher proportion of minority and immigrant groups (as a percent of their total population) live in cities, little is known about the travel patterns of people of color. Information on travel behavior, however, is far from undeveloped. In fact, rich databases (e.g., NPTS, American Travel Survey (ATS), U.S. Census Bureau) and a large amount of empirically based literature provide information about the different contours, patterns, and processes of travel by Americans in general. Only recently have significant inroads been made to better understand travel behavior among racial and ethnic minorities, joining a small but growing subfield in transportation research that analyzes other issues of equity in travel, including gender (Rosenbloom, 1993; Wachs, 1992; Michelson, 1983; Hanson and Johnson, 1985; McNight, 1994; Rosenbloom, 1995a), the aged (Galin, 1995; Falcocchio and Cantilli, 1974; Brail, Hughes, and Arthur, 1976; Wachs, 1979; Carp, 1988; Rosenbloom, 1988; Rosenbloom, 1995b), the disabled (Falcocchio and Cantilli, 1974; Rosenbloom, 1992; Brail, Hughes, and Arthur, 1976; Fielding, 1982; Coughlin and Lacombe, 1997), and the poor (Murakami and Young, 1997; Rittner and Kirk, 1995; Kain and Meyer, 1970). But, even in these topics, the literature is embarrassingly thin. What is known about travel behavior for the general population is telling, not only because it informs how and why most Americans move from point A to point B, but also because it provides a glimpse of the travel behavior of people of color.

Understanding transportation in America is central to understanding America in historical context. This is particularly true with regard to urban America. The historical development of the United States is intricately webbed to several key phenomena, transportation perhaps being one of the most important technological breakthroughs in the past two centuries. The economic, social, cultural, political, environmental and infrastructural development of America is embedded in a transportation system that many take for granted. It has enabled society to do so much, both good and bad. Trade and access to consumer products, including health, education, and leisure are made possible and speedier by advancements in transportation. Transportation also is linked to community destabilization and has a relatively poor track record serving many people of color, women, the working poor, young, elderly, and disabled people in urban, rural, and Native American tribal communities (Holmes, 1995).

Race and ethnicity in America are important for several reasons. At a federal level, they take on particular significance in spending, program development, and resources. At the very least, they allow researchers to highlight uneven outcomes among different Americans, an important consideration in policy debates and actions. Analyzing distinctive travel patterns among Americans is important for several reasons. First, as race, ethnicity, and other population subcategories have taken hold in the American national psyche (and certainly actions), federal and state agencies have recognized the need for analyses of population subgroups. Perhaps more importantly, despite resistance to reform and denial from many, uneven outcomes exist by race, ethnicity, and other subcategories (e.g., gender, age, and sexuality) on different social indicators, including the distribution of transportation resources and travel patterns. Second, there are clear residential and socioeconomic patterns among people of color, least of which are their disproportionate numbers among the unemployed and the working poor and their concentration in urban centers. Patterns of distinct travel behavior are critical to understanding job access, residential segregation, other economic opportunities, and mobility constraints. Finally, implementation of future transportation policies such as those that foster higher density, transit and pedestrian-oriented developments or private auto use and infrastructure development would be wise to consider how and who these policies will ultimately affect.

[2] This figure is derived from the Statistical Abstract of the United States (1998), Table 40, which provides data on the metropolitan and non-metropolitan area population for 1996.

To be sure, research, planning, and policy on transportation are much more than understanding and implementing policies on the travel behavior of different groups. Indeed, the field of transportation has grown exponentially as researchers try to keep up with technological, infrastructure and different land use developments. Emphasizing race and ethnicity on only travel behavior unwittingly assumes that travel patterns are the only equity problems in the field, when, in fact, transportation (similar to other federal programs and social phenomena) is ladled with many inequalities. Take, for example, the lawsuit against Los Angeles County Metropolitan Transportation Authority that shows that the average subsidy for bus riders is $1.17 per ride, while for rail riders it is $28. This disparity is all the more glaring when considering who rides buses and who rides rail. The 350,000 bus riders who use the public transportation system in Los Angeles each day are 80 percent people of color and 80 percent poor (Duran, 1995), while almost the opposite is true of rail users in general and more specifically in Los Angeles.

Another example is the difference (about 10 to 1) between federal outlays for urban and rural public transportation. Considering that 43 percent of the disabled, 39 percent of the elderly, 32 percent of the unemployed, and 39 percent of people below the poverty level live in rural America, this disparity is even more glaring. Finally, the environmental impacts of highway construction and private automobile use on poor communities are difficult to understate. Highways historically have cut through poor or minority communities, creating environmental hazards and fracturing neighborhoods physically, socially and economically. Measurably higher levels of immediate and long-term toxic effects from air, water and noise pollution and debris degrade local land values and further destabilize urban areas. These issues, while important to understanding the broader equity problems in transportation, are not the central focus of this chapter. They are presented here to validate their importance in the field and more generally also to highlight their connection to race, inequality, and travel patterns.

What Do We Know About Travel Patterns in General?

For the non-transportation expert, travel behavior is mostly about those activities related to moving from one point to another such as from home to work or to the grocery store. Frequency, time, and mode usually measure these activities. Of course, other travel indicators interest different sectors of the transportation industry; but, for purposes of impacting federal and state policy regarding travel, these three seem to dominate research and discussion. For example, in 1990, Americans took 8.8 billion transit trips and, on any average weekday, over 7.5 million people will ride on public transit vehicles (American Public Transit Association, Public Transportation Fact Book, 1999). Both of these important and very illuminating data speak to frequency. Frequency in travel behavior is important for at least two reasons. First, it gives a general measure of the number of trips Americans make in a given day, month, year, or time period. These data in turn allow researchers to measure many things such as impacts on infrastructure and travel vehicle use and demand for transportation; of course, these data also provide particular insights into how American culture is evolving. Second, frequency in travel is important to policy makers and researchers who attempt to influence decision holders. Numbers pertaining to trip frequency and to users can significantly impact the worthiness of a new federal transportation program, continued funding of an existing project, or the expansion or upgrade of another.

Time incurred in traveling and mode of transportation also are important for understanding travel behavior. Time, in travel research, is primarily concerned with understanding the time it takes to travel from one point to another or to several points in a single trip—what is often termed as chaining. Distance often is used as a proxy for time or as a close cousin in measuring the length or distance from different points in a trip. These data are used for numerous analyses including differences in travel by urban and suburban dwellers and other subcategories of groups such as those delineated by race, gender, and age. In addition, these data serve to highlight the need for rail and other public travel modes. Finally, the manner of travel from different points in a city or region is central to understanding travel behaviors among

different people and different cities. More importantly, these data provide critical insights to a region's or city's culture and demand for different types of travel.

According to the American Public Transit Association, about 8.6 billion trips were taken on transit[3] in the United States in 1997, the year for which the latest data are available. Of these, 61 percent were bus trips, 28 percent heavy rail, 4 percent commuter rail, 3 percent light rail, and the remainder on other modes. Over 6 million people used transit each weekday. About 5 percent of all commuters use transit, but in most large cities 15 to 50 percent do (American Public Transit Association, Public Transportation Fact Book, 1999). Average trip length is longest for vanpools (33.1 miles). Commuter rail was 22.5 miles, ferryboat 6.5 miles, heavy rail 5.0 miles, bus 3.9 miles, and other modes 1.6 miles or less.

Nationally, more than half (54%) of all transit trips are for work trips, while 15 percent are for school, 9 percent for shopping, 9 percent for social activities, and 5.5 percent for medical purposes. The vast majority of transit users are between the ages of 18 and 65. About 7 percent of all transit users are over the age of 65, while 10 percent are 18 and under. Slightly more women (52%) than men use transit, and Whites comprise the largest users of transit at 45 percent, followed by African-Americans (31%), Latinos (18%), and Asians or Native Americans (6%). When compared to the percent of the total population that these groups represent (Whites [72%]; Black [13%]; Hispanic [11%], and Asian [4%]) in the United States, these figures show a disproportionate use by African-Americans and Latinos. Poor Americans are large users of transit, with those with family incomes below $15,000 comprising 27 percent of all transit trips. The middle class also are frequent users of transit—17 percent by those whose family income is over $50,000 (American Public Transit Association, Public Transportation Fact Book, 1999).

Transit serves two primary users, those that have the means or choice of transit and those who do not. People in the transit-dependent market have no personal transportation, no access to such transportation, or are unable to drive. Included are those with low incomes, the disabled, elderly, children, families whose travel needs cannot be met with only one car, and those who opt not to own personal transportation. People who have a choice in their transit mode are mostly workers, environmentalists, travelers, and people on recreational, social, medical, or other journeys who do not have to use transit but do so for reasons of speed, comfort, convenience, traffic avoidance, or environmental principle. Transit, however, is not the only option in travel mode.

Pucher, Evans, and Wenger (1998) examine key variations in urban travel behavior by income, race, ethnicity, sex, and age. They find that, overall, the poor, racial and ethnic minorities, and the elderly have much lower mobility rates than the general population. Although all segments of the American population are dependent primarily on the auto for urban travel, the poor, Hispanics, and African Americans are far more likely to use transit than other groups. In their analysis, they find that differences in travel behavior among racial and ethnic groups are strongly related to differences by income class. African Americans and Hispanics are more likely than whites to take a school bus, a taxicab, and to walk. They also are less likely to travel by auto, both HOV and SOV (Pucher, Evans, and Wenger, 1998).

From a broad overview of those measures most important to understanding travel behavior and a general synopsis of travel among Americans, this chapter turns to more specific issues of travel and race.

What Do We Know About Travel Patterns Regarding Race and Ethnicity?

Most of the work on travel and subpopulation (e.g., race, age, gender) focuses on five categories; gender, race, class, the disabled, and age. Travel patterns by women show the increasing influence of balancing

[3] Transit includes all multiple-occupancy-vehicle passenger service of a local and regional nature provided for general public use such as public and private bus, public and private rail, and public and private water services.

work outside of the household and within the home. According to Rosenbloom (1995a), women make more person-trips per day than do men. However, women made shorter trips whereas men traveled 27 percent more person-miles than comparable women in urban areas and 16 percent more in rural areas. Low income people of both sexes in urban areas and low income women in rural areas worked further from home than comparable people from households making more money. At the very lowest income levels, women workers traveled further than comparable male workers. Race, similar to gender, class, and rural/urban dichotomies, likewise delineates travel patterns. In general, White men traveled more than all other men and White women traveled more than all other women. Hispanic women and those from Other Races made fewer trips than comparable men. The difference between Hispanic men and women on all indicators of travel were two to three times greater than the differences between the sexes in any other grouping (Rosenbloom, 1995a).

The above paragraph is a good example of how research on subpopulations is presented. It clearly shows differentiation and a barrage of complexity in making sense of the differences. As a result, two things need to be considered in this type of analysis. First, findings should be clear and accessible to policy makers and others who influence the world of transportation. Second, these findings should be understandable in a broader context for different people regarding work, leisure, and other life styles and norms.

In 1998, the U.S. Department of Transportation commissioned several key papers to analyze the travel behavior of people of color based on the 1995 NPTS. These papers represent the most accurate and extensive analysis to date regarding how Americans of different racial and ethnic origins travel. They provide an excellent summary of what is known regarding the travel patterns of people of color for work and non-work purposes.

Doyle and Taylor (2000) undertake the formidable task of understanding variation in metropolitan travel behavior by sex and ethnicity. Their major findings are impressive though predictable to those who study inequality. They find that race and ethnicity appear to be more important influences than gender on mode choice and commuting behavior, although gender differences persist, especially by household type. The authors look at three key factors related to travel behavior. The first factor is a series of travel modes. The authors look specifically at licensing, auto availability, carpooling, and transit. They find that there are racial differences in licensing rates, automobility, and transit use. The second factor that they look at is commuting—the distance traveled and the time it takes to travel. For commuting, they find that ethnicity plays a major role. For example, Black women have the longest commute times of any group. In addition, women of color, especially those living in the center city, have disproportionately longer commute times that are largely explained by a combination of low income, non-SOV mode choice, household responsibilities, and low levels of education. Finally, the authors examine purpose of travel. Here the authors found that women make more trips per day on average because they make more stops for shopping and personal/household-serving purposes (chain trips). Differences in number of trips by racial group and income, residential location, and human capital largely explain this variation. For working women, this means that women are more likely to chain these errands into their commute trips.

Giuliano (2000) analyzes the primacy of residential location (and other factors such as socioeconomic) in understanding differences in travel characteristics across ethnicity and race. She begins by first documenting racial differences in four travel categories: (1) daily travel distances (person-miles), (2) time spent traveling (person-minutes), (3) number of person trips, and (4) trip mode. Giuliano (2000) finds significant differences in the distance and time traveled by different racial groups, showing that Whites travel the furthest and Blacks spend the most time traveling. She also finds differences in the number of person-trips; however, variability is much more consistent both between and within racial/ ethnic groups. While differences between groups are significant, the group's means are distributed in a tight range. Whites have the highest average number of trips. Finally, she shows that personal vehicle trips account

for the overwhelmingly majority of all person-trips for each racial group. She also shows that significant differences exist among racial groups for the other mode choices (transit, walking, other). The point here is that there is less variability overall in trips, relative to total distance and total travel time.

Giuliano (2000) then proceeds to explain these differences through multivariate analysis, finding that racial and ethnic differences are not only limited to effects explained by different location patterns but also by fundamental differences in what motivates travel and location choices. Her general conclusion regarding location is that geography matters, but it matters in different ways for different population segments. For Blacks and Hispanics, spatial location patterns seem to provide the best explanation; for Asians, they reflect different travel choice processes.

Two important papers by Chu, Polzin, Rey, and Hill (2000) and Polzin, Chu, and Rey (2000) analyze mobility and mode choice for non-work travel by people of color. In their mobility paper, the authors (Chu et al., 2000) provide rich descriptive data on mobility in 1995 (the most current NPTS database) and an analysis of mobility over time, i.e., how have mobility rates changed from 1983 to 1995? They find that Whites exhibited higher mobility, about 2 percent over the national average, while mobility for people of color was lower. Among people of color, Hispanic mobility was the highest (about 2 percent below the national average) and Asian mobility was the lowest (about 15 percent below the national average). They also find that differences in average mobility for non-work travel among the racial and ethnic groups change little with personal, household, and geographic characteristics. Regarding mobility over time, all racial and ethnic groups had positive growth rates for non-work mobility travel activities. This was true for several different measures of mobility (e.g., person trips, person miles, vehicle trips, vehicle miles, and person hours). Mobility grew at a much faster rate for people of color than for the White population during 1983 to 1995. Among people of color, Hispanic mobility grew at the highest rate, followed by Blacks and other groups.

In their second paper (Polzin et al., 2000), demographics of people of color and their mode choice (how people travel) is analyzed for the White, Black, Hispanic, Asian, and Other subpopulations. Using descriptive statistics and multivariate analysis, they find several distinctive patterns of mode choice among people of color. First, people of color are several times as likely as Whites to use public transit for non-work travel and about twice as likely as Whites to walk for non-work travel. Blacks stand out among people of color in their use of public transit—they are 9 times as likely as Whites to use public transit for non-work travel, while other people of color are about 2 to 3 times as likely as Whites to use public transit for non-work travel.

From the findings of these very thorough, complex, and well-researched papers, what is known about people of color and their travel patterns? First, differences in travel frequency, length, time and mode by race clearly exist and, as a result, differences exist by class (when using race as a proxy). Second, because these papers are national in scope, they fail to address differences in regional or city/urban contexts. As a result, caution should be taken when analyzing national data, especially when it points to differential outcomes by race. National figures on most measures of inequality often mask important and significant differences on social economic indicators regarding race. As a result, the data presented in the papers summarized earlier are probably masking even larger differences by race. For example, racial or ethnic differences in New York City may very well differ from differences in Houston, Miami, Chicago, and Los Angeles.[4]

[4] Later in this chapter, economic restructuring in the United States is analyzed and the argument presented that uneven restructuring processes resulted in different economic outcomes across different cities and regions. Los Angeles is presented as an example, supporting the point that national travel often masks city or regional differences.

Now, with a better idea about what is known regarding race and ethnicity in travel behavior, this chapter focuses on the meaning of these data to larger issues of inequality, including poverty and social welfare. To do this, a discussion is first provided on how to think about inequality in contemporary society. Those factors most important in any analysis of inequality in the United States are discussed. Some key general trends and indicators are provided regarding those measures of inequality believed to be important in linking knowledge about travel behavior. Finally, a more specific discussion follows regarding how travel behavior among people of color and travel are linked.

ANALYZING INEQUALITY

Contemporary analyses of the urban condition often focus on the processes and circumstances that have produced marginal and poor populations (Wilson, 1987; Jencks and Peterson, 1991; Massey and Denton, 1993; Danziger, Sandefur, and Weinberg, 1994; Holzer, 1996; Jargowsky, 1997). Several themes have predominated in this work. First, the research focuses on the economic changes that result in divergent opportunities. Beginning with an emphasis on "rustbelt" cities and the deindustrialization that accompanied changes in urban economies, analysts contended that economic opportunity for blue collar workers declined as jobs with good pay and decent benefits in the manufacturing sector disappeared along with the factories (Harrison and Bluestone, 1988; Wilson, 1987). Second, the research focused on the divergent economic fortunes of the skilled and the unskilled. In the context of deindustrialization and the growth of jobs in the advanced service sector, the importance of skills, both "soft"[5] and "hard" have become the differentiating marker of access to a comfortable place in the modern urban economy (Holzer, 1996). Third, the research focused almost exclusively on deindustrializing, rustbelt, urban centers of the Midwest and Northeast, thereby reinforcing an almost exclusively Black-White lens on urban inequality and the notion that poverty and inequality was negligible in the West.

These explanations of contemporary urban inequality are not so much wrong as incomplete, partial, and lacking in a fully developed perspective. Such a perspective would take into account not only the direct effects of each explanation separately, but their combined and interactive effects as well. By focusing on rustbelt cities, the analysts missed a growing segment of urban America, where the dynamics were no longer simply black-white but increasingly multiracial and multiethnic. By focusing on skills, these explanations were missing the fact that new immigrants with few skills were being absorbed economically in larger numbers in the cities of the Sun Belt and elsewhere. By positing a set of structural forces that could be explained without reference to race, these explanations were still unable to provide compelling explanations for the resulting inequalities that were often conditioned and coded by race and ethnicity.

In addition, past studies rarely, if ever, took account of the social processes and interactions among and between recent arrivals and more established ethnic and minority groups (Wilson, 1996, and Waldinger, 1996, provide recent important exceptions). As a result, a slice of the complex dynamics necessary to understanding inequality in cities went unexplained. This important factor, when coupled with an altogether different economic restructuring process in the Southwest (and other Sun Belt regions), leave unexamined many significant aspects of inequality in major urban centers.

Enduring racial residential segregation is one of the main underpinnings of the racialization of inequality. For example, the form of concentrated ghetto poverty so often associated with rustbelt central cities would not have emerged in the absence of persistent racial bias in the housing market (Massey and

[5] Soft skills are often in reference to personal characteristics or traits that employers prefer. For example, dressing appropriately, speaking properly and without slang, arriving to work on time, and displaying an eager and willing attitude towards work.

Denton, 1993; Yinger, 1995). Research reported by Bobo, et al., (2000) strongly pinpoints a racial preference hierarchy that permeates how individuals think about and make neighborhood location choices in Los Angeles. The matter of where people live, or even consider living, as well as where they will feel welcomed or threatened is still powerfully coded by racial and ethnic considerations. Where individuals live often has direct impact on employment opportunities, information networks, services and amenities, and a host of other quality of life indicators (i.e., school quality, exposure to poverty and neighborhood decay, exposure to hazardous waste, risk of criminal victimization, and so on).

Another telling example is the role that immigrants play in understanding differential economic opportunities and other outcomes for native-born and other sub-population groups. The increasing importance of the role of nativity in better explaining inequality in cities like Los Angeles, New York, Miami and other metropolises point to complex layers of interactions, labor market opportunities, housing patterns, and racial bias. Exploring how foreign-born status interacts with the native-born in different labor market contexts, racial bias in the housing market, travel patterns, and local economies is central to understanding contemporary inequality.

Urban America also and perhaps most importantly is a social prism capturing and refracting much of the diversity of the modern American experience. Generally, there has been a rapid increase in the number of truly multiethnic urban areas in the U.S. According to Frey and Farley (1996): "The combined minority populations—Latinos, Asians and blacks—increased nationally at seven times the rate of non-Latino whites" (p. 35). Their analysis of 1990 U.S. Census data identified 37 "multiethnic metros," where at least two of three minority groups exceeded their percentage in the U.S. population as a whole. Another way of appreciating the rapidly changing racial and ethnic make-up of the population is to consider a "diversity index," which indicates the proportion of times two randomly selected individuals in the U.S. would differ by race and ethnicity. In 1970 that figure was 0.29. It rose to 0.35 in 1980 and to 0.40 in 1990. It is projected that this number will exceed 0.60 as early as 2020 and furthermore, that by 2050 the U.S. population will be composed of roughly 50 percent those now classified as racial and ethnic minorities (all figures from Harrison and Bennett, 1995, p. 142).

An account of the dynamics of inequality in America focuses on three processes that prove to be important to the dynamics of social life in most large urban metropolitan areas: (1) immigration and rapid demographic change; (2) economic restructuring and persistent inequality; and (3) persistent racial residential segregation.

Immigration and Rapid Demographic Change

Table 1-1 provides data on the percent of total immigration to metropolitan areas of intended residence during the mid-1980s and well into the 1990s. Clearly, Los Angeles and New York City were the primary beneficiaries of large-scale immigration to the United States during this period. However, the chart also points to significant immigration to other large and important urban centers in the United States. These other cities also are widely considered immigrant enclaves or cities with significant newcomers amidst their population.

Perhaps what stands out the most with Los Angeles and other immigrant-receiving cities are the transformations from a predominantly white European base to an increasingly heterogeneous people of color base. Of course, the pace and transformative character of this population change in part explains some of the unique contours of inequality in America. At the very least, it provides a benchmark for thinking about massive and profound urban change in the face of an older (at least in terms of recency of arrival) African American, Latino, and White ethnic base.

Table 1-1. Percent of Total Immigration Admitted by Metropolitan Area of Intended Residence, 1984 to 1997

Year of Arrival	LA Metro*	New York	Chicago	Houston	Miami	Total (top 5 Cities)	Total Immigration
1984	11.4	16.9	4.1	1.4	2.1	35.9	543,903
1985	12.8	3.9	3.9	1.3	2.4	24.3	570,009
1987	12.9	16.2	3.4	1.9	6.3	40.7	601,516
1988	15.9	14.5	3.3	1.7	6.0	41.4	643,025
1989**	27.4	10.7	5.5	3.2	2.3	49.1	1,090,924
1990**	28.7	10.7	4.8	3.8	2.5	50.4	1,536,483
1991	17.3	8.9	3.3	2.9	3.2	35.7	1,827,167
1992	16.9	13.1	3.8	2.8	3.3	39.9	973,977
1993	14.6	14.2	4.9	2.5	3.4	39.6	904,292
1994	11.5	15.5	5.0	2.2	3.6	37.8	804,416
1995	10.1	15.5	4.4	2.0	4.3	36.3	720,461
1996	8.9	14.5	4.4	2.3	4.5	34.6	915,900
1997	10.1	13.5	4.4	2.2	5.7	35.9	796,378

*LA Metro includes the Los Angeles-Long Beach SMSA and Orange County.

**Part of what explains the large increase in immigration to Los Angeles in 1989 and 1990 is the large number of previously undocumented immigrants who became legalized through the Immigration Reform and Control Act of 1986. One of the act's provisions called for a general amnesty for those immigrants without documents who had been residing in the United States continuously prior to 1982.

Source: U.S. Immigration and Naturalization Service, Statistical Yearbook of the Immigration and Naturalization Service, 1996. U.S. Government Printing Office: Washington, DC.

Table 1-2 shows immigration to the top five immigrant receiving cities during 1995. Clearly, New York City and Los Angeles received the bulk share of new arrivals during this year. The previous table shows the consistency over time of new arrivals concentrating in just a few cities. Immigration to the United States is eclectic, with newcomers from many different countries concentrating in urban centers. Any analysis of immigration, especially their concentration in cities, is incomplete without a discussion of unauthorized or illegal immigration.

Table 1-3 shows data released from the INS detailing estimates of the undocumented immigrant population. According to the INS, about 5 million undocumented immigrants were residing in the United States in October 1992.[6] Two types of unauthorized immigrants exist. The most typical way of joining the illegal population is to obtain visas for temporary visits and stay beyond the authorized period of admission. This segment of the population constitutes roughly half of the illegal immigrant population residing in the United States. The other half consists of those who enter the country surreptitiously across land boarders; these are referred to as EWIs (Entry Without Inspection). EWIs include persons from nearly every country, but a large majority is from Mexico; most of the rest are from Central American countries (U.S. Immigration and Naturalization Service, 1996).

[6] These data represent estimates of the resident unauthorized immigrant population residing in the United States as of October 1992 (Warren, 1994). No estimates of the unauthorized immigrant population were undertaken for the 1993, 1994, and 1995 years.

Table 1-2. Immigration to Selected Cities, 1995, by Selected Country of Birth and Area (Metropolitan Statistical Area) of Intended Residence

	NY	LA*	Chicago	Miami	D.C.**
All Countries (total)	111,687	54,669	31,730	30,935	25,717
Bangladesh	3,210	260	59	40	326
Canada	345	373	229	148	187
China (PR)	10,281	3,365	853	201	820
Columbia	2,168	297	156	1,726	254
Cuba	231	269	89	13,670	62
Dominican Republic	20,606	19	98	1,352	298
Equador	2,904	278	279	294	134
El Salvador	468	3,554	120	192	2,158
Germany	326	271	112	77	172
Guatemala	381	1,735	399	212	360
Guyana	4,912	53	10	81	220
Haiti	3,040	16	91	2,329	167
Hong Kong	1,113	972	166	64	150
India	3,638	1,363	2,823	143	1,383
Iran	279	2,401	146	55	701
Jamaica	6,087	123	249	1,352	508
Korea	1,420	2,914	547	30	962
Mexico	640	8,139	6,085	214	316
Nigeria	1,102	286	310	49	724
Pakistan	2,227	369	669	120	799
Peru	1,046	487	140	1,043	670
Philippines	2,816	6,924	2,519	480	1,211
Poland	2,539	165	4,942	35	69
Soviet Union	17,615	4,592	3,276	252	968
Taiwan	536	2,312	183	40	298
United Kingdom	799	693	276	152	398
Vietnam	313	2,573	487	16	1,888
Yugoslavia	1,135	255	1,115	17	113
Other	19,510	9,611	5,302	6,551	9,401

*Refers to Los Angeles-Long Beach.

**Refers to Washington DC-MD-VA.

Source: U.S. Immigration and Naturalization Service, *Statistical Yearbook of the Immigration and Naturalization Service, 1994*, U.S. Government Printing Office: Washington, D.C., 1996. Tables 17 & 19.

By far, California received the largest share of unauthorized immigrants in 1996 at 40 percent. Texas follows Los Angeles with 14 percent. The top five states with the largest number of unauthorized immigrants are the same as the top five states with the largest number of legal immigrants. Well over 50 percent (54%) of all unauthorized immigrants come from Mexico—no other country comes close to this figure. Included in the mix of unauthorized immigration are significant numbers from El Salvador, Guatemala, Canada, Poland, Philippines, and Italy.

Table 1-3. Estimated Illegal Immigrant Population from Top Ten Countries of Origin and Top Ten States of Residence: October 1996

Country of Origin	Population	State of Residence	Population
All Countries	**5,000,000**	**All States**	**5,000,000**
Mexico	2,700,000	California	2,000,000
El Salvador	335,000	Texas	700,000
Guatemala	165,000	New York	540,000
Canada	120,000	Florida	350,000
Haiti	105,000	Illinois	290,000
Philippines	95,000	New Jersey	135,000
Honduras	90,000	Arizona	115,000
Poland	70,000	Massachusetts	85,000
Nicaragua	70,000	Virginia	55,000
Bahamas	70,000	Washington	52,000

Note: Total figures do not add to 5,000,000 because table only lists top ten countries and states.

Source: U.S. Immigration and Naturalization Service, *Statistical Yearbook of the Immigration and Naturalization Service, 1995*, U.S. Government Printing Office: Washington, D.C., 1997. Table P.

While immigration explains a very large part of the massive demographic changes occurring in most of our cities, migration and fertility rates also are important to the growth of multiethnic urban areas in the United States. In 1990, Whites made up the largest share of the total population at 76 percent, followed by Blacks (11.8%), Latinos (9%), and Asians (3%). By the middle of the 21st century (2050), prognosticators predict that the Latino share of the total U.S. population will increase to 26.2 percent, the Asian share to 5.4 percent. On the other hand, the White and Black shares in the total population are expected to decline to 56.5 percent and 10.9 percent, respectively. As mentioned earlier, the United States is an increasingly urban country—that is, a significant number of Americans live in cities. This fact is especially true of people of color who overwhelmingly live in urban areas.

Thus, the confluence of immigration, migration, fertility, and the deteriorating population position of Whites and Blacks allows for a range of urban dynamics related to inequality and race relations in particular. The concentration of racial and ethnic groups in cities places them in precarious positions regarding opportunity structures related to employment, housing, and education—all key indicators of well-being and future prosperity.

Economic Restructuring and Persistent Inequality

Over the past two and half decades the gap between the economic have and have-nots in urban America has widened substantially (Phillips, 1990; Michel, 1991; Levy, 1995; Burtless, 1990; Harrison and Bluestone, 1988). Recent studies have shown increasing polarization, especially in terms of employment prospects, earnings, and accumulated wealth (Michel, 1991; Levy, 1995; Harrison and Bluestone, 1988; Oliver and Shapiro, 1996). Other studies have drawn attention to the persistence of poverty and the increasing geographic isolation of the ghetto poor from the mainstream of American society (Wilson, 1987; Jargowsky and Bane, 1991; Mincy and Ricketts, 1990; Jargowsky, 1997).

In general, poverty is more unequally distributed in urban areas than in the United States as a whole. For example, Table 1-4 provides poverty figures for Los Angeles and the United States for 1990, 1993, and 1995. During each year the percentage figure that represents the total number of people in poverty relative to the non-poor was significantly higher in Los Angeles than for the rest of the United States.

Table 1-4. Poverty in Los Angeles County and the United States

Year	Los Angeles County		Percentage in the United States
	Number of People in Poverty (all ages)	Percentage	
1990	1,469,913	16.7	12.8
1993	2,164,629	23.8	15.1
1995	2,057,499	22.7	13.8

Source: United States Bureau of the Census, Current Population Survey.

This differential peaks in 1995 when the difference between the percent below poverty in Los Angeles and the rest of the United States is almost 9 points. While Los Angeles is only one of many cities in the United States with this pattern, it nevertheless provides an example of urban poverty trends in this country.

Two explanations of restructuring highlight fundamental changes in the basic structure of the U.S. economy (Sassen, 1990) and thus measures of inequality. These arguments hold that inequality is connected to the decline of central city manufacturing employment and to the increasing polarization of the labor market into high wage and low wage sectors (Wilson, 1987 and 1996; Kasarda, 1993). Accordingly, high rates of joblessness exist in central city communities, especially among Black males, in part as a consequence of the suburbanization of well-paying entry level jobs (the spatial mismatch hypothesis) and partly due to the resulting gap between skills and types of employment opportunities available in central cities (The skills mismatch hypothesis, see Kasarda 1983, 1988, 1989, 1990; Moore and Laramore, 1990).

Again, turn to Los Angeles to highlight how restructuring has affected employment opportunities in a specific context. More importantly, looking at Los Angeles confirms the emphasis that city or regional analyses mask racial disparities in travel. The restructuring spin highlighted by Wilson (1987) and Kasarda (1993) is perhaps more readily applicable to Los Angeles than is the mismatch analysis. Goods-producing manufacturing in Los Angeles has been remarkably robust since post-World War II and rivals historic growth periods in other regions of the United States (Scott, 1996). At approximately the same time, Los Angeles begins a downward spiral in the auto and auto-related branch plants and its aerospace and defense sectors begin to erode, but these declines are buffered to some extent by the massive manufacturing growth. So while the rest of the United States was reeling from manufacturing declines and horrendous rustbelt-like economic conditions, Los Angeles was intensively manufacturing and only slightly declining in its rustbelt.

The mismatch story also seems out of place in Los Angeles, where literally millions of low skilled immigrants find jobs and consider the region a prime employment destination area. Waldinger and Bozorgmehr (1996) explain this theoretical contradiction by suggesting that "immigration is part of a fundamental process of urban economic restructuring, in which the growth of services breeds a demand for both high- and low-skilled labor while increasingly excluding workers with middle-level qualifications." They further argue that by "creating jobs for people with low skills, it also creates the demand for workers willing to work at low-status, low-paying jobs. While such low-wage jobs are increasingly found in the advanced services, the simultaneous proliferation of high-paid service workers adds further to the demand for immigrant workers. Once in place, the immigrants provide a cheap, easily managed labor force that can bolster the declining goods-producing sector and help revive sagging urban economies." As a result, unlike the mismatch explanation, this "immigrant restructured hypothesis" suggests that Los Angeles and other immigrant rich regions retain and create many easy-entry jobs at the expense of creating better paying and middle skilled jobs, or jobs with well-developed internal labor markets which afford opportunities for advancement.

Besides the typical industrial, manufacturing, and service type jobs found in Los Angeles, the area also boasts highly developed ethnic and immigrant employment niches spanning different occupations (i.e., domestics, gardeners, janitors, restaurants). The growth of Los Angeles's ethnic economies has been profound. However, not all groups share in this growth equally; perhaps even more daunting than the uneven participation rates is that these jobs tend to offer low wages, poor benefits packages, and little opportunities for upward mobility.

Economic restructuring in Los Angeles clearly differs from that in New York City and of course elsewhere in the United States. As a result, when looking at travel patterns, regional and city contexts need to be considered in understanding and explaining outcomes by people of color and travel. Finally, while specific differences in economic restructuring processes exist and, as a result, different outcomes, some generalizations nevertheless help in linking broader or larger policy goals and federal outlays such as transportation planning. These generalizations include, for example, that U.S. economy has moved from goods production to services, that unions are less impactful at a national level, and that wages continue to decline. These trends alone can set the stage for better linking urban transportation policies, programs, and resources at a national level while maintaining an awareness of the fact that local differences are real and need to be addressed.

Persistent Racial Residential Segregation

Names of communities such as Harlem, South Chicago, East St. Louis, North Philadelphia, South Central LA, East LA, and Simi Valley designate not merely physical spaces, but each one is immediately and widely understood to have a particular racial and ethnic make-up as well. Terms such as "China-town," "Koreatown," or even "Little Saigon" remain in everyday parlance. Given the common sense recognition of "racialized space," it is surprising that so much of the literature on economic restructuring and the dynamics of inequality ignored or downplayed the fact of racial residential segregation (Fainstein, 1993). Indeed, both the structural transformation of the economy hypothesis and the culture of poverty hypothesis came under sharp criticism for ignoring a central factor in modern urban inequality: patterns of racial residential segregation (Galster and Keeney, 1988; Fainstein and Fainstein, 1989; Massey and Denton, 1993). According to this view, Whites' unwillingness to share residential space with Blacks, and to a lesser degree, other minorities, locks minorities into inner city communities which are isolated from mainstream avenues of social and economic mobility (Massey, Condran, and Denton, 1987; Bickford and Massey, 1991).

Three facts about racial residential segregation stand out. First, it can be quite extreme, as has long been the case for African-Americans. Nationally, the Black-White index of dissimiliarity or segregation score stood at 0.69 in 1990, down only slightly from the 1980 figure of 0.74. This means that more than two-thirds of African-Americans would have to change their current place of residence to accomplish a random distribution without regard to race. The comparable figure for Los Angeles in 1990 was 0.73, slightly above the national average. There is considerable variability depending upon the groups compared. Thus, Hispanic–non-Hispanic–White segregation score was 0.50 nationally in 1990, and stood at 0.61 in Los Angeles. The Asian-White figures were 0.41 and 0.46 nationally and in Los Angeles, respectively. One recent assessment of segregation patterns in the Los Angeles metropolitan area noted three important patterns: (1) segregation tended to be higher and change less in Los Angeles County as compared to Riverside, San Bernadino, Orange, and Ventura Counties; (2) the number of diverse neighborhoods was increasing substantially, but much of this involved Black, Latino and Asian mixtures as opposed to extensive mixing with Whites; and (3) the level of Hispanic segregation was rising and threatening to create an enormous "mega-barrio" (Clark, 1996).

Second, where people live can have important effects on economic opportunities and overall quality of life experience. Neighborhoods vary tremendously in quality of services, amenities, and level of exposure to unwanted social conditions such as crime, severe unemployment and poverty, and failing schools (Bickford and Massey, 1991; Massey, Condran and Denton, 1987; Massey and Fong, 1990). Indeed, Massey and Denton (1993) make the powerful argument that economic restructuring and racial segregation interact in ways that can sharply increase the magnitude of economic dislocations and social ills associated with them. Furthermore, to the extent minorities face racial discrimination and other constraints in the housing market, they are less likely to have ready access to areas rich in employment opportunities and less likely to form personal ties to individuals who can link them to other important economic opportunities. Segregative processes in the housing market also impose limitations in terms of the value of the homes minority individuals own and in terms of mortgages and other loans they may obtain, and drive up the cost of insurance. All of these factors play a part in undermining the accumulation of assets and wealth by African Americans and other racial minorities (Oliver and Shapiro, 1995).

Third, although a complex array of factors, including economic resources and personal taste issues, seem to contribute to racial residential segregation, there is growing evidence that racial discrimination and prejudice are key elements in its perpetuation (Massey and Denton, 1993; Yinger, 1995). A number of auditing studies established that Blacks and Latinos are likely to encounter substantial levels of differential treatment in their dealings with realtors, landlords, and home owners (Yinger, 1995). The forms of discrimination include being shown fewer units; being lied to about the availability of units; being steered to particular neighborhoods or sites; being told more discouraging things about a neighborhood, house, or apartment unit; and being offered less favorable terms. Furthermore, there is growing evidence of racial discrimination in access to home mortgage loans as well (Jackson, 1995; Myers and Chan, 1995).

CONNECTIONS BETWEEN TRAVEL AND INEQUALITY

Uneven travel patterns for people of color and the above analysis and indicators of inequality in America are linked in two ways: (1) economic opportunities and (2) quality of life.

Travel and Economic Opportunities

It is of no surprise that the overwhelming use of public and private transport is economic related. People travel to work, to purchase goods, and to spend their income on leisure activities. Perhaps more importantly, transportation is central to employment opportunities, and thus to economic or class outcomes. Three key areas connect public and private transit with economic opportunities: (1) the mismatch between jobs and residence, (2) efforts to reform welfare by transitioning women as wards of the State to workers, and (3) residential segregation.

Mismatches, Employment, and Travel

The mismatch hypothesis as first proposed by John Kain (1968) over 30 years ago attempts to explain inner-city minority joblessness. On the face of it, the spatial mismatch argument is quite basic. It argues that the flight or suburbanization of blue-collar industries from the inner cities after World War II led many who lived in the core of urban metropolitan areas into unemployment and thus poverty. This thesis, mostly applied to African Americans, holds that because inner-city African Americans, on average, are modestly skilled and educated, the loss of these jobs entails special hardships. Tied to the cities by housing discrimination and low incomes, the group is geographically disconnected (mismatched) from well-paying, often unionized blue-collar jobs that have left these areas for suburbs, Sun Belt areas, or Third World countries. A strand of this research also argues that lack of automobile ownership and sparse public transport linkages stifle commuting options to peripheral areas where low-skilled work is currently

found in abundance. This holds true for many in the inner city, but especially for those from the working and poor class.

The growth of central-city employment in the post-war era, the argument goes, has been largely white-collar with substantial skill or educational requisites. As a result, central city residents (most of whom are African-Americans, Latinos, and, in the largest cities, Asians) are not connected (mismatched) to jobs nearest their place of residence (Kasarda, 1983; Wilson, 1987). Thus, the mismatch hypothesis addresses the problems of those cities with the largest numbers of poor, the highest concentrations of poverty, the highest concentrations of new arrivals, and the mostly minority poor. To date, the mismatch hypothesis remains a viable, albeit contested, explanation for the low inner-city employment rates for city residents. One need only look to recent research publications on this topic to assess its popularity and importance (Aponte, 1996; Taylor and Ong, 1995; Stoll and Raphael, 2000; Stoll, Holzer, and Ihlandfeldt, 2000; Stoll, 1999a and 1999b; Stoll, 1998).

Chief among the recommendations (at least in regard to transportation planning) advocated by those who study the role of geographic space and employment is car ownership and/or improved or accessible public transport (Stoll, 1999a; Taylor and Ong, 1995; Sanchez, 1999). Despite the call for improved public transit by civil rights leaders, policy advocates, researchers, and federally appointed commissions,[7] significant mobility problems still exist in low-income groups and racial minorities.

The call for improved public transit and/or automobile ownership for the working poor would provide an important intervention strategy to lessen unemployment among inner-city residents. Earlier this chapter discussed how the average distance traveled (by miles and time) has grown. Others show that the distance between a city resident's home and potential employment location has also increased over time (Holzer, 1991). As this distance increases, low skill, working class, or unemployed workers with low levels of personal mobility or public transport are not able to meet the travel requirements of the new jobs in the outlying suburban areas of major cities. Currently, urban public transit systems operate efficiently in densely developed urban areas. These systems however do a poor job of serving dispersed trip origins and destinations (Kain, 1968).

In a keen paper written by Thomas Sanchez (1999), he asks if access to public transit significantly improves employment levels in urban areas. This question is very important because, despite the lack of evidence (at least according to the author), public transit system enhancements continue to be recommended to help solve central city unemployment problems (Blackley, 1990; Hughes, 1991; Willis, 1997). The author provides justification for increased support of public transit by empirically showing that access to public transit is a significant factor in determining average rates of labor participation at least in two large urban cities (Portland and Atlanta). He argues that improved access to public transit can overcome the physical separation between the residential locations of non-White workers and job locations.

Taylor and Ong (1995), while finding no support for a spatial mismatch, do find that private vehicle ownership almost equalizes commute patterns between minority workers and Whites. They raise the question of how important a private automobile is as an employment tool, in particular to low-skilled, low-waged labor. They argue that commuters dependent on public transit are at a distinct disadvantage in accessing employment, especially to dispersed suburban job sites, which clearly points to policies to help carless job-seekers get access to automobiles.

So, on one hand, if a spatial mismatch is evident, then it makes good public policy sense to devote resources to make public transit available to workers in the inner-city who need to get to jobs in outlying

[7] For a nice summary see Thomas W. Sanchez, 1999.

areas. In a similar vein, car ownership for the working class also makes sense to bridge point A (residence) and point B (place of employment). Car ownership also makes sense if no mismatch occurs and high unemployment exists—perhaps as a result of a car mismatch as Taylor and Ong suggest explicitly (1995). What both policy advances fail to address are those groups (non-Whites) who have access to areas of suburban employment, yet remain unemployed. Employer discrimination, inadequate education, and insufficient job training are the likely culprits. Thus, policy recommendations for improving job training, job information, day care services, tax credits, and a strict enforcement of civil rights legislation seem the more appropriate form of intervention.

Welfare Reform and Travel to Work

In 1996, President Clinton signed the Personal Responsibility and Work Opportunity Act, the emphasis, at least in theory, being on the latter part of the Act's namesake—work opportunity. Welfare reform would come to an end—at least in terms of how it had been operating for the past two decades or so. Unique to this bill was a large focus on transitioning women from the dole to the workplace. Women on welfare would, after an initial grace period of about 24 months, be forced to work, joining the ranks of workers similar to themselves—low-skilled, low-educated minority and immigrant laborers. The connection between welfare reform and travel are similar to the skill and spatial mismatch for the simple reason that women on welfare are similar to minority unemployed urban men—at least in regard to economic opportunities, access to personal travel, and human capital. There are, however, some unique dimensions to consider in discussing welfare reform and travel (MacDonald, 1999; Rosenbloom and Burns, 1994; Rosenbloom, 1986; Madden and White, 1978; Ong and Blumenberg, 1998); they are (1) day care concerns, (2) household responsibilities, and (3) job availability for ex-welfare recipients.

Over the last three decades the number of families headed by a woman alone have increased substantially. In 1970 only 11 percent of all families were maintained by a woman alone; that grew to 15 percent in 1980, 16 percent in 1985, and almost 20 percent in 1990. When these figures are divided along racial and class lines, larger percentages of single headed households below the poverty threshold and among minority women are seen. Two prevailing arguments drive policy regarding women with children on welfare. The first, which is currently responsible for welfare programs, argues that women should not be dependent on welfare and that a caring and healthy and intact household should include a mother who works rather than one who depends on the federal government for support. The second argument, less accepted in policy circles, basically argues that poor women (just like middle and upper class women) should have the opportunity to raise and care for their children twenty-four hours a day. The possibility of raising children is all but lost living below the poverty threshold and in need the support of the federal government. To do so means transitioning to the regular job market—one bereft with low wages, instability, minimal insurance coverage, and long hours away from home. Most discouraging to first timers entering the work force is the lack and inaccessibility of day care, further complicating and lessening a mother's wage potential and opportunities (i.e., being able to spend many hours outside of the home in a good suburban job).

Accessible day care is a different issue altogether from affordable day care. For many working and middle class families, affordability often is the biggest impediment to utilizing day care services. Accessibility is usually not an issue for middle class (and higher) families because they have personal transport options, usually a vehicle. Driving a few miles outside of a normal travel pattern to access day care far outweighs the benefits of keeping children in an inadequate day care center or at home by themselves, which, depending on the age of the children, might make parents criminally liable. For poor people dependent on public transport, easily accessible day care is fundamental to their successful transition to work. Day care centers located on major thoroughfares or close to major transportation hubs are important to facilitating the transition from childcare responsibilities in the household to the world of work. Similarly, alternative forms of day care, such as vouchers that would subsidize extended family

members (e.g., a grandparent, teenager, or aunt) who care for children of welfare mothers who work, would be a first start. This in part would aid in transitioning more immigrant mothers who, for cultural and other reasons, are very uncomfortable leaving their children in "official" day care centers. They are much more comfortable leaving their children with extended kin.

Other household responsibilities such as cleaning, cooking, and generally running the day-to-day activities of a household likewise call for unique approaches to transportation planning regarding women on welfare and their transition to work. For example, stopping to purchase produce, other groceries, and goods to feed and care for a household are part of the day-to-day activities that every household in America undertakes. The primary difference between poor and non-poor households in this regard being quality, quantity, and ease in purchasing goods. For poor people, shopping for groceries is often an expensive and time-consuming ordeal. Few traditional grocery stores are found in urban ghettos and barrios, which forces poor people to either pay exorbitant prices at smaller "mom and pop" style stores or travel significant distances, cutting into time spent at home and adding to the frustration of having to commute for basic subsistence goods. Similarly, purchasing quality goods at decent prices often is not possible in the inner city; large commercial and discount stores often are found only in suburban or outlying regions.

Finally, the types of jobs available to welfare dependent mothers may not be better than those jobs found in the inner city. In other words, given low levels of education, work skills, and experience, few employers may find previously welfare dependent mothers attractive. Thus, the few job prospects available to welfare mothers in outlying areas may be similar to jobs closer to home—those that offer minimum and part-time work. This of course throws into serious consideration the type of jobs available for poor and low educated people—the skills mismatch hypothesis again rears its ugly head.

In a thoughtful essay, Wachs and Taylor (1998) ask how transportation strategies can help meet the welfare challenge of Clinton's Personal Responsibility and Work Opportunity Act. Besides favoring the optimal—though highly unlikely—creation of jobs in central cities or making suburban homes affordable to the poor, they advocate subsidized or creative proposals to make car ownership easier for the working poor and the previously welfare dependent. This would of course provide great flexibility and accessibility to day care and consumer services—key components of any mother's life. Ong (1996), in a study looking at work and automobile ownership among welfare recipients, revealed that those owning an automobile enjoyed a significant advantage in terms of higher employment rates and total earnings. In addition, a vehicle provides greater economic mobility opportunities. Employment prospects and variability at where and in what jobs one might undertake increase with an automobile. Wachs and Taylor (1998) also support the improvement of public transportation systems but ring a cautious tone to their advocacy. They argue that, despite substantial public subsidy, productivity continues to decline, and ridership is flat or declining in most metropolitan areas. In general, new suburban transit services have done an especially poor job of attracting riders, and improved outcomes as a result of public transport investment is not at all clear. This clearly points to policies that emphasize employment and training, education, and subsidized and accessible day care.

Residential Segregation and Transportation

The relationship between socioeconomic status and spatial segregation has a long history in the United States and in scholarship. Denton and Massey argue that, for most racial and ethnic groups, residential segregation falls steadily as social class rises and as generations in the United States increase, with the conspicuous exceptions being Blacks and Puerto Ricans. The consequences of residential segregation are great. It is a primary structural cause of the geographic concentration of poverty in U.S. urban areas. In another paper, Massey, Gross, and Eggers (1991) link minority poverty and segregation within metropolitan areas to the concentration of socioeconomic deprivation within neighborhoods. They also connect

neighborhood poverty rates to individual-level outcomes commonly associated with the underclass—male joblessness, teenage motherhood, and single-parenthood. As a result, residential segregation and transportation are linked—as either fostering or hindering economic opportunities that allow one to escape structural neighborhood factors.

Male joblessness as described earlier may well be a function of skills mismatch, geographic or spatial mismatch, or both. Male joblessness, especially that pertaining to African-Americans, is also very likely the effect of persistent racial discrimination by employers, low levels of human capital, and poor educational outcomes as a result of shoddy schools. Residential segregation is one of the major factors in poor educational outcomes. It also accounts for fewer job opportunities and thus low levels of job experience, education and job experience being primary characteristics that employers value. Access to public transit and/or private automobile is key to employment and to leaving one's place of residence and a geographically concentrated poverty neighborhood. As Massey, Gross, and Eggers (1991) summarize: a variety of theorists have argued that where one lives determines a lot about who one knows, what one learns, and how one is connected to society.

In William J. Wilson's classic book on the underclass (1987), he argues that people living in neighborhoods of concentrated poverty "experience a social isolation that excludes them from the job network system that permeates other neighborhoods and that is so important in learning about or being recommended for jobs that become available in various parts of the city" (p. 57). In short, concentrated poverty leads to male joblessness and, hence, to other social dysfunctions in the inner city. Thus, to the extent that transportation policy can aid in decreasing unemployment and the isolation of concentrated poverty, fewer young men and women will participate in activities outside the norm of mainstream U.S. behavior.

Travel and Quality of Life

The impacts of travel, as discussed earlier in this chapter, are not only related to economic opportunities but also have a large effect on quality of life. Expansion of transportation facilities and infrastructure has not benefited everyone equally. In particular, minority neighborhoods and the low-income people who live in them have had to contend, for example, with unacceptable noise and air pollution levels (Forkenbrock and Schweitzer, 1999) and concrete structures that do little for the aesthetic make-up of local neighborhoods. The U.S. Department of Transportation mandates that a wide variety of environmental, social, and economic effects be considered when evaluating a possible change in the transportation system. In regard to quality of life issues, the Department of Transportation is concerned with four categories of effects: (1) changes in air quality, (2) changes in noise level, (3) social effects, and (4) economic effects. Thus, at a very important level, the federal government acknowledges the importance and impact that transportation policies have beyond merely the economic. For purposes of this chapter, three quality of life issues are identified as affecting people of color through transportation patterns and policies: environment, services, and leisure.

A useful framework for linking transportation planning and an urban environment is provided by Forkenbrock and Schweitzer (1999). They measure the extent to which the air quality or noise consequences of a transportation system change would disproportionately affect minority populations. Their study demonstrated how it is possible to determine whether air quality or noise effects would adversely and disproportionately affect minority populations or low-income neighborhoods. They present a methodology that allows them to improve the quality of information available to transportation planners and, perhaps more importantly, to potentially affected residents. Key to their analysis is their theoretical framework in which they linked environmental justice (a federal policy) to understanding transportation inequities.

The environmental justice movement (and Act), while only recently passed (February 11, 1994), has been gaining momentum in the United States for many years. It has certainly been "moving" in the United States for well over 30 years, gaining recent stimulus from urban inequities and disproportionate effects on minority and low-income populations as a result of city, state or federal programs or private industry development. Transportation infrastructure (i.e., rail, freeways) falls into the category of environmental justice effects due to the damaging, deleterious, and disproportionate impact on low-income and minority neighborhoods.

The procurement of services and the dependence on travel for this make transportation planning critical in addressing inequities found in urban areas. Transportation planning and the location of hubs and subway stops, for example, impact greatly the distribution of goods. Likewise, easy access to health care, legal assistance, education, and subsistence goods provides low income and minority populations with critical services that most Americans have a right to procure. More importantly, these services are critical to quality of life, and ultimately job prospects, information, and general well being.

Finally, transportation provides us with access to leisure activities, different forms of entertainment, and access to cultural, artistic, and sporting events. Perhaps more important than the general well-being and quality of life gained from this type of access is the ability to venture outside of isolated and impoverished neighborhoods at a relatively low cost and with ease. Part of experiencing any urban environment is being exposed to different cultures, events, and art forms. Transportation allows people from different backgrounds, classes, and races to venture outside of their normal sphere of activities.

Even though economic opportunities are perhaps the central core in terms of understanding travel patterns among people of color, they should not be the only frameworks for understanding inequality and travel. Quality of life should not be underestimated in how it impacts job acquisition, information, and producer goods. Perhaps more important, quality of life issues and transportation bring together different institutions and people that, in the absence of mobility opportunities, might not normally come together.

CONCLUSION

As public and private travel patterns among Americans have changed, so have the contours of race and inequality in the United States. One does not necessarily cause the other, but both are intricately linked. Travel patterns among people of color are complex but clearly differentiated from Whites and along other subcategories such as gender and age. In addition, while most research on race and travel is focused on national patterns and data, important regional and city context differences clearly exist and need to be explored. The utility of national trends, however, should not be dismissed. The data presented in this chapter are clearly important and encourage policy makers, transportation planners, and others to fashion policies and programs related to equity in travel. Perhaps more important to the focus of this chapter, it analyzes how travel patterns are likewise linked to broader issues of inequality in the United States.

Inequality in the United States exists in several different dimensions. It rears its ugly head in many of our institutions, cultural mores, and daily lives. Two central factors help analyze inequality in a changing urban context, where people work and where they live. Foreign immigration, the largest we have ever experienced in the history of the United States, continues to profoundly impact our cities, daily activities, and notions of what this country is. As cities continue to be repositories of new arrivals, old timers, the poor, and ethnic minorities, the demographic make-up of the United States will drive policy makers, planners and others to solve vexing problems, inequality perhaps being the greatest challenge facing urban areas.

Economic restructuring has likewise contributed to worsening and persistent forms of inequality. As the economic structure of the United States continues to adjust to global pressures, new technologies, and different consumer demands, the employability of inner-city residents becomes more in doubt. This is especially true when data consistently show growing income and wage inequality between the high skilled and low skilled work force, between White and non-White workers, and between urban and rural workers. Finally, residential segregation, the third component in understanding contemporary inequality, argues that Whites' unwillingness to share residential space with Blacks and, to a lesser degree, other minorities locks minorities into inner city communities which are isolated from mainstream avenues of social and economic mobility (Massey, Condran, and Denton, 1987; Bickford and Massey, 1991).

Transportation impacts inequality in two clear ways: by increasing or decreasing economic opportunities and accessibility to quality of life attributes. It is of no surprise that the overwhelming use of public and private transport is economic related. People travel to work, to purchase goods, and to spend income on leisure activities. Perhaps more important, transportation is central to employment opportunities, and thus economic or class outcomes. Clearly, travel and economic outcomes are related to connecting workers to employment opportunities, jobs, and information regarding jobs. Welfare reform and the transition from State dependency to work are likewise central to how transportation impacts a contemporary public policy, but more important, to how it impacts a very important and sizable segment of population. Finally, the deleterious effects of neighborhood isolation can in part be challenged through effective, accessible, and low-cost travel opportunities. This in turn assists inner-city residents by helping them acquire jobs, subsistence goods, access to information, and a better quality of life.

Finally, this research does not suggest that transportation alone can be expected to eliminate inequality in the United States. Inequality is not new to this country, nor has it ever disappeared. Understanding inequality is part of the solution, as is understanding the role that uneven transportation opportunities, investments, and uses have in maintaining dichotomous relationships among different socioeconomic indicators. Eliminating inequality will only occur through an integrated program of economic development, housing, education, transportation, and political will.

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Chapter 2
Demographics of People of Color

Findings from the Nationwide Personal Transportation Survey

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INTRODUCTION

This chapter presents a demographic synopsis for people of color utilizing information from the 1995 Nationwide Personal Transportation Survey (NPTS), the Bureau of the Census, and several other sources. First, the U.S. population is analyzed to review its composition in terms of people of color, as well as the growth trends for these particular segments of the population. Then, various demographic characteristics are presented for the racial/ethnic groups, including selected personal (age, education), household (composition, income, tenure, residential choice), and basic transportation (vehicle availability, expenditures, licensure, trip making) characteristics.

Defining Race and Ethnicity

Racial and ethnic groups are often defined for purposes of analysis using one of two approaches. In one approach, the groups are defined according to the cohorts established for the original survey (i.e., race and ethnicity remain discrete). In the other approach, the racial and ethnic groups are combined and defined jointly: Hispanics, non-Hispanic Whites, non-Hispanic Blacks, non-Hispanic Asians, and non-Hispanic Others. The effect of alternative grouping on each group is dependent on its share of Hispanics. For example, Hispanics accounted for approximately 9.8 percent of Whites in 1990, 4.0 percent of Blacks, 6.3 percent of Asians, and 13.0 percent of others.[1] In either approach, Hispanics may include people of any race.

Unless indicated otherwise, this chapter utilizes the joint-definition approach. In addition, the non-Hispanic groups (non-Hispanic White, non-Hispanic Black, non-Hispanic Asian, and non-Hispanic Others) subsequently will be referred to as White, Black, Asian, and Others, respectively.

Race and Ethnicity in the NPTS

In most surveys, including the NPTS and the decennial Census, the race and/or ethnicity of respondents is established via self-identification through the selection of one of several pre-determined racial and/or ethnicity cohorts included in the questionnaire. Respondents do not have the option to indicate a multi-racial or multi-ethnic background. In these surveys, racial groups are typically defined as White, Black, Asian (including Pacific Islanders), and a residual category identified as "Other Races." Ethnic groups are based on Hispanic origin: Hispanic and non-Hispanic.

While the 1995 NPTS questionnaire did provide questions to establish both the race and ethnicity of its respondents, it is important to note that the race/ethnicity data that resulted is household-based, not person-based. During data collection for the NPTS, after recruiting a household for participation in the survey, an adult member of the household was asked a series of questions about the persons and vehicles

[1] Bureau of the Census (1997), *1997 Statistical Abstract of the United States*, Washington, D.C.: U.S. Department of Commerce.

of the household. The person providing this information then became identified as the "reference person" for that particular household's records. As part of the data collection process, the identified race and ethnicity cohorts for the reference person were automatically applied to the rest of the members of that household. This procedure, as a result, did not allow for the occurrence of multi-racial and/or multi-ethnic households. (The 1983 NPTS was the last survey of this series to include person-based race/ethnicity data.)

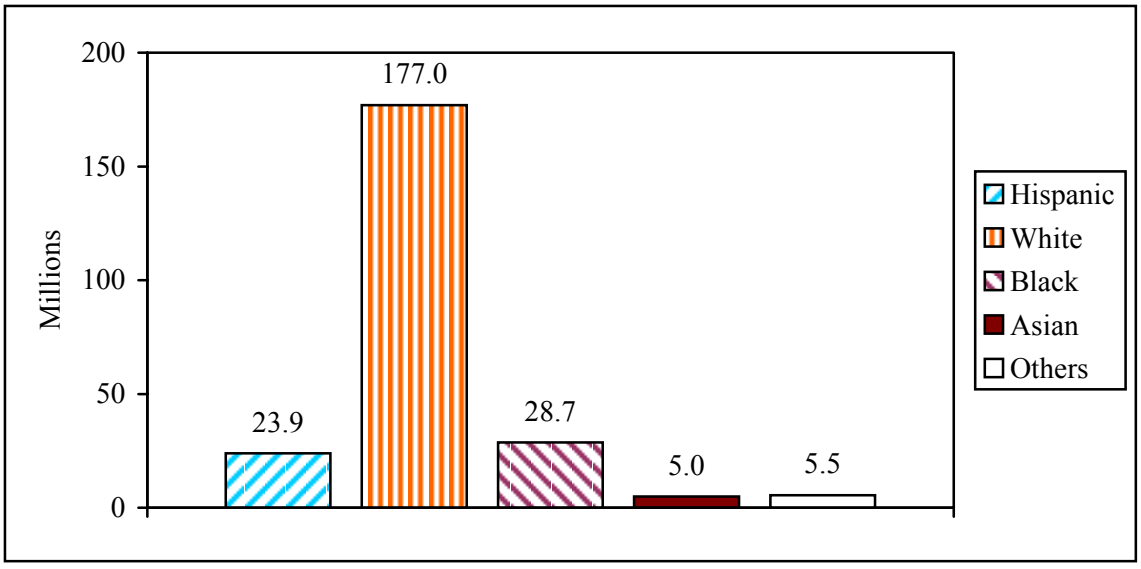
TOTAL POPULATION

Group Size

The NPTS survey is intended to reflect the total U.S. population, hence its weighting is designed to expand the sample to match the estimated U.S. population in total and to match the population with respect to selected characteristics including race, ethnicity, MSA status and size, household size, age, and gender. However, it should be noted that the population of each discrete racial and ethnic category may not match Census figures since race/ethnicity expansion was based on "Black" versus "Non-Black, " rather than for all potential race/ethnic groups. This has impacted, for example, the relative sizes of the populations for Asians and Others, which combined match Census totals, but do not match the distributions for 1995.

According to the 1995 NPTS database, the total number of persons (age 5 years or older) in the United States in 1995 was 241,675,000. A total of 1,660,731 of these persons resided in households for which the race/ethnicity was not identified. The breakdown for those whose race and ethnicity were known is as follows: 23.9 million Hispanics, 177.0 million Whites, 28.7 million Blacks, and 5.0 million Asians, and 5.5 million Others (Figure 2-1).

Figure 2-1. Size of Racial and Ethnic Groups (Persons 5 Years or Older), 1995



Source: Person File, 1995 NPTS.

Growth and Composition

The various racial and ethnic groups are projected to continue to follow different growth patterns, as shown in Figure 2-2.[2] Between 1980 and 1990[3], the Asian population grew 96.1 percent, followed by the Hispanic population (53.0 percent), the residual group (35.4 percent), the Black population (1.0 percent), and the White population (4.1 percent). Each group is expected to continue to grow through 2030, albeit at lower rates than those exhibited during the 1980-1990 period. Beyond 2030, Hispanics, Asians, and the residual group are projected to continue to grow at relatively high rates. Blacks are also expected to continue to grow beyond 2030, but at a much lower rate. The growth rate for Whites, on the other hand, is projected to decline after 2030.

These different growth patterns among the racial and ethnic groups are expected to change the composition of the U.S. population considerably in the next half-century, as presented in Figure 2-3. The 1990 U.S. population was composed of about 9.0 percent Hispanics, 75.9 percent Whites, 11.8 percent Blacks, 2.8 percent Asians, and 0.7 percent Others. By 2050, the Hispanic share is expected to increase to 26.2 percent, the Asian share to 5.4 percent, and the residual group to 1.0 percent of the total population. White and Black shares in the total population are expected to decline to 56.5 percent and 10.9 percent, respectively, by 2050.

Role of Immigration

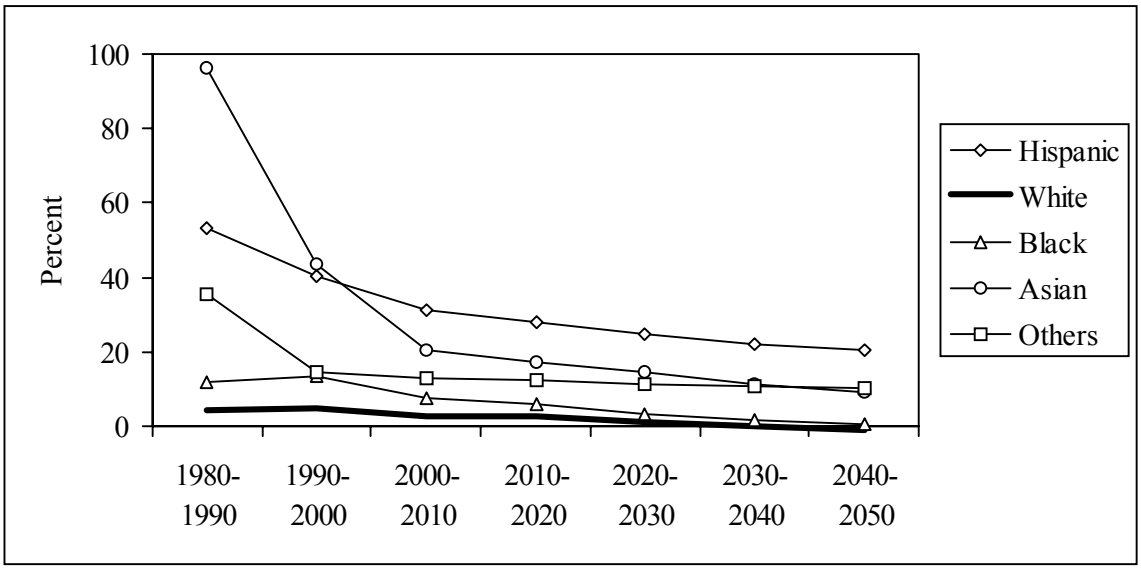
The role of immigration in the net change of population varies across the racial and ethnic groups. Figure 2-4 shows the net changes in the U.S. population in 1980, 1992, and 2000 by racial and ethnic group, and the portion of the net changes that resulted from net migration. Net migration includes international migration, which is of interest here, as well as the movement of Armed Forces personnel, federally affiliated civilian citizens, and their dependents. Data for 1992 was selected for presentation, rather than information for 1990 or 1991, due to the particularly significant movement of Armed Forces that occurred during those years because of the Gulf War.

From the data exhibited in the figure, it is apparent that migration has played a large role in the growth of the Hispanic and Asians populations in the U.S. since 1980, and is projected to continue to do so through 2000. In 1980, 55.3 percent of the net increase in the Hispanic population and 76.8 percent of the net increase in the Asian population was due to migration. In 2000, 38.5 percent and 60.9 percent of the net increases in the Hispanic and Asian populations, respectively, are anticipated to result from migration.

The Black population, on the other hand, has not been impacted as significantly by migration. In both 1980 and 1992, the portion of the net growth in the Black population due to migration was proportional to that experienced by the White population (15.8 percent versus 18.6 percent, respectively, in 1980; 22.1 percent versus 24.3 percent in 1992). However, this is projected to change by 2000, when it is expected that 30.7 percent of the net increase in the White population will be due to migration, compared to only 14.7 percent for the Black population.

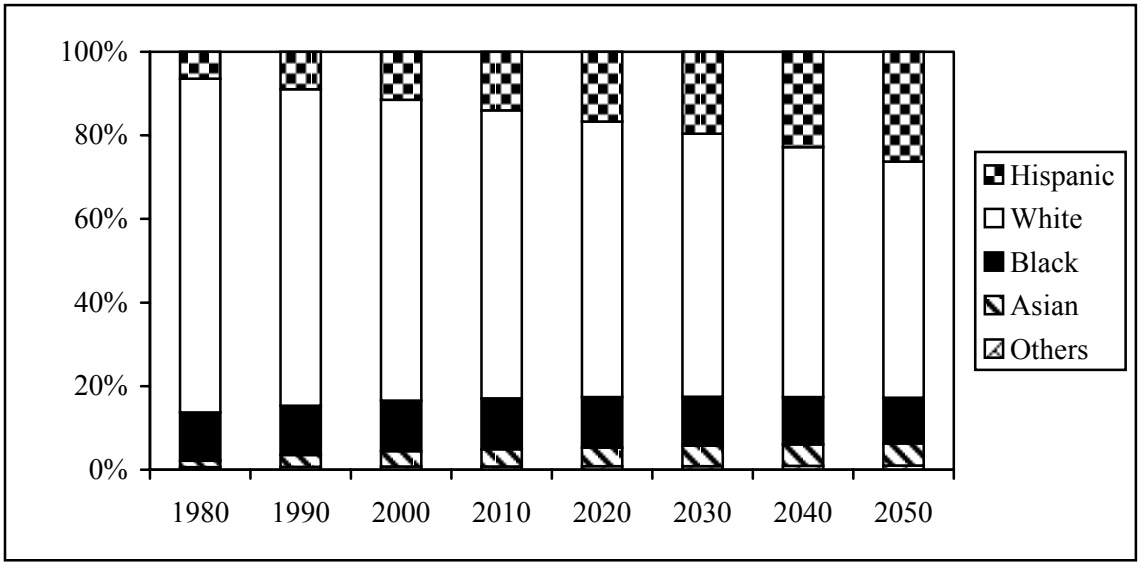
[2] People of all ages are represented in Figures 2-2 and 2-3, including those less than five years old.
[3] Data on population breakdown by racial/ethnic background as presented in this chapter are unavailable for years prior to 1980 in the Bureau of the Census' *1997 Statistical Abstract of the United States*.

Figure 2-2. Growth Rates of Racial and Ethnic Groups in the U.S., 1980-2050



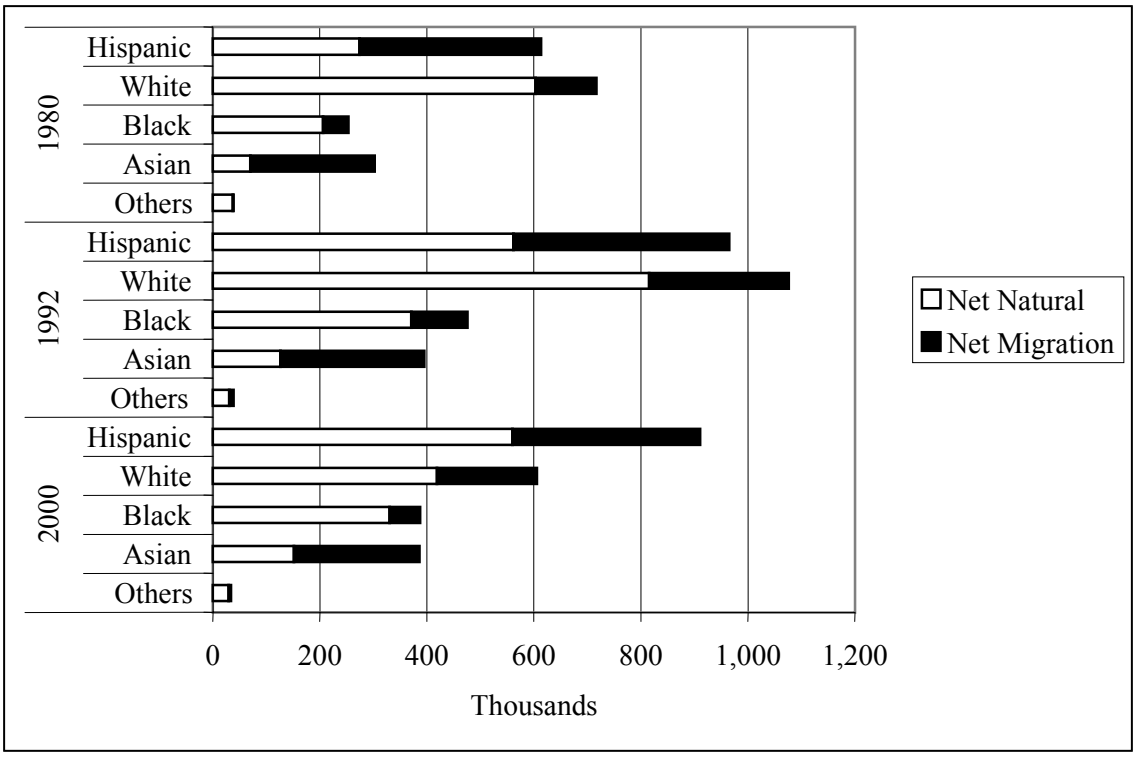
Source: Bureau of the Census (1997), *1997 Statistical Abstract of the United States*. Washington, D.C.: U.S. Department of Commerce. The projections are the Bureau's middle projection series.

Figure 2-3. Composition of U.S. Population by Racial and Ethnic Background, 1980-2050



Source: Bureau of the Census (1997), *1997 Statistical Abstract of the United States*.

Figure 2-4. Components of Net Changes in Racial and Ethnic Groups in the U.S., 1980, 1992, 2000



Source: *Statistical Abstract of the United States*, 1994 (No. 19) and 1997 (No. 20). Whites and Blacks include non-Hispanics only.

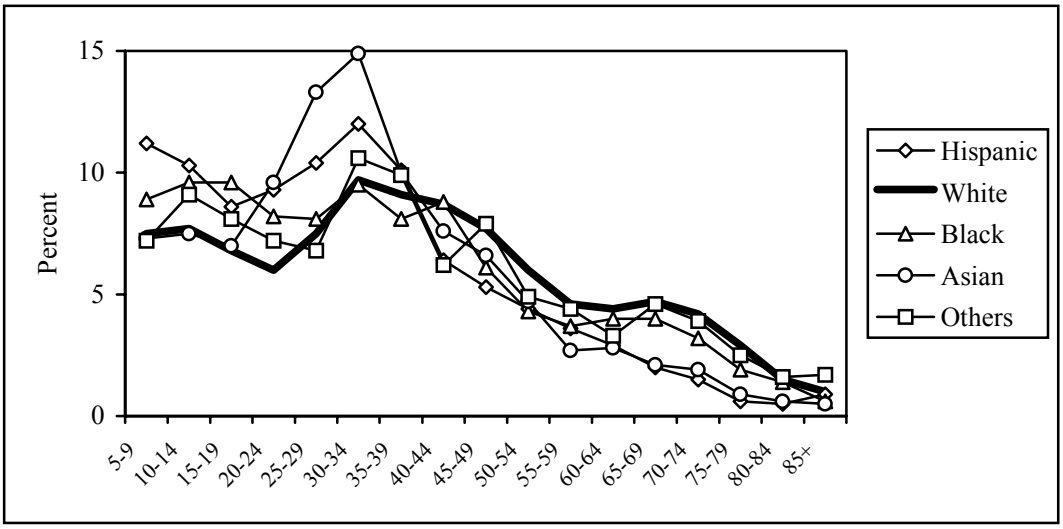
DEMOGRAPHIC CHARACTERISTICS

Age

The age distributions for each of the racial and ethnic groups, based on the 1995 NPTS data, are presented in Figure 2-5. For the most part, it is evident from the graphic that persons of color tend to be younger, overall, than Whites, who exhibited the highest proportions among most of the older age cohorts (i.e., 50 years and above). To illustrate this point, an examination of the youngest age cohorts reveals that 39.4 percent of Hispanics, 36.3 percent of Blacks, 31.4 percent of Asians, and 31.6 percent of Others fell within the age range of 5-24 years. Only 28.0 percent of Whites were within this particular age range. Conversely, 29.3 percent of Whites were in the age range for 50 years and above, while 16.4 percent of Hispanics, 23.1 percent of Blacks, 16.2 percent of Asians, and 26.9 percent of Others were within this range.

Interestingly, the 30-34 age cohort had the highest proportion of persons for each of the racial and ethnic groups except Blacks. The peak age cohorts for Blacks were the 10-14 and 15-19 categories.

Figure 2-5. Age Distribution of Persons (5 Years or Older) by Racial and Ethnic Background, 1995



Source: Person File, 1995 NPTS.

Household Composition

Household composition is an important demographic factor in helping one understand a household's level of mobility. Depending on a household's particular life cycle category, its level of income (and, perhaps as a result, its vehicle availability) and its trip making needs can be impacted by the number of adults/ children that reside in it. Figure 2-6 illustrates the proportion of persons living in single-adult households with children for each of the racial and ethnic groups. Typically, single-parent households have fewer resources with which to satisfy their comparatively substantial travel needs.

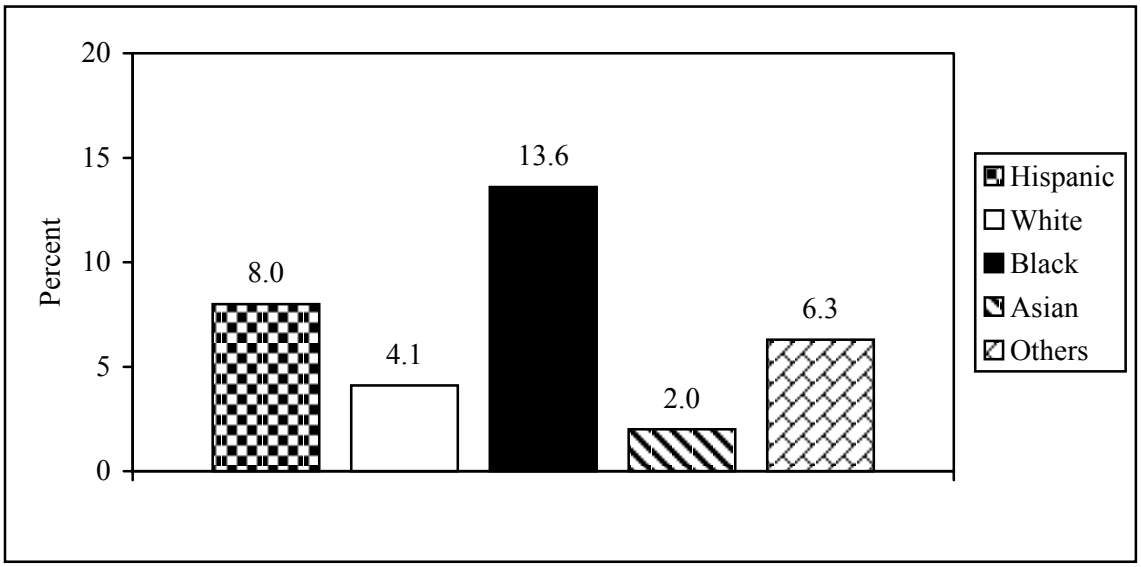
According to the data presented in the figure, with the exception of Asians, people of color tend to have the highest proportions of persons living in single-parent households. Blacks have the largest proportion (13.6 percent), overall, among the racial and ethnic groups. Only 4.1 percent of Whites and 2.0 percent of Asians reside in single-parent households.

Related to life cycle are two other compositional characteristics that can have an effect on households: multiple generations residing in the same household and the grandparental care of children. Figure 2-7 presents Census data for these particular characteristics for each of the racial and ethnic groups. In this graphic, the population being examined is all children (under 18 years) who co-resided with their grandparents during 1995. This population is then distributed among three specific household types based on who maintains the household and whether or not the parents are present within the household.

It is evident from the illustrated distributions that, when children co-reside with their grandparents, people of color are more likely to reside in multigenerational households, regardless of who actually maintains the household. In 1995, 73 percent of Hispanic households, 76 percent of Black households, and 88 percent of Asian/Other households where children co-resided with grandparents were multigenerational in nature. For Whites, this proportion was only 62 percent. (In Figure 2-7, the left and right bar clusters constitute the multigenerational households with children, parents, and grandparents present.)

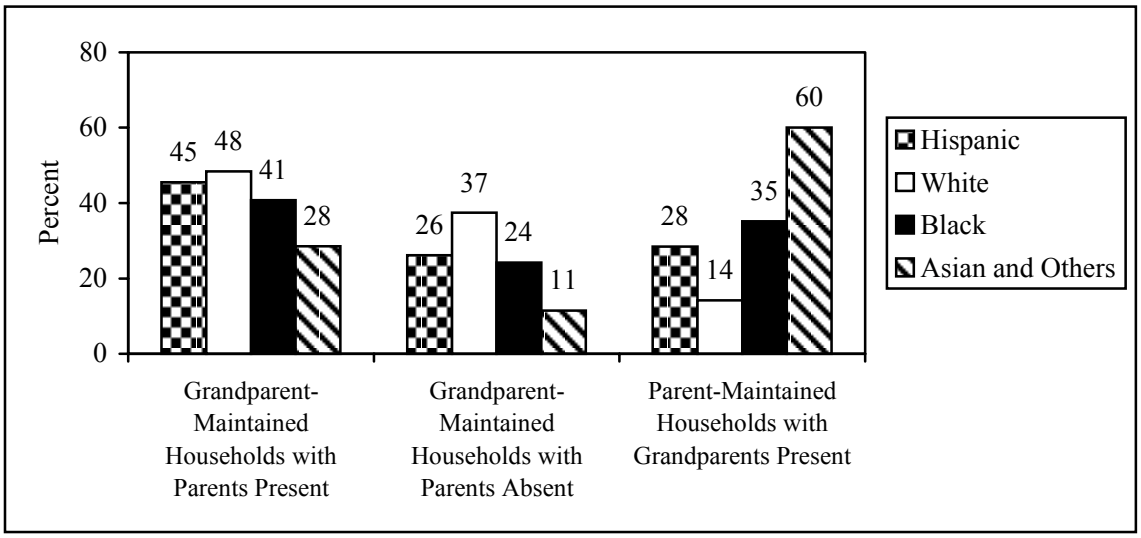
When considering only those households where children lived solely with their grandparents (i.e., no parental presence/involvement), Whites had the highest proportion (37 percent) among the racial and ethnic groups.

Figure 2-6. Percent of Persons (Five Years or Older) in Each Racial and Ethnic Group Living in Single-Adult Households With Children Under 18 Years of Age, 1995



Source: Person File, 1995 NPTS.

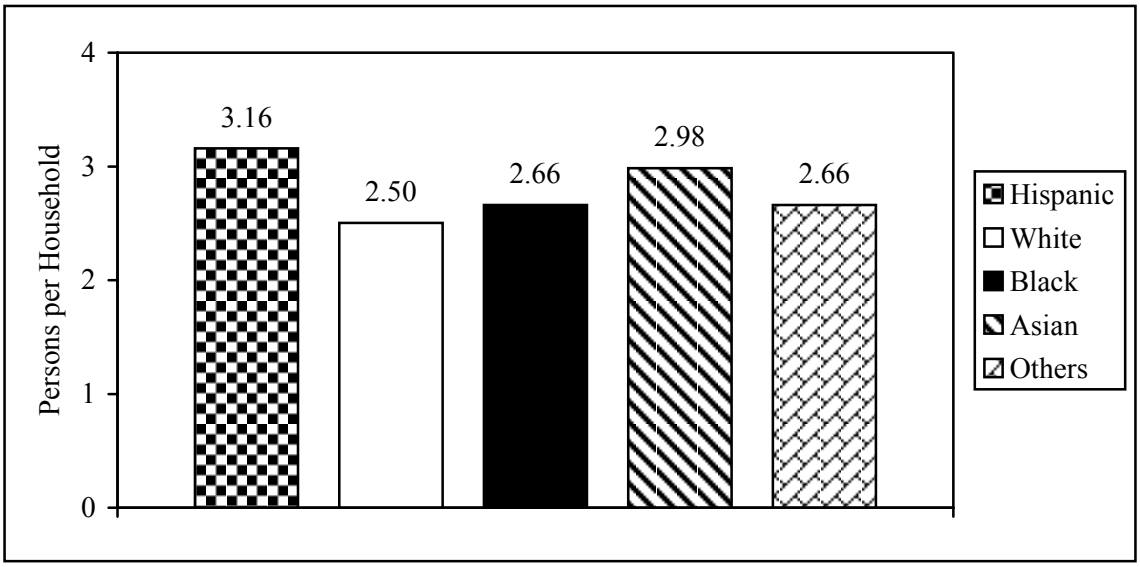
Figure 2-7. Distribution of Children Under 18 Years of Age Co-Residing With Grandparents by Racial and Ethnic Background, 1995



Source: Ken Bryson and Lynne M. Casper, *Co-resident Grandparents and Grandchildren*, Table 2. Current Population Reports, Special Studies, P23-198, Bureau of the Census, 1999.

Finally, any examination of household composition should also include a discussion of average household size. The size of a household can be especially important in relation to its overall mobility. Overall trip making tends to increase with household size, however, as a household increases in size, it is also possible for income and subsequently vehicle availability to become an issue. As shown in Figure 2-8, in 1995, people of color had larger average households than did Whites. Hispanics had the largest households with an average of almost 3.2 persons per household. Age, income, culture and a variety of other factors influence household size.

Figure 2-8. Average Household Size by Racial and Ethnic Background, 1995



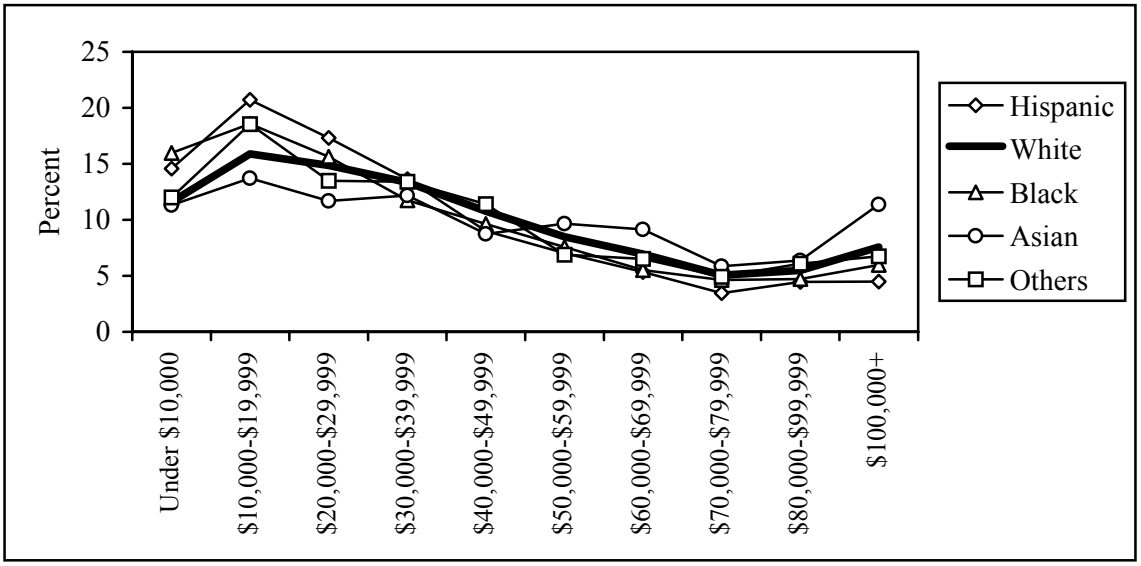
Source: Household File, 1995 NPTS.

Household Income

The household income distributions for each of the racial and ethnic groups are presented in Figure 2-9. With the exception of Asians, it is evident from the graphic that people of color tend to live in households with lower levels of income than do Whites. Overall, 35.3 percent of Hispanics, 34.5 percent of Blacks, and 30.6 percent of Others had household incomes of less than $20,000 in 1995. Only 27.5 percent of Whites and 25.0 percent of Asians were within this particular income range. Conversely, 33.5 percent of Whites and 42.4 percent of Asians had annual household incomes of $50,000 or more in 1995, while 24.8 percent of Hispanics, 28.4 percent of Blacks, and 31.1 percent of Others had similar household income levels.

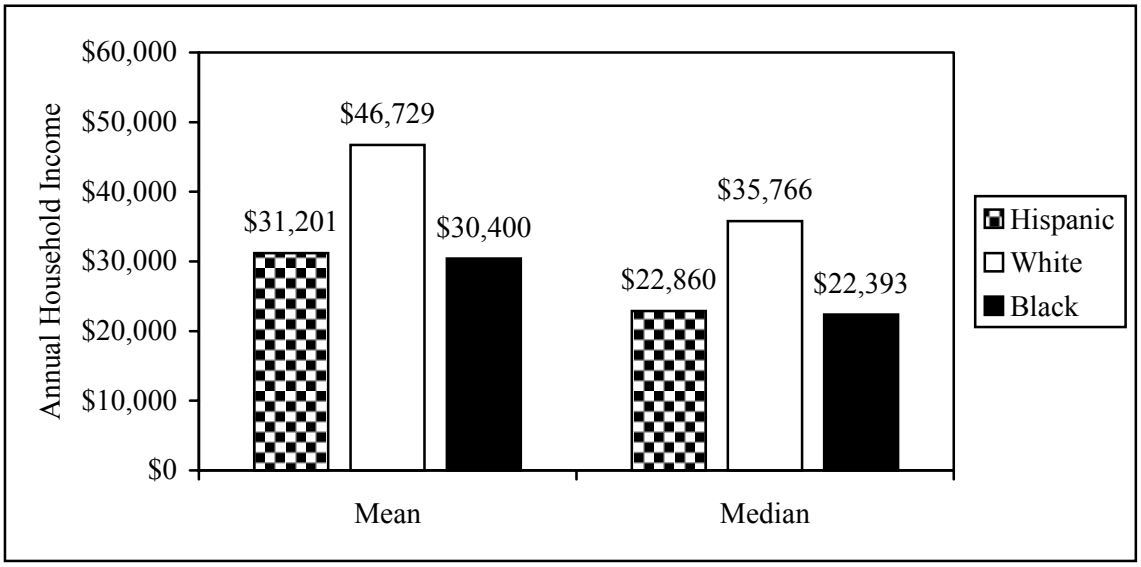
Figure 2-10 presents mean and median annual household incomes for 1995 for a few of the racial and ethnic groups, based on information from the Census. Unfortunately, the source did not use a joint definition in developing its race/ethnic cohorts; nor were the Asian and Other categories available. Comparatively, however, it is clear that both the mean and median income levels of Hispanics and Blacks were significantly lower in 1995 than for Whites.

Figure 2-9. Household Income Distribution of U.S. Population by Racial and Ethnic Background, 1995



Source: *1995 Current Population Survey*, March Supplement, Federal Electronic Research and Review Extraction Tool, http://ferret.bls.census.gov/cgi-bin/ferret.

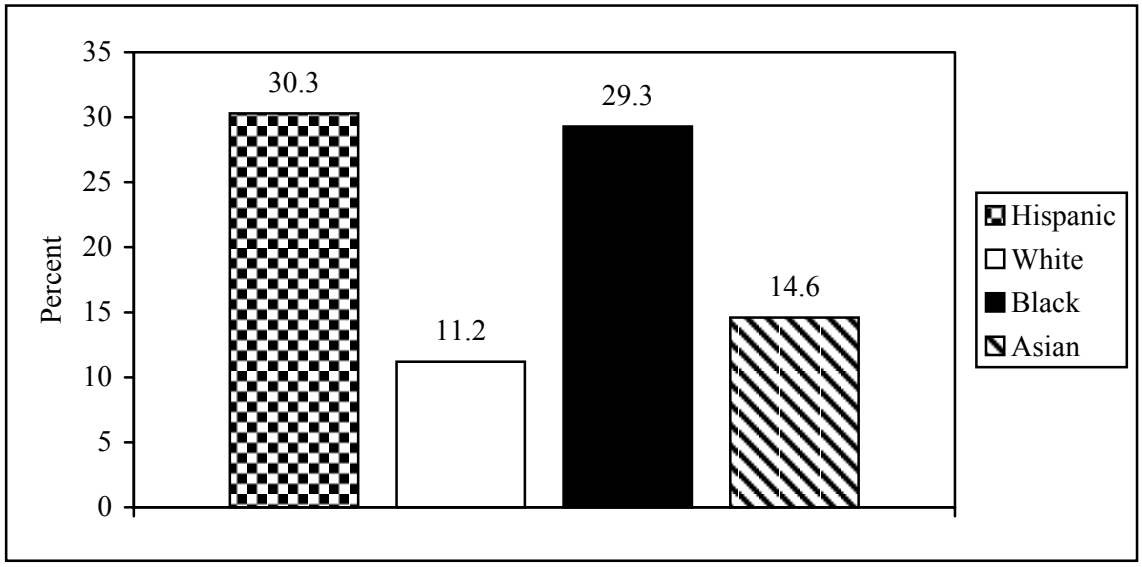
Figure 2-10. Mean and Median Annual Household Income by Racial and Ethnic Background, 1995



Source: *Money Income in the United States: 1995*, Table 2, http://www.census.gov/hhes/www/previnc.html, U.S. Bureau of the Census, accessed on October 12, 1999. The groups are not based on the joint definition used throughout this chapter. Whites and Blacks include Hispanics.

The Census data presented in Figure 2-11 depict similar results for the comparative household income levels of the racial and ethnic groups. In this figure, the percentage of persons in each of the racial and ethnic groups that lived in poverty during 1995 is shown. The graphic indicates that 30.3 percent of Hispanics and 29.3 percent of Blacks lived in poverty during this time. Only 11.2 percent of Whites and 14.6 percent of Asians had household incomes below the poverty level.

Figure 2-11. Percent of Persons in Each Racial and Ethnic Group Living in Poverty, 1995



Source: *Poverty in the United States: 1995*, Table A, http://www.census.gov/hhes/www/prevcps.html, U.S. Bureau of the Census, accessed on October 12, 1999. The groups are not based on the joint definition used throughout this chapter. Whites, Blacks, and Asians may include Hispanics.

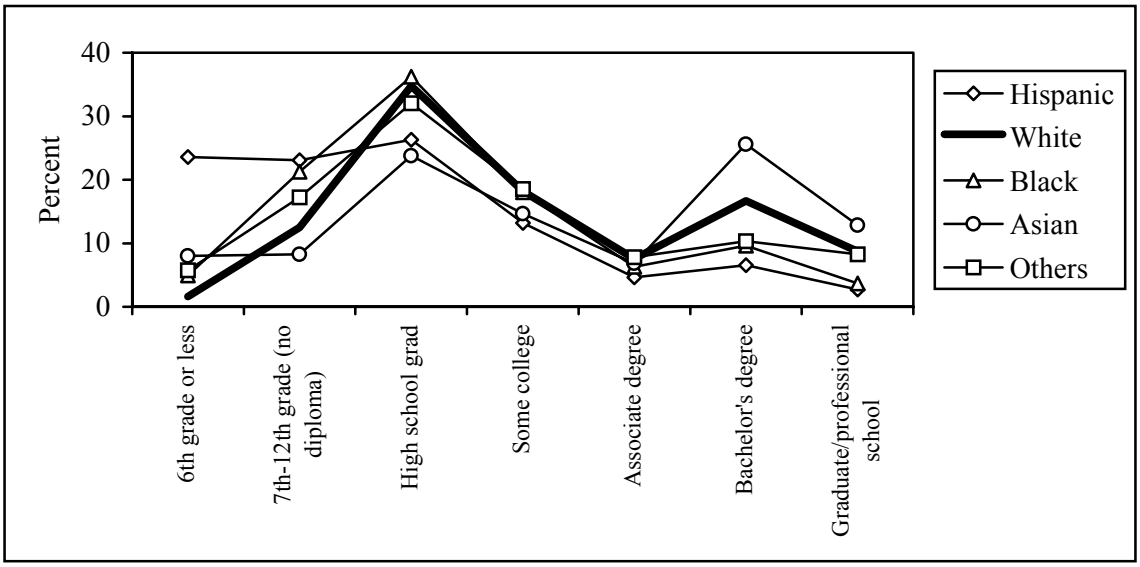
It should be noted that the source for this information did not use a joint definition in developing its race/ethnic cohorts either; nor was the Other category available.

Education

Distributions for the education attainment levels for each of the racial and ethnic groups are shown in Figure 2-12. The figure shows that Hispanics and Blacks tend to have lowest levels of education attainment among the groups. Overall, 72.9 percent of Hispanics and 62.4 percent of Blacks had no more than a high school education in 1995. A total of 48.8 percent of Whites, 40.0 percent of Asians, and 55.0 percent of Others had similar education attainment levels. Conversely, 33.0 percent of Whites, 45.3 percent of Asians, and 26.4 percent of Others had at least an Associate degree, while only 13.9 percent of Hispanics and 19.6 percent of Blacks had similar education attainment levels.

It is interesting to note that the high school cohort had the highest proportion of persons for each of the racial and ethnic groups except Asians. The peak education attainment cohort for Asians was the Bachelor's degree category.

Figure 2-12. Education Attainment Level Distribution of U.S. Population (25 Years or Older) by Racial and Ethnic Background, 1995



Source: *1995 Current Population Survey*, March Supplement, Federal Electronic Research and Review Extraction Tool, http://ferret.bls.census.gov/cgi-bin/ferret.

Housing Tenure

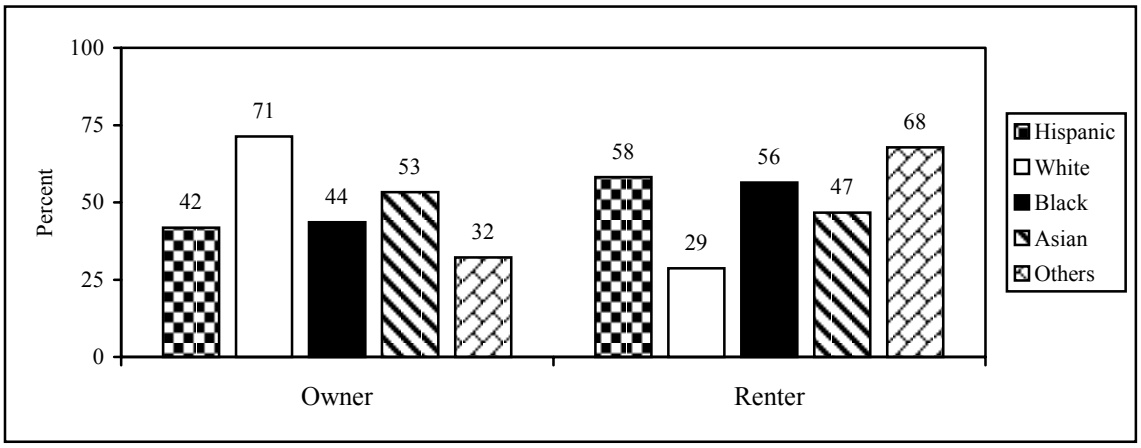
The tenure of a housing unit describes the manner in which it is held, i.e., whether it is owned or rented. Figure 2-13 presents the 1995 distribution between homeowners and renters for the persons within each of the racial and ethnic groups. The data indicate that it is more likely for people of color to rent than it is for Whites. Among the people of color, Asians (53 percent) are the most likely to own their residences.

Residential Location

Figure 2-14 presents the distribution of the persons in each racial and ethnic group by the urbanization classification of the locations of their residences. Basically, the classifications are related to area densities, i.e., areas with the urban classification have the greatest densities while areas with the rural classification are the least dense.

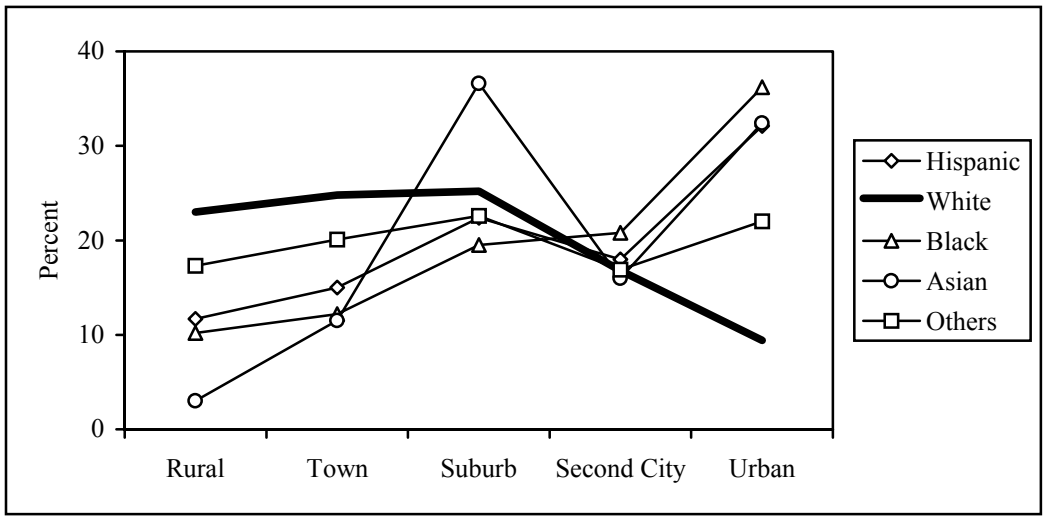
The distributions indicate that, in 1995, the highest proportions of Whites (25.2 percent), Asians (36.6 percent), and Others (22.6 percent) lived in areas classified as suburban, while the highest proportions of Hispanics (32.1 percent) and Blacks (36.2 percent) lived in areas with an urban classification. Large proportions of Asians (32.4 percent) and Others (22.0 percent) also resided in urban areas during this time. Interestingly, Whites had the lowest percentage of persons living in areas classified as urban: 9.4 percent. However, Whites also had the greatest proportions of persons living in areas classified as either rural or town.

Figure 2-13. Housing Tenure Distribution of U.S. Households by Racial and Ethnic Background, 1995



Source: U.S. Department of Commerce and Department of Housing and Urban Development, American Housing Survey for the U.S. in 1995, Current Housing Reports, H150/95 RV, Table 2-1, Introductory Characteristics – Occupied Units (Thousands). The groups are not based on the joint definition used throughout this chapter. Blacks, Asians, and Others may include Hispanics.

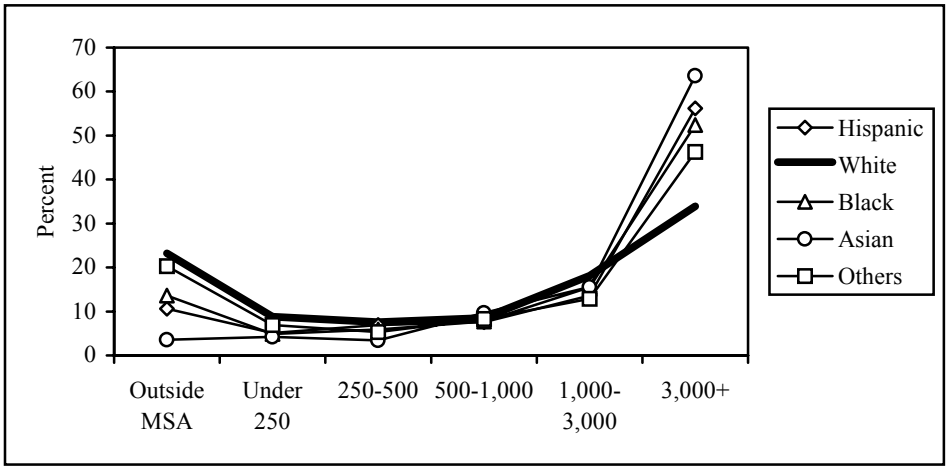
Figure 2-14. Urbanization Classification Distribution of Persons (Five Years or Older) by Racial and Ethnic Background, 1995



Source: Person File, 1995 NPTS.

Figure 2-15 also presents information from the 1995 NPTS database related to residential location. In this figure, the distribution of the persons in each racial and ethnic group by the MSA (Metropolitan Statistical Area) status and size of their residential locations is shown. Essentially, the information indicates whether a person's residence was located within a Census-defined MSA in 1995 and, if so, what the population size was of that particular MSA. Typically, as metropolitan areas increase in size, so do their density and the availability of services (such as transit).

Figure 2-15. MSA Status and Size (in 000s) Distribution of Persons (Five Years or Older) by Racial and Ethnic Background, 1995



Source: Person File, 1995 NPTS.

From the data, it is evident that, in 1995, the highest proportions of Hispanics (56.2 percent), Blacks (52.4 percent), Asians (63.6 percent), and Others (46.3 percent) lived in the largest MSAs (i.e., populations of 3,000,000 or more persons). The highest percentage of Whites (33.9 percent) also lived in these largest MSAs, but at a comparatively smaller proportional level. Interestingly, Whites (23.2 percent) and Others (20.3 percent) had the highest proportions of persons living in areas outside MSAs.

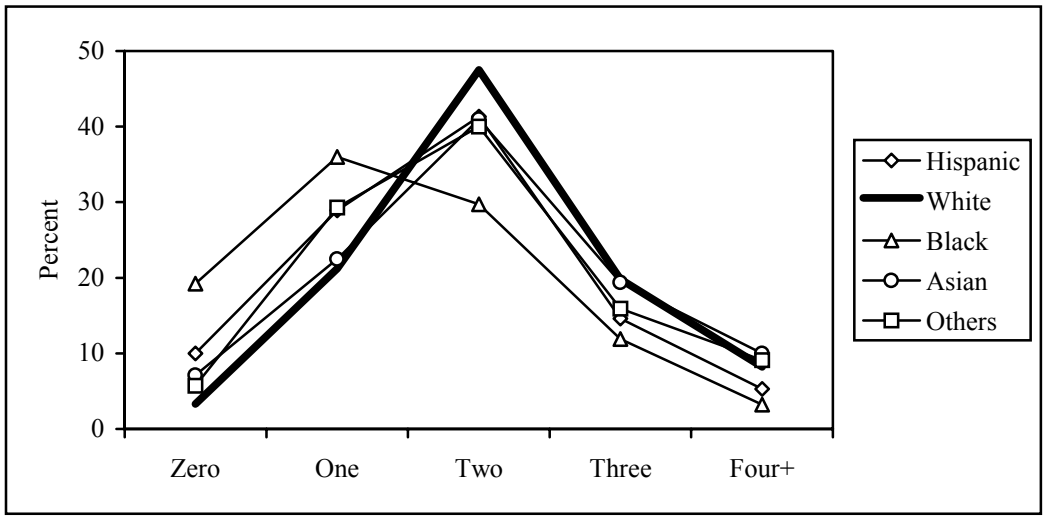
BASIC TRANSPORTATION CHARACTERISTICS

Vehicle Availability

Distributions for the household vehicle availability levels for each of the racial and ethnic groups are shown in Figure 2-16. It is evident from the data that, for the most part, people of color live in households with fewer vehicles than do Whites. This is particularly true for Blacks, who had the lowest household vehicle availability levels of any of the groups. Overall, 38.9 percent of Hispanics, 55.2 percent of Blacks, 29.6 percent of Asians, and 35.0 percent of Others lived in households with one vehicle or less. Only 24.5 percent of Whites had similar vehicle availability levels.

Further exemplifying the low vehicle availability of Blacks is the fact that the highest proportion cohort for all of the other racial and ethnic groups was the two-vehicle household category. The peak vehicle availability cohort for Blacks was the category for one-vehicle households. In addition, Blacks had, by far, the highest proportion of persons living in zero-vehicle households: 19.2 percent. Hispanics (10.0 percent) had the next highest proportion of persons in this particular category, while Whites had only a 3.3 percent share of persons with zero vehicles available.

Figure 2-16. Household Vehicle Availability Distribution of Persons (Five Years or Older) by Racial and Ethnic Background, 1995

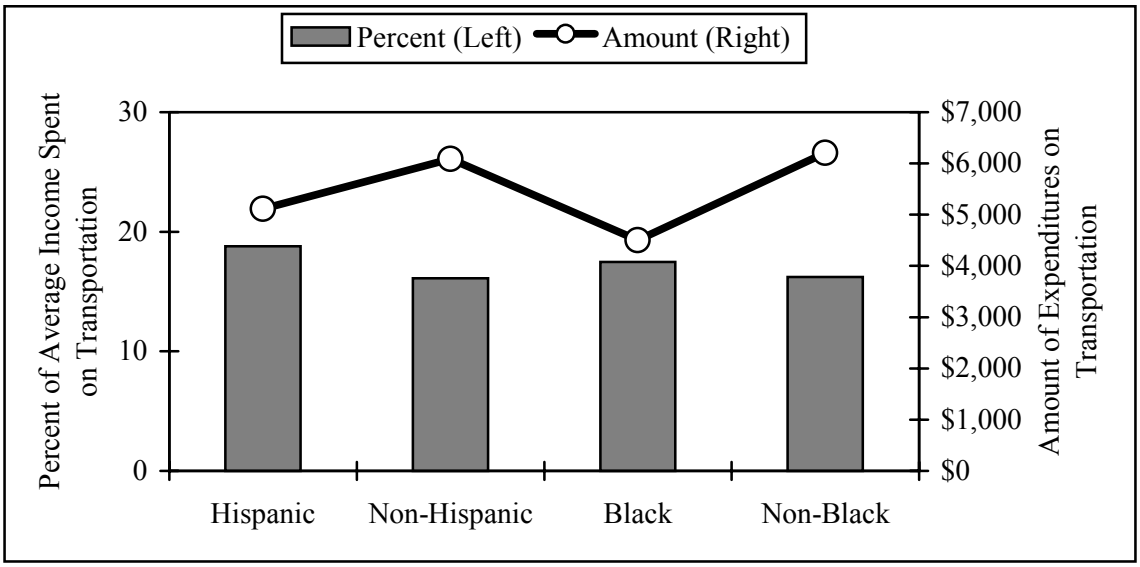


Source: Person File, 1995 NPTS

Transportation Expenditures

Figure 2-17 presents annual household expenditures on transportation for 1995 by racial and ethnic background, based on information from the U.S. Bureau of Labor Statistics. It should be noted that this source did not use a joint definition in developing its race/ethnic cohorts; nor were all of the discrete categories used throughout this chapter (i.e., White, Asian, Other) available. However, the expenditure data do indicate that Hispanics and Blacks spent fewer dollars but larger shares of their annual income on transportation in 1995.

Figure 2-17. Annual Household Expenditures on Transportation by Racial and Ethnic Background, 1995



Source: http://stats.bls.gov/csxstnd.htm#1995, Table 7, U.S. Bureau of Labor Statistics, Consumer Expenditure Survey. Cohorts are not based on the joint definition used throughout the chapter.

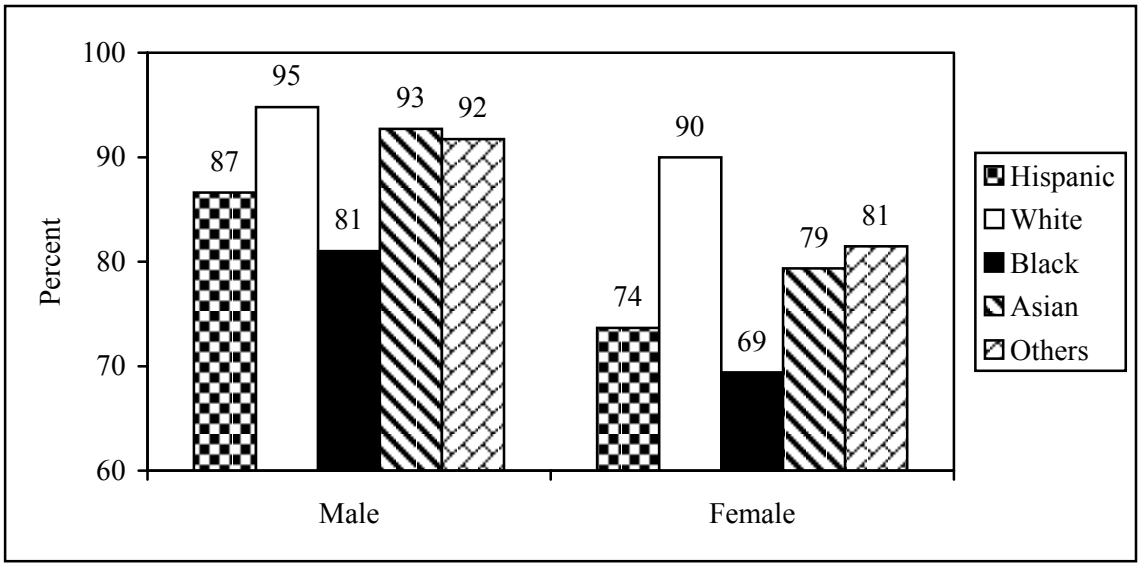
Hispanics spent 18.8 percent ($5,114) and Blacks spent 17.5 percent ($4,503) of their annual household income on transportation in 1995. Comparatively, Non-Hispanics and Non-Blacks spent 16.1 percent ($6,090) and 16.2 percent ($6,208) of their income on transportation, respectively, during this time.

Licensed Drivers

One of the primary factors that can impact a person's level of mobility is whether or not the person is licensed to drive. Lack of a driver's license would necessitate the use of alternative modes of transportation to the automobile—the mode that potentially permits the highest levels of personal mobility. In Figure 2-18, NPTS data have been utilized to illustrate the licensure rates of both males and females in each of the racial and ethnic groups for 1995.

Overall, it is evident that people of color (age 16 or older) are less likely to be licensed drivers than Whites. This is especially true for Hispanics and Blacks. While the licensure rates for Asians and Others were closer to those of the Whites, they were still lower. Comparing the genders, the licensure rates for males exceeded those of the females for each of the racial and ethnic groups. Interestingly, the difference in licensure rates between Whites and the other groups was greater for the females than for the males.

Figure 2-18. Licensure Rates of Persons (16 Years or Older) by Gender and Racial and Ethnic Background, 1995



Source: Person File, 1995 NPTS

Trip Making

Table 2-1 presents average annual trip making data for each of the racial and ethnic groups. The statistics are presented for two basic categories: person travel and vehicle travel. The primary difference between these two categories is related to whether or not the person making the trip was the driver for the trip. For example, a trip to the store by a person driving a personal auto would register as one person trip and one vehicle trip. However, the same trip if made by bus would only count as one person trip. Therefore, every trip a person makes is considered to be a "person" trip (thus, representing total travel), but only those trips for which the person actually operates the vehicle are categorized as "vehicle" trips.

Table 2-1. Average Annual Trip Making per Person (Five Years or Older) by Racial and Ethnic Background, 1995

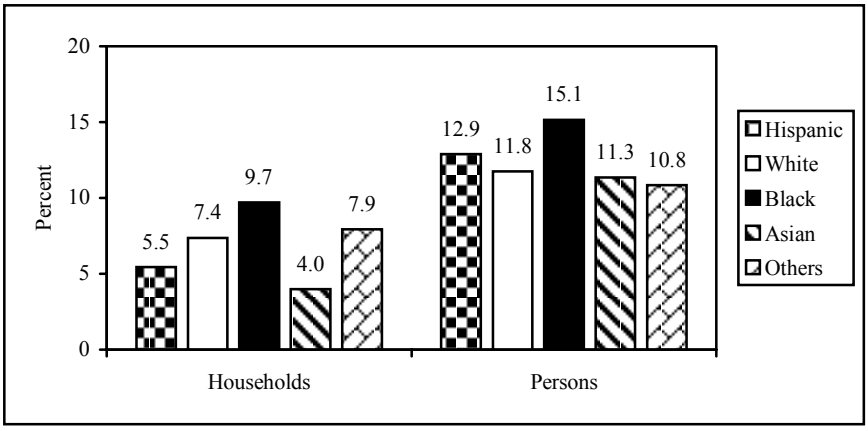
Racial and Ethnic Groups	Person Trips	Person Miles	Person Hours	Vehicle Trips	Vehicle Miles	Vehicle Hours
Hispanic	1,535	12,358	423	820	7,252	222
White	1,604	14,988	433	1,012	9,209	265
Black	1,423	11,065	414	726	6,003	194
Asian	1,393	10,252	367	819	6,847	227
Others	1,499	14,195	420	857	8,714	242
All	**1,568**	**14,115**	**428**	**951**	**8,558**	**251**

Source: Travel Day File and Person File, 1995 NPTS

An examination of the information shown in the table indicates that, for each trip making measure over a period of a year, people of color made fewer trips, traveled fewer miles, and spent less time traveling than Whites. In almost every case, the statistics for people of color were even below the overall national averages. It is interesting to note that the discrepancy in travel between Whites and the other groups was the most pronounced for person and vehicle trips. Calculating ratios based on these figures finds that Whites drove on 63.1 percent of their total trips, while Hispanics (53.4 percent), Blacks (51.0 percent), Asians (58.8 percent), and Others (57.1 percent) drove less frequently on their trips.

Another way of comparing mobility across the racial and ethnic groups is to look at the proportion of households and persons within each group who do not make any trips on a given day. Figure 2-19 presents the data for this particular analysis. As shown, on a household basis, Blacks were the most likely to go an entire day without making a trip. This was also the case for travel by individuals. Of note is the fact that neither White households nor White persons (on an individual basis) were the least likely to go "trip-less" on a given day.

Figure 2-19. Households and Persons (Five Years or Older) Making Zero Trips on a Typical Day by Racial and Ethnic Background, 1995



Source: Travel Day File and Person File, 1995 NPTS

SUMMARY

Our desires to plan transportation facilities and services that respond to the public's needs have resulted in the transportation planning profession striving to understand and, ultimately, predict travel behavior. Toward this end, we are continually developing and refining our understanding of the relationship between various socio-demographic traits and travel behavior. This chapter has characterized several socio-demographic traits that have been known to affect travel behavior and has explored the relationship between these traits and the various racial and ethnic groups. There remain significant differences between the racial and ethnic groups for many of the traits. The subsequent chapters explore how the various traits and/or cultural differences can help explain travel behavior differences among these groups.

Chapter 3
Work-Related Travel Patterns of People of Color

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INTRODUCTION

As the recent *Transportation Statistics Annual Report* (1997) indicates, the United States is an extra-ordinarily mobile society. Work trips constitute nearly one-fourth of this mobility, and often have a significant impact on a household's travel patterns. Examining travel data allows us to comprehend more fully how and why people travel, and what factors may influence their travel behavior, such as age, gender, income, or race. Sources such as census files and the Nationwide Personal Transportation Survey, include data on minority populations. However, most discussions of national data sources on travel patterns, such as *Commuting in America*, do not extensively examine minority subgroups. This study attempts to sharpen the focus on the commuting travel behavior of people of color, and to provide the basis for a more thorough examination of the transportation needs of underserved and, in some cases, overlooked populations. The study examines primarily trends and differences in means of transportation to work and travel time, controlling for socioeconomic and demographic factors.

This study of the work-related travel patterns of people of color—African Americans, Hispanics, and Asians—uses the 1990 Public Use Microdata Sample (PUMS B) 1 percent file. The study considers variables such as travel time and transportation mode choices, and considers individual characteristics, such as age, gender, race, income and education level; work-related characteristics, such as hours worked, type of worker, and departure time; and household characteristics, such as income and number of children. The purpose of these preliminary tabulations is to provide the bases for more focused statistical analyses, which would take into account the effects of sample size and outliers.

REVIEW OF LITERATURE

An analysis of databases in the Transportation Research and Information Service (TRIS), Online Computer Library (OCLC) First Search, National Transportation Library, GPO Monthly Catalogue, CARL, and traditional literature search techniques does not locate a well developed literature on the topic of travel patterns of people of color. Recent studies found on travel patterns of people of color reveal three broad categories of research: national studies by government agencies and private sector companies; case studies by university researchers; and studies that examine race, gender, and equity issues in transportation. This literature review examines the key findings of these major sources of research on the travel patterns of people of color.

Research efforts conducted or sponsored by the Federal Highway Administration tend to have a more national scope and do not examine racial, ethnic, or other significant sub-populations in great detail. The *Commuting In America* (CIA) studies and the *Nationwide Personal Transportation Survey* (NPTS) examine travel patterns of the population as a whole and examine African Americans, Hispanics, and other people of color descriptively. This approach readily acknowledges that important trends and

developments among subgroups can be obscured and lead policy makers to ignore what Alan Pisarski calls the "democratization of mobility" (1996, p. xiv). The national studies may mask the concerns and needs of large underserved populations and allow policy makers to ignore or fail to address problems of access, mobility, and equity (Zimmerman, 1997; Bullard and Johnson, 1997).

Pisarski (1996), for example, also notes that saturation of vehicle ownership nationwide can be overstated:

> These tendencies can be overstated because of a failure to examine these patterns in sufficient demographic detail. Saturation is a characteristic almost exclusively found among the White non-Hispanic population . . . . Census data indicate that about 5.3 million workers live in vehicle-less households . . . . On average, more than 30 percent of Black households do not own vehicles, and in central cities the number is over 37 percent . . . . Hispanics have an overall rate of vehicle-less households of 19 percent; that rate rises to 27 percent in central cities (pp. xiv-xv).

Commuting in America II documents the near saturation of vehicle ownership among urban White non-Hispanic males (96 percent) and notes the significant differences among racial and ethnic groups regarding vehicle ownership, driver's licenses, and mode choice. Ross and Dunning's analysis of 1995 Nationwide Personal Transportation Survey data shows that the private vehicle use rate by Whites is 91.3 percent, compared to private vehicle use rate by African Americans of 79 percent (1997, p. 21). Pisarski (1996) indicates that the African American population as a whole averages more than 30 percent non-vehicle households (p. 36).

The CIA and NPTS studies also seem to minimize the significance of public transit use in large urban areas and among people of color. This lack of attention may result from the overall small numbers of Americans who use transit, the decline in transit use, and the dominance of privately owned vehicles (POVs). Pisarski (1996) points out that transit ridership for commute trips declined from 6.3 percent of total riders in 1980 to 5.1 percent in 1990 (p. 63). Such numbers obscure the value of transit in large urban areas and mask the significance of transit to minorities, elderly travelers, women, low-income travelers, and choice riders (Nelson, 1997; Federal Transit Administration, 1996; Smerk, 1991). As Sandra Rosenbloom shows in *Transit Markets of the Future* (1998), almost 19 percent of Black workers used transit in 1990, 13 percent of Hispanic workers, and 12 percent of Asian workers" (p. 8). "At all household income levels," Rosenbloom writes, "Blacks, Hispanics, and Asians were more likely to commute using public transit than were Whites. . ." (p.12). African Americans, and African American women in particular, tend to use transit at significantly higher rates than other populations (Zimmerman, 1997). Rosenbloom (1998) shows that "not only were Black workers, for example, more reliant on public transit than the average worker—they were many times more likely to use transit in most service environments and generally much more reliant in less dense communities. For example, Black workers in very-low-density metropolitan areas under 200,000 were almost 5 times as likely to use transit as the average worker" (p. 16). Previous studies also document that African Americans and Hispanics tend to have longer average travel times to work, fewer vehicles, and lower average driver's license ownership rates than comparable non-poor and White Americans (Kidder and Sultzman, 1973; Joint Center for Political and Economic Studies, 1985; Millar, Morrison and Vyas, 1992).

Ibipo Johnston-Anumonwo has suggested a relationship between women's occupations and the mode of travel to work, and convenience (Johnston-Anumonwo, 1988). In later work, Johnston-Anumonwo examined female commuting in Buffalo, New York for differences between African-American and White women. In her analysis of Buffalo, New York census data, Johnston-Anumonwo found that African-American women were over represented in central city use of *public* transit, but that there was little difference between suburban Black and White females in their use of *private* transportation

(Johnston-Anumonwo, 1995). This preponderance of transit ridership was further illustrated in Johnston-Anumonwo's work with Rudy Wilson (1996), in which they argued that African-American dominance of public transportation for commuting to suburban jobs was not an isolated occurrence. Their comparative analysis of three cities (Miami, Kansas City, and Detroit) demonstrated that African-American women used public transportation in disproportionate numbers.

Sidney Davis's case study of African-American travel behavior in Atlanta confirms what other studies have indicated about this group. Davis studied PUMS data for 1980 and 1990 and found that, overall, African Americans in Atlanta prefer the automobile over all modes of transportation but transit use among this group is almost twice as high as transit use among Whites. According to Davis, 1990 data indicate that 70.9 percent of Black males and 60.2 percent of Black females prefer to use private vehicles (car, truck, or van) to make the journey to work, compared with 87.5 percent for White males and 84.6 percent for White females. Public transit use rates for Blacks were 24.3 percent (males) and 34.9 percent (female), compared to the rates for Whites— 4.2 percent (males) and 5.2 percent (females). Davis also comments on the existence of longer travel times for African Americans:

> . . . . the average travel time to work, regardless of mode, was and still is significantly longer for Black males and females than for White males and females. Such differences would not be expected in the absence of housing and labor market discriminatory practices. The legacy of those practices continue to make the cost of mobility excessive for African Americans living in Atlanta.

A series of studies sponsored by the National League of Cities describes part of the socioeconomic and political context that frames travel behavior of people of color (Hughes, 1989). According to Mark Alan Hughes:

> Central cities are no longer unchallenged centers of economic and political power, nor even the daily destinations for most suburban commuters. The modern metropolis consists of many competing and uncoordinated centers . . . .The economy is figuratively moving away from untrained workers by shifting from manufacturing to services—just as institutions that train workers for those information-intensive jobs are collapsing. Furthermore, the economy is literally moving away from the poor by shifting from city to the exurbs—just as escalating housing prices, environmental concerns and racial exclusion make it impossible for the poor to follow . . . .

Nearly 10 years later, this observation needs restatement to reflect today's commuter patterns, which are more lateral, dispersed, and decentralized. A considerable body of evidence also indicates that reverse commuting is a growing trend (American Public Transit Association, 1993; American Public Transit Association, 1994). The National League of Cities studies and the *Commuting In America* studies provide empirical support for the "spatial mismatch" hypothesis to explain why African Americans, Hispanics, and other inner-city residents lack ready access to those areas of dynamic job growth in the suburban ring around central cities. The spatial mismatch hypothesis suggests that employment rates and poverty rates are higher for inner city blacks in large part because they are isolated from employment opportunities located in the mainly suburban and exurban metropolitan regions areas that ring central cities (Kain, 1968). Variations on this basic theme examine racial exclusion and discrimination, housing segregation, job skills, and education levels as factors that explain the inability of inner city residents to gain stable access to these new areas of economic opportunity (Holzer, 1991; Blackley, 1990; Deskins, 1992).

While case studies of African American travel times suggest that African Americans tend to face longer commute times than Whites, a few studies suggest a different result. Using PUMS data for Atlanta,

Ihalanfeldt and Sjoquist found that average travel times for Blacks were significantly longer and may explain 30 to 50 percent of Black-White employment gaps (Ihalanfeldt and Sjoquist, 1990; Davis, 1994; Zag, 1990). In a study of PUMS data for Detroit, Miami, and Kansas City, Wilson and Johnston-Anumonwo (1996) found that Whites had longer commuting times than Blacks in Kansas City (p. 14). Wyly, in a study of PUMS data of Minneapolis-St. Paul, found no independent link between labor market segmentation and longer commute times for African Americans (Wyly, 1996). Clearly, a study of national data sets and surveys that isolate or focus on African Americans and other minority groups can provide clarity on the complex issue of travel behavior.

Widespread acceptance of the spatial mismatch hypothesis by the research community and policy makers has prompted many cities and transit agencies to experiment with various reverse commuting programs and car ownership programs to address the problem of access and mobility (Wartman, 1993; American Public Transit Association, 1993; American Public Transit Administration 1994; Rosenbloom, 1992). The Federal Transit Administration, the Surface Transportation Policy Project, and a small group of researchers tend to see solutions to the problem of access and mobility in the development of the concept of Livable Communities and Central City Concentration (Federal Transit Administration, 1995; Federal Transit Administration, 1996; Spain, 1997; Dittmar, 1995). According to this perspective, the mobility problems of people of color, low-income groups, and older population are best addressed through enhancing the attractiveness of the central city and promoting alternatives to the use of automobiles.

The purpose of this study is to explore work-related travel patterns of people of color and offer possible explanations for some of the more unique patterns. This analysis will help to determine if there are variables other than race that might influence higher travel times for certain groups. Previous studies have indicated that minority workers travel for a longer time than Whites (Miller, Morrison, and Vyas, 1992; Rosenbloom, 1995), which may be influenced by variables such as income or household composition. Factors such as education and income determine the ability to afford private vehicles, and these variables also have an impact on place of residence, which in turn can affect the distance from transit or from the outer city loop. Travel choices also are influenced by factors such as age, gender, and number of children (Zimmerman, 1997). For example, elderly workers might prefer to live within small, self-contained suburbs, which would reduce commuting time. Single mothers could have longer commuting times because of trip chaining and household responsibilities or the need to drop children at day-care facilities.

This review indicates a number of core issues that need to be addressed in this analysis:

- Are differences in commute times due to race or disparities in incomes?
- What is the impact of transit availability on mode choices and commute times?
- Is there any evidence for the spatial mismatch hypothesis?
- Is there any evidence for the lack of well developed and integrated transit systems within minority neighborhoods?
- What is the impact of transportation-related preferences on the success of welfare-to-work programs?
- Should we attribute longer commute times to the quest for better career opportunities?
- Is there evidence to indicate complex trip chaining on part of specific groups such as single mothers with children?

Based on these issues, we have structured this report in six sections. First, we provide a brief overview of work-related transportation patterns, which includes a profile of all workers by race and their travel times

as well as tabulations of departure time for the entire sample (excluding New York City).[1] Second, we discuss the impact of the availability of transit on commute times and also highlight areas which have a greater disparity. Third, we discuss the issue of income versus race and highlight four related dimensions—individual income, household income, welfare income, and educational level. The fourth section addresses social and demographic patterns and trends including gender, number of children, single mothers, young workers, and elderly workers. The fifth section concludes with a discussion of the results and their implications for transportation planning and recommendations for further investigation.

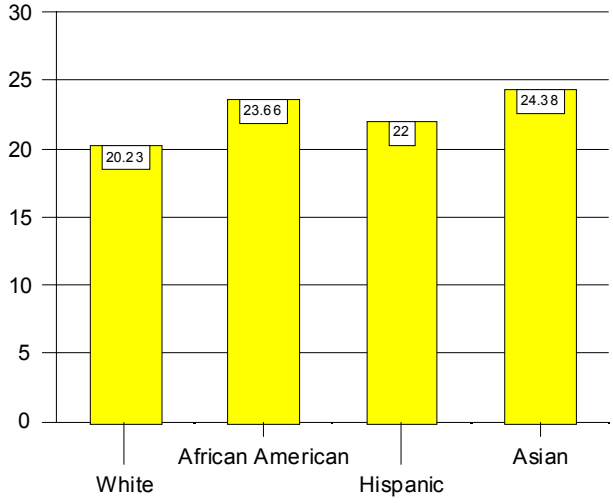
WORK-RELATED PATTERNS

Minority workers accounted for approximately 22 percent of the sample in the 1990 PUMS B data. As Table 3-1 indicates, Hispanic was the largest minority group (9.50 percent) and Asian (2.70 percent) was the smallest.

Table 3-1. Race Distribution of Workers in PUMS 1990 B Sample

White	African American	Hispanic	Asian	Others
78.20%	9.00%	9.50%	2.70%	0.60%

Figure 3-1. Average Travel Times by Race (minutes)



An initial tabulation of travel times by race suggests that Asians had the longest commute time (average of 24.38 minutes) followed by African Americans (23.66 minutes). These commute times are approximately 20 percent more than those of Whites (Figure 3-1). Within each race, the percentage of people whose commute times were less than 30 minutes was about 80 percent (Table 3-2). However, the percentage of Asians and African Americans whose commute times are 10 minutes or fewer is about 17 percent less than Hispanics and about 40 percent less than Whites. Asians are also most likely to have commute times in excess of 30 minutes among all the groups.

The time of departure for work could potentially affect the transportation mode choice. For example, transit systems often lower frequency of operation during off-peak hours, which can require commuters to choose other modes such as private car or car-pooling. Travel times to work are longest for those individuals who depart from home during early morning hours (5:00 a.m. - 7:00 a.m.) and mid day (12:00 p.m. - 2:00 p.m.). African Americans have the longest travel time when they depart for work during mid day, while Asians have the longest travel time during early morning hours (Table 3-3). The

[1]Please note that the analyses of income versus race and social and demographic trends are based on the entire sample *excluding* New York City.

Table 3-2. Travel Time by Race (percentage)

Race	0 to 10	>10 to 20	>20 to 30	>30 to 40	>40 to 50	>50 to 60	>60 to 90
White	35.58	31.49	17.28	5.09	5.65	3.14	1.77
African American	25.22	33.95	20.76	5.12	7.54	5.22	2.18
Hispanic	30.17	32.35	20.25	4.53	6.51	4.45	1.74
Asian	25.46	30.91	21.46	6.31	8.13	5.28	2.45

Table 3-3. Average Travel Time by Departure Time and Race (minutes)

Departure Time	White	African American	Hispanic	Asian
Early Morning (5 a.m – 7 a.m.)	24.79	25.75	25.03	28.20
Morning Rush Hour (7 a.m. – 9 a.m.)	17.22	20.24	18.40	21.32
Late Morning (9 a.m. – 12 Noon)	16.22	20.09	17.73	19.86
Early Afternoon (12 p.m. – 2 p.m.)	20.61	24.58	21.27	22.77
Late Afternoon (2 p.m. – 4 p.m.)	16.74	20.23	18.36	19.06
Evening Rush (4 p.m. – 8 p.m.)	16.07	19.74	18.01	18.31
Late Evening (8 p.m. – 12 a.m.)	20.20	21.89	19.96	21.42

reason for these time-band differences is not immediately evident, although it may be influenced by mode choice. African Americans tend to use slower transportation modes (e.g., transit and car pooling) than other groups during mid-day hours (Table 3-4).

Table 3-4. Transportation Mode Choices for People Commuting During Early Afternoon (percentage)

Mode	White	African American	Hispanic	Asian
Private	79.46	62.31	67.49	67.08
Carpool	10.79	17.13	16.25	14.55
Transit	1.83	12.97	6.95	7.67
Other	7.92	7.59	9.31	10.7

Asian and African American workers who leave for work during the early morning have similar transportation preferences (Table 3-5). However, Asians still have a 12 percent longer travel time.

Table 3-5. Transportation Mode Choices for People Commuting During Early Morning (percentage)

Mode	White	African American	Hispanic	Asian
Private	78.68	61.01	62.00	63.14
Carpool	15.12	22.30	25.06	24.06
Transit	2.96	11.98	7.80	9.44
Other	3.24	4.71	5.14	3.36

TRANSIT AVAILABILITY AND REGIONAL DIFFERENCES

One possible explanation for longer travel times for Asians and African Americans may be transportation choice. African Americans and Asians tend to use transit more often than Hispanics and significantly more than Whites. Alternately, drive-alone commuting by African Americans and Asians is 17 percent less than Whites (Table 3-6). Longer travel times for Asians may also be the result of geographic location of residence. As *Commuting in America II* indicates, ". . . Asians . . . are the least oriented toward nonmetropolitan areas" (pp. 57-58). This characteristic, combined with vehicle-less households and a shift to the suburbs for employment, may account for the travel time. More study is needed to uncover the precise explanation for these differences among minority groups.

Table 3-6. Transportation Mode Choices (percentage)

Race	Drive Alone & Car-Pooling	Private Vehicle	Car-Pooling	Transit	Taxi	Non-Motorized	Worked At Home	Other
White	88.2	76.58	11.62	3.08	0.11	3.88	3.28	1.45
African American	77.3	59.11	18.19	13.93	0.43	4.69	1.00	2.66
Hispanic	80.3	61.12	19.23	9.53	0.17	5.47	1.95	2.54
Asian	79.4	60.90	18.47	11.23	0.12	5.91	1.96	1.41

Travel patterns in regions and metropolitan areas with transit availability are likely to differ significantly from regions with no transit. As Table 3-7 reveals, there is considerable deviation among minority groups in different regions. Further, it appears there is little difference between Whites and minorities as a whole (except in New York City). Rather, the differences may be between specific pairs of groups in different regions and vary because of demographic influences such as age, gender, education, and income level (Rossetti and Eversole, 1993).

Table 3-7. Disparity in Average Travel Times for People of Color in Specific Regions (minutes)

Region	White	African American	Hispanic	Asian	Range
East North Central	17.89	19.11	18.23	17.28	1.83
East South Central	19.70	19.48	18.14	16.66	3.04
High Urban Transit (HUT)	24.53	29.33	25.23	26.22	4.80
Low Urban Transit (LUT)	21.24	23.13	21.32	22.17	1.89
Medium Urban Transit (MUT)	21.53	24.58	22.98	24.22	3.05
Middle Atlantic	21.04	23.82	21.92	26.42	5.38
Mountain	16.47	17.75	16.90	16.71	1.28
New York City	30.67	37.62	34.03	35.88	6.95
Northeast	19.48	19.35	18.23	19.36	1.25
Other	18.73	18.20	16.89	18.24	1.84
Pacific	20.14	22.80	21.13	22.62	2.66
South Atlantic	20.64	21.50	20.30	20.16	1.34
West North Central	15.04	17.49	15.32	12.84	4.65
West South Central	18.16	18.14	17.40	17.46	0.76

Analysis of specific regions[2] and transit availability reveals several interesting patterns:

- Whites have the shortest travel times in all areas with transit availability (Mountain, Middle Atlantic, and New York City Metropolitan)
- Asians have the shortest travel times in East North Central, East South Central, South Atlantic, and West North Central regions
- Hispanics have the lowest travel times in West South Central, Northeast, and Other regions
- African Americans generally have the longest travel times in all regions with available transit.

High disparity in average travel times between groups can be seen, based on the range of travel times for specific regions:

- In High Urban Transit (HUT) areas, the difference between average travel times for Whites and African Americans is 4.80 minutes

[2]The analyses are based on the regional classifications shown in the Appendix.

- In the Middle Atlantic Region (excluding New York City and urban areas that might be classified under HUT Medium Urban Transit [MUT], or Low Urban Transit [LUT]), the difference between average travel times for Whites and Asians is 5.38 minutes
- In the New York City Metropolitan Area, the difference in average travel times for Whites and African Americans is 6.95 minutes
- In the West North Central Region (excluding any urban areas that might be classified under HUT, MUT, or LUT), the difference in the average travel times between Asians and African Americans is 4.65 minutes.

Table 3-8 shows that the differences in regions of disparity appear primarily in the "0 to 10 minutes" and the "greater than 40 to 50 minutes" categories. Table 3-9 reveals that for the HUT and Middle Atlantic regions, the major differences in average travel times are in the use of private car and transit. Groups with low travel times tend to use private vehicles more often; groups with longer travel times tend to use transit more often. Table 3-10 reinforces this argument, showing less private-car usage and more transit usage among African Americans in three regions. However, the notable exception to this is the West North Central region. Although the preferences of Asians and African Americans in this region are similar, African Americans still experience longer travel times. This implies that the higher travel times for African Americans in West North Central could be due to other reasons, such as income. Given that transit takes longer, it appears that there might be underlying social, demographic, and situational factors which might cause people to use transit. (Rosenbloom's recent study, *Transit Markets of the Future* [1998], examines economic, demographic, social, land use, and transport policy issues relating to transit use.) Additional analyses should be conducted to determine the profile of persons who use transit, especially in areas which do not have well developed or integrated transit systems.

Table 3-8. Race by Travel Time for Regions of Significant Disparity (percent of work trips)

Region	Race	Travel Time (in minutes)						
		0 to 10	>10 to 20	>20 to 30	>30 to 40	>40 to 50	>50 to 60	>60 to 90
High Urban Transit	Whites	26.60	28.14	20.54	8.07	8.93	5.32	2.38
	African Americans	15.58	26.93	24.55	8.12	12.99	8.89	2.94
Middle Atlantic	Whites	35.57	31.41	16.10	4.95	5.28	3.68	3.02
	Asians	27.97	29.15	15.56	5.77	8.47	6.67	6.39
New York City	Whites	20.74	23.56	18.84	8.23	11.32	10.63	6.68
	African Americans	10.89	18.36	19.49	7.40	17.14	17.96	8.76
West North Central	Asians	56.68	30.56	9.71	1.73	1.22	0.09	0.00
	African Americans	37.52	37.32	17.29	2.84	3.02	1.26	0.75

Table 3-9. Transportation Mode Choices for Regions of Significant Disparity (percentage)

Region	Race	Mode						
		Private Car	Transit	Car-Pooling	Non-Motorized	Taxi	Worked At Home	Other
High Urban Transit	Whites	72.08	8.60	10.49	4.33	0.14	3.17	1.19
	African Americans	52.80	24.46	15.54	3.96	0.30	1.18	1.77
Middle Atlantic	Whites	75.93	3.98	11.38	4.49	0.12	2.80	1.31
	Asians	56.93	15.01	17.34	7.24	0.04	1.82	1.63
New York City	Whites	38.64	36.39	8.42	10.67	1.63	3.11	1.13
	African Americans	24.84	58.19	7.42	6.14	0.85	0.68	1.89
West North Central	Asians	69.51	2.05	16.42	6.31	0.00	3.23	2.49
	African Americans	65.02	7.02	16.13	6.40	0.69	0.49	4.26

Table 3-10. Travel Times for Private Car and Transit Use by African Americans in Three Regions (percent of trips by mode)*

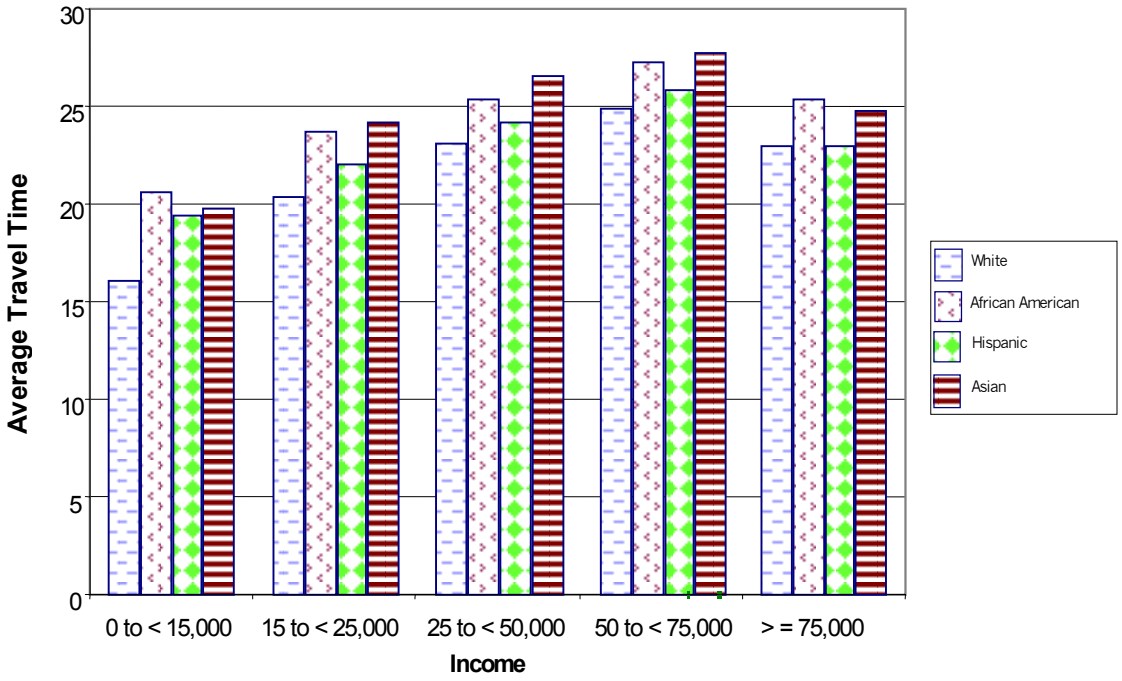
Region	Mode	Travel Time (in minutes)			
		0 to 10	>40 to 50	>50 to 60	>60 to 90
African Americans in High Urban Transit	Private Car	51.42	42.74	31.34	29.07
	Transit	4.97	39.86	54.78	61.27
African Americans in New York City	Private Car	32.82	16.07	10.96	9.24
	Transit	11.52	76.72	81.91	84.04
African Americans in West North Central	Private Car	56.57	62.70	35.85	45.59
	Transit	3.33	22.13	45.19	33.30

*Percentages do not add to 100 because not all modes are shown.

INCOME VS. RACE

Individual and household incomes affect a person's ability to afford a private vehicle as well as the choice of geographic location of residence. As a result, travel times will likely vary with income. All groups report longer travel times at higher income levels. The general trend is a gradual increase from the very low income category (0-15K) to the high income (50-75K) category, and then a slight drop for the very high income category (>75K). The disparity between Whites and minority groups generally decreases with a rise in income level (Figure 3-2).

Figure 3-2. Average Travel Time by Race and Income (minutes)



This corresponds to an increase in private vehicle use with an increase in income levels. It appears that the greatest difference between Whites and minority groups is in the low-income groups. A significant percentage of low-income persons also use other means of transportation, such as taxi, non-motorized means, and working at home. The data suggest (Figure 3-3) that low-income minorities might be taking a longer time to travel because they have fewer private vehicles, use more transit, and car pool more than low-income Whites. However, the absence of a private vehicle does not appear to be the only cause of longer travel times, especially among low-income groups. Travel times for low-income transit users reveal that minorities may have as much as 12 percent longer travel times than Whites. Ross and Dunning's analysis of 1995 NPTS data for land use transportation interaction (1997) indicates that "African Americans and Asians have higher than average transit availability while the availability for whites is below average. Transit is also available to a greater than average percentage of Hispanics" (p. 21).

Income and race may jointly affect travel times. However, the extent and nature of this effect on travel times is not clear. For example, although Asian and White workers are similar in their income profile, Asians still have as much as 22 percent longer commute times in certain income categories. This disparity is widest among the low-income groups (Figure 3-2). The same disparity applies to African Americans and Hispanics who also share a similar income profile (Table 3-11). However, African Americans report about 5 to 10 percent longer travel times than Hispanics across all income levels. Disparities that exist in spite of similar income profiles suggest that there may be other variables at play. For example, it is possible that Asians and African Americans are more spatially isolated or simply do not live close to activity centers or employment opportunities (Kain, 1968; Ihalanfeldt and Sjoquist, 1990; Shen, 1997). Racial segregation and discrimination may also explain these persistent disparities. Although minorities may have access to transit facilities, the systems may not provide services that meet their needs. Longer travel times could then also be a result of seeking better employment opportunities.

Figure 3-3. Transportation Mode Choices by Income and Race

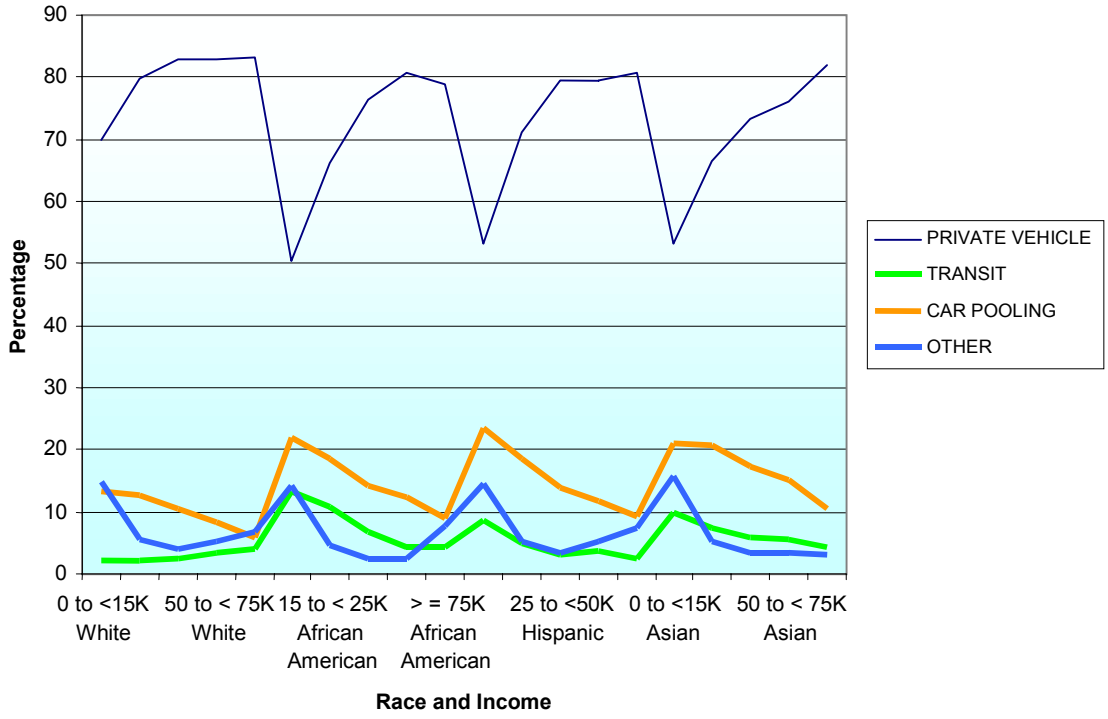


Table 3-11. Income Profile (percentage)

Race	0 to <15K	15 to <25K	25 to <35K	50 to <75K	>=75K
White	36.16	24.09	29.62	6.39	3.74
African American	47.42	26.88	22.58	2.45	0.67
Hispanic	51.78	24.60	19.53	2.79	1.30
Asian	38.78	23.26	27.19	6.66	4.12

Since individual income alone might not determine the use and access to transportation means, it is important to consider individual income in the context of household income. Primary workers are predominant wage earners whose individual income exceeds at least 70 percent of the household income. It is natural to expect that non-primary workers contributing to less than 30 percent of the household income would seek employment opportunities in areas which are closer to place of residence. However, Table 3-12 suggests that this trend holds only for Whites. There is no difference in the travel times of primary and non-primary workers in minorities. This further suggests that minorities might be living in areas which have a dearth of low-skilled employment opportunities.

There is also more evidence that income is not the single determinant of commute times. A comparison of welfare workers (those who receive more than 50 percent of their income from welfare sources) by race shows that African American welfare workers take the longest time to commute (Table 3-13) and make the least use of private vehicles to go to work (Table 3-14). The travel patterns of welfare workers for all groups are similar in that private vehicle use decreases by one-third.

Table 3-12. Travel Times for Primary Workers by Gender (minutes)

Gender And Worker Status	White	African American	Hispanic	Asian
Male Primary Worker	22.25	23.31	22.85	24.24
Female Primary Worker	19.50	23.21	20.50	22.60
Male Non Primary Worker	21.09	23.75	22.60	24.69
Female Non Primary Worker	18.05	22.51	19.65	22.61

Table 3-13. Average Travel Times of Welfare Workers (minutes)

Whites	African American	Hispanic	Asian
17.12	22.15	19.61	20.80

Table 3-14. Transportation Mode Choices for Welfare Workers (percentage)

Race	Private Vehicle	Car-Pooling	Transit	Other
White	52.63	17.74	8.48	21.15
African American	30.80	18.36	29.56	21.28
Hispanic	44.94	20.82	14.16	20.08
Asian	49.17	26.75	12.11	11.97

The educational level attained by an individual determines to some extent their income potential. The educational level also determines the type of job, and as a result, the departure time for that job or shift. For example, factory workers without a college degree may be more likely to work evening or graveyard shifts. Low education groups rely more on transit and car pooling. The data also suggest that there is a pattern of longer travel times for individuals with more years of education (see Table 3-15). This would be expected and corresponds to similar results based on income levels. Further, the disparity in travel times between minorities (Asians in particular) and Whites becomes wider as the number of years of education increases. This also suggests that well-educated, high-income minorities commute more than Whites so as to avail themselves of better career opportunities in their professions.

Table 3-15. Average Travel Time by Education Level and Race (minutes)

Education	White	African American	Hispanic	Asian
No High School Diploma	17.73	21.55	21.13	20.28
High School	19.72	22.61	20.75	22.20
Associate Degree	20.90	23.52	22.28	24.62
Bachelors Degree	21.77	24.42	22.57	25.90
Masters/Professional	21.20	24.38	22.14	25.12
Doctoral Degree	20.65	22.00	22.72	21.66

SOCIAL AND DEMOGRAPHIC TRENDS

Males generally have longer commute times than female workers (Table 3-16). Among men, Asian males have the longest commute times (about 13 percent more than White males); among women, African American females have the longest commute times (about 22 percent more travel time than their White counterparts). This is unusual because, although minority men use more private vehicles than their female counterparts (Figure 3-4) who tend to use transit and car pool more often, they still experience higher travel times. This could be due to a larger social phenomenon where males commute longer distances because they seek better career opportunities, as is evidenced by the differences between males and females regardless of primary work status (Table 3-12). However, it is also possible that males are beginning to make more non-work-related trips and increasing their role in household responsibilities, evidenced by the differences in travel times of male and female non-primary workers (see Table 3-12).

Table 3-16. Average Travel Time by Gender and Race (minutes)

Gender	White	African American	Hispanic	Asian
All Males	21.42	22.82	22.29	24.22
All Females	18.23	22.54	19.73	22.40

There is some anecdotal evidence regarding the presence of children in the household that supports this notion (Zimmerman, 1997). There appears to be further evidence that corroborates the possibility that males might be undertaking more non-work-related trips. A comparison of male and female travel times based on the number of children suggests this possibility. Table 3-17 suggests that female travel times decrease slightly as the number of children increases. Male travel times increase with the presence of one or two children and go down slightly with more children, but are still more than the travel times of those with no children. In any case, the disparity between males and females increases with the number of children. An examination of the travel preferences for males and females who have three or more children (Table 3-18) suggests that males use private cars more and car pooling less frequently. However, as indicated earlier, females with three or more children have considerably shorter travel times despite using fewer private vehicles. It appears that this pattern would hold specifically for couples who have

Figure 3-4. Transportation Mode Choices for Males and Females (percentage)

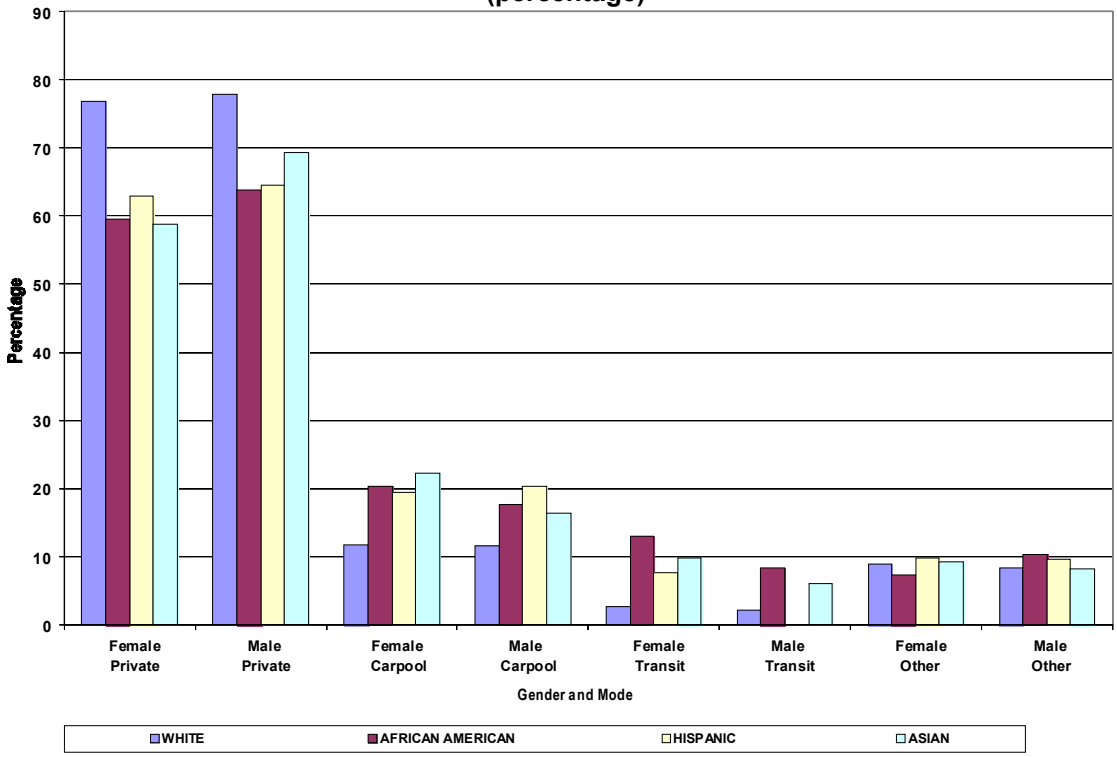


Table 3-17. Average Travel Time by Gender and Race and Number of Children (minutes)

Gender	Race	No Children	One Or Two Children	Three Or More Children
Males	White	20.86	22.29	21.73
	African American	22.40	23.63	22.65
	Hispanic	21.65	22.92	23.00
	Asian	23.08	25.62	24.43
Females	White	18.76	17.85	15.87
	African American	22.52	22.85	21.55
	Hispanic	19.97	19.62	19.05
	Asian	22.56	22.55	20.79

Table 3-18. Transportation Preferences by Gender and Those With 3 or More Children (percentage)

Gender	Mode	White	African American	Hispanic	Asian
Males	Private Car	77.80	66.15	63.91	72.63
	Transit	1.42	5.62	3.88	4.17
	Car pooling	12.87	21.47	24.12	17.28
	Other	7.91	6.76	8.09	5.92
Females	Private Car	72.63	57.26	54.56	58.90
	Transit	1.05	10.81	7.48	6.61
	Car pooling	13.18	24.60	25.93	24.52
	Other	13.14	7.33	12.03	9.97

children younger than six years because of the need to be transported to day-care and pre-school facilities, or may apply to children older than six who go to private schools. Children who are six or older would not have to rely on their parents for transportation and would be using the public school bus. There are no appreciable differences for African Americans and Hispanic married females and single mothers who have no children older than the age of six (Table 3-19). A possible explanation could be that some minority single mothers in ethnic groups either live with their parents or live close by, thereby negating the need for day care. An odd finding, however, is the unusually high travel time of Asian married mothers. It is not clear whether Asian married females handle more transportation-related household chores than married females in other groups. This suggests that there may be cultural factors as well which influence the mode choices and commute times of females.

Table 3-19. Average Travel Times by Marital Status for Females With Children Under Six Years (minutes)

Marital Status	White	African American	Hispanic	Asian
Married	19.75	23.65	20.80	24.40
Single	20.44	23.14	20.99	22.52

The age of the worker seems to play an indirect role in influencing the transportation mode and thereby the commute time. Younger workers (<20 years) are typically starting out in their careers or still in school working part time. Due to the educational level attained as well as fewer years of professional experience, they do not have many choices regarding job site, place of residence, and departure time. As a result, several in this age group might be working part time and would be holding less steady jobs. So the tendency might be to look for jobs which are either near the place of residence or near educational facilities, such as dormitories or university apartment housing. Table 3-20 suggests that while Whites and Hispanics are able to avail themselves of this opportunity, the same is not true for African Americans and Asians who work no more than 20 hours. This might be because both African Americans and Asians might be living in areas which are further away from even part-time employment.

Table 3-20. Average Travel Time by Hours Worked for Young Workers (< 20) (minutes)

Hours Worked	White	African American	Hispanic	Asian
0 – 20 hours	9.93	12.70	10.42	12.77
> 20 to 35 hours	14.21	19.09	16.38	16.83
> 35 hours	17.79	20.57	20.81	20.88

Elderly workers also might be working fewer hours because of physical limitations. As a result, they might choose jobs which are more accessible. As expected, the elderly population has shorter commuting times (Table 3-21). The elderly have shorter commute times because they tend to work at home as much as four times as other age groups. However, both Asian and African American elderly workers tend to have longer commute times than other groups. It is possible that elderly White and Hispanic workers are able to use more unconventional transportation modes such as non-motorized vehicles, walking, and working at home, because they might be living in communities which are independent and self-sufficient. Hence, the ability to address transportation needs of the elderly really depends not only on the number of transportation options (such as transit) but also on how well developed and independent these communities are.

Table 3-21. Average Travel Time by Hours Worked for Elderly Workers (> 65) (minutes)

Hours Worked	White	African American	Hispanic	Asian
0 – 20 hours	14.27	18.95	15.70	16.68
> 20 to 35 hours	15.24	20.13	17.38	20.47
> 35 hours	17.26	22.51	18.87	22.70

CONCLUSIONS

A preliminary analysis of the PUMS B 1990 work-related data reveals that Asians and African Americans take at least 15 percent longer on average to travel to work than Hispanics and Whites. There is some evidence that such differences might be due to both race and other variables.

A common theme underlying the work-related travel patterns of people of color is the degree of private-vehicle use. Those using private vehicles have shorter travel times and transit users have longer travel times. A comparison of the travel times for private car and transit preferences shows that transit takes twice as long for commuting. High travel time groups might be forced to resort to transit and car pooling due to a variety of social and economic factors. Travel time also appears to be varying with income and educational level attained. High education groups may opt to travel more to pursue high-income opportunities. On the other hand, the extra commute might not result in a significant income differential for low-education groups. Travel times are highest during early morning and mid-day hours, possibly because of the tendency to use transit and car pooling more often. Significantly, private cars are used

most often in late evening hours, primarily because transit systems often offer limited evening and late-night services.

There are also several race-related specific patterns that cannot be attributed only to variables such as age, income, and gender. For example, young African American and Asian workers have longer commute times than their White and Hispanic counterparts despite similar income profiles. This disparity is also evident when we look at young part-time workers who tend to hold less steady jobs. Whites and Hispanics in this group have much lower commute times because they are able to avail themselves of such part-time employment opportunities closer to their residence or dorms. There is also a difference among those who drive private cars. Asians who commute by private car on average spend 15 percent more time than other groups. Asians and African Americans who commute in the early morning and during the midday also have longer (time) commutes than others. This suggests that Whites and Hispanics live primarily in areas that are closer to well-developed areas that provide more and better employment opportunities.

Such residential clusters can be identified using geographic information systems (GIS) software. This might reveal, for example, whether businesses are being developed in predominantly White areas. Over the past 30 years there has been an increasing trend of sub-urbanization of low-income, low-skill jobs. Based on this, future policy questions should address the issue of trip reduction programs or offer corporate tax subsidies for businesses to expand in under-developed areas in order to address the mismatch between residential locations of low-income households and the jobs that correspond to their education and skill level. Other options could include the development of car ownership programs to allow low-income groups to use a private car. Longer travel times for low-income groups could also be a consequence of longer distances to transit points. This is because modal shifts could include patterns such as from car pool to transit, or private vehicle to transit, or bus transit to rail transit. Local-level transportation planning should integrate existing public transportation systems so as to minimize the time of travel to transit points.

It is important to note that there are also race-related patterns specific to certain regions in the country. First, Whites have the lowest travel times in all areas that have transit availability, Mountain region, and Middle Atlantic region. African Americans generally rank last or second-to-last in all regions. These differences could be prevalent in females, low income, low education, very young, and the elderly groups. There are also specific differences in other regions of high disparity, such as the Middle Atlantic and the West North Central region. Based on this, separate case studies can be undertaken for each region to determine the causes of such disparities. Transportation planners should then design and enhance transportation infrastructure taking into account such disparities.

The study also provides initial evidence for the spatial mismatch hypothesis. Specifically, it appears that minority groups have to travel longer to seek high-income or even part-time low-skilled opportunities relative to Whites. There is also some evidence that transit systems are not as well integrated in minority neighborhoods. As a result, commute time is increased because of longer distances to transit points.

Some issues left to be resolved in the second phase of this project include examining whether travel times vary with race or income, which can be done using an analysis of variance (ANOVA) model to determine if there is an interaction effect. Also, it is not clear whether males have longer travel times because of their tendency to seek better career opportunities or because of an increasing role in transportation-related household chores. Male travel times vis a vis female travel times can be compared with the 1990 and 1995 NPTS data sets to evaluate whether this is indeed part of a trend. Also, further analysis will be conducted to see if there is a statistical correlation among income, gender, and children for married workers. Another unexplored issue is race concentrations—the possibility that minority neighborhoods that are more dense, more integrated, and more developed could offer several low-skilled opportunities,

thereby reducing the commute time, especially for non-primary workers, young workers, low-education workers, and welfare workers. Also, low-income White workers tend to have more private vehicles than low-income minority groups. The reason for this disparity is not clear. Finally, the impact of the following variables will also be considered: type of commuting, vehicles available per worker, family type, distance to transit, availability of transit, area type, population density, residential density, employment density, and MSA size.

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Chapter 3 Appendix: Data and Variable Specification

The PUMS 1990 (B file) consists of two types of records: a housing record and a person record. Each housing record is followed by a variable number of person records (depending on the number of occupants). Work-related records include those of persons 16 years or older who worked during the reference week of data collection in 1989. Therefore, this analysis does not include temporary absences such as vacations, or persons looking for work, or persons on layoff. Most of the variables described below pertain to the person record. The exceptions are household income (used to determine primary worker status) and number of children in the household, both of which are gathered from the housing record. Because the PUMS file was not self-weighted, individual weights were factored into all race-related tabulations. Listed below is a description of all variables used in the study.

DEPARTURE TIME

Departure time refers to the time of day that the person usually left home to go to work. Eight levels of departure time were considered:

Early morning	5:00 a.m. - 7:00 a.m.
Morning rush hour	7:00 a.m. - 9:00 a.m.
Late morning	9:00 a.m. - 12:00 noon
Mid-day	12:00 noon - 2:00 p.m.
Late afternoon	2:00 p.m. - 4:00 p.m.
Evening rush hour	4:00 a.m. - 8:00 p.m.
Late evening	8:00 p.m. - 12:00 midnight
Night	12:00 midnight - 5:00 a.m.

TRAVEL TIME

Travel time refers to the total number of minutes that it usually took the person to get from home to work. This includes time spent on all activities (including waiting for public transportation, picking up car pool passengers, etc). This was treated as a continuous variable in most tabulations. As a discrete variable, the following levels were considered: 0 to 10, between 10 and 20 inclusive, between 20 and 30 inclusive, between 30 and 40 inclusive, between 40 and 50 inclusive, between 50 and 60 inclusive, between 60 and 90 inclusive, and greater than 90 minutes.

HOURS WORKED

Hours worked pertains to the total number of hours worked per week at all jobs. The levels that were considered include 0-20, 20-35, and >35 hours.

INCOME

Three income-related variables were considered:

- **Total individual income** is the sum of all incomes derived from wages or salaries, farm self employment, non-farm self employment, interest, dividend, social security, royalty, welfare, disability, and other sources. This does not include income from property sale, "in-kind" income (such as food stamps), tax refunds, insurance, etc. The income groups include very low (0 - <15,000), low (15,000 to <25,000); medium (25,000 to <50,000); high (50,000 to <75,000); and very high (>75,000).
- **Primary Worker Status** has two levels, depending on whether the individual income exceeds 70 percent of the total household income. A value of one indicates that the person is a primary worker, whereas a value of zero indicates that the person is not a primary worker.
- **Welfare Status** has two levels, depending on whether the public assistance income exceeds half of the total individual income. A value of one indicates that the person is primarily on welfare-related income, whereas a value of zero indicates that the person is not primarily on welfare-related income.

AGE

The age of a person was categorized by the following levels: less than 20, more than 20 to 25, more than 25 to 35, more than 35 to 45, more than 45 to 55, more than 55 to 65, and more than 65.

CHILDREN

Two children-related variables were considered:

- **Number of children** in the household includes natural born, adopted, and step children. The levels were: zero, one to two, and greater than or equal to three.
- **Age of children** is restricted to the presence and age of *own* children and has the following levels: children under 6 years, children between 6 and 17 years, children under 6 and between 6 and 17, no own children.

EDUCATION

Persons were classified based on the number of years completed or the type of degree. Six levels were included: No high school or some high school, but no diploma; high school graduate or some college, but no degree; associate degree; bachelor's degree; master's or professional degree; and doctoral degree.

GENDER

Gender includes male and female.

RACE

The categories for race include Hispanic, white (non-Hispanic), African American (non-Hispanic), Asian (non-Hispanic), Other (non-Hispanic) .

MODE OF TRANSPORTATION

The mode of transportation is the primary mode of travel or conveyance (for the longest distance) that the person usually used in going from home to work. The following categories were included: Private Vehicle Driven Alone (includes car, truck, van, motorcycle), Private Vehicle Car Pooled, Transit (includes rail, bus, streetcar, subway, elevated, trolley, ferryboat), Taxicab, Non-motorized (bicycle or walking), Telecommuting, and other means.

AVAILABILITY OF TRANSIT

Based on a ranking of 35 largest transit agencies, the entire sample was also classified based on the degree of availability of transit. These include:

- New York City Metropolitan Area
- High Urban Transit (HUT)
  Chicago, Los Angeles, Washington, Philadelphia, Boston, San Francisco, Atlanta, Baltimore, Seattle.
- Medium Urban Transit (MUT)
  Miami, Houston, Pittsburgh, Honolulu, New Orleans, Denver, Portland (Oregon), Minneapolis, Cleveland.
- Low Urban Transit (LUT)
  Detroit, Milwaukee, Dallas, Saint Louis, San Diego, San Antonio, San Jose, Phoenix, Hartford.
- Other Regions (excluding above metropolitan areas):

  New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont)

  Middle Atlantic (New York, New Jersey, Pennsylvania)

  East North Central (Indiana, Ohio, Illinois, Michigan, Wisconsin)

  West North Central (Minnesota, Missouri, South Dakota, Iowa, Kansas, Nebraska, North Dakota)

  South Atlantic (Delaware, District of Columbia, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Florida, Georgia)

  East South Central (Alabama, Kentucky, Mississippi, Tennessee)

West South Central (Arkansas, Louisiana, Oklahoma, Texas)

Mountain (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming)

Pacific (Alaska, Hawaii, Oregon, Washington, California)

Other

Chapter 4
Work, Automobility, and Commuting

Differences by Race and Ethnic Background

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INTRODUCTION

Major trends in commuting, such as the increase in the size of the American workforce and the increase in the number of women workers in particular, the suburbanization of housing and jobs, and the ever-increasing use of the private auto, are well documented. These trends in travel have become part of the common understanding of changes in travel patterns in the last three decades, as well as describing the personal experience of many people.

A tremendous economic boom occurred in the last part of the century, and by many measures the nation's material well-being is extraordinary. Since 1970 average living space has nearly doubled in size to more than 800 square feet per person; the number of households with two or more vehicles has climbed from 29 percent to 62 percent; air travel has quadrupled. Some economists see the advent of the information age, mirroring the changes brought by the industrial age, as bringing a pattern of steep and possibly rising inequality for a long time to come (Lardner, 2000).

There are disparities in travel between the White majority and people of color. Some researchers see African-Americans, Hispanics, and Whites converging in many travel measures, such as women's employment, driver's licensing rates, and person-hours of travel. If so, the changes in travel for people of color can be projected by looking at the recent path of the White majority.

For some commuters travel speeds have increased, their car is a comfortable haven as they travel in solitude from a suburban home to a suburban workplace. The White majority almost entirely have private vehicles available, and many live and work in low-density suburban areas that make a car a necessity for every trip. But there is another picture, describing the everyday commuting experience of another group of Americans—families in poverty, in the core of the older cities and older suburbs, who are stuck in low-paid service jobs, without a car, and fewer travel options. This group is primarily composed of African-Americans, Hispanics, and newer immigrants.

There has been a shift in the origin of U.S. immigrants in the last decades—until 1970, Latin America and Asia contributed only 28 percent of the immigrants, whereas by 1997 together they contributed 78 percent. Population forecasters expect large increases in the number of Hispanics and immigrants in the U.S., but trends in purchasing power and economics are harder to predict. There is a deep interrelation between participation in the economy, both as producers and consumers, and the amount and type of trips that an individual or a family makes.

The trip to work is a major element of travel—many times it is the longest trip of the day and most people must arrive at a designated time. Some commuters make stops on the way to and from work—dropping

passengers or conducting errands. Others seek out the most direct and efficient mode and route to shorten their commute time to a minimum. In this research, data from the Nationwide Personal Transportation Survey (NPTS) is used to examine how people commute to work, specifically workers of different racial and ethnic backgrounds. The major groups are identified by the racial/ethnic origin of the head of the household in the NPTS, and include non-Hispanic African-Americans, non-Hispanic Whites and Asians as racial categories and Hispanics, who can be of any race.

WORK

Overview

Americans continue to travel more and drive more—and one of the major reasons for the increase in driving in the last 30 years has been the increase in labor force participation, especially for women. In 1950, only one-third of women worked outside the home; 50 years later 60 percent of women are in the labor force. Since 1969, the proportion of women who were drivers grew almost 20 percent (from 61 percent of women to 80 percent of women) and the number of household vehicles grew by 143 percent. The number of households with three or more vehicles went from 3 million households in 1969 to 19 million households in 1995—a six-fold increase. So it is not simply the added work trip, but the greater availability of autos to women, the greater household income provided by working women, and the need to purchase goods and services to sustain the household that have fueled the increase in travel.

African-American women have had higher labor force participation rates than White women for many years. In 1970, African-American women had a rate of nearly 50 percent, compared to 42.6 percent for White women; in 1995, White women were at 58.5 percent participation compared to African-American women at 60.5 percent participation; by 2006, the participation rates are projected to converge. The biggest increase for White women was in the 1970s, when the rate for women in the workforce increased from 43 percent to 51 percent. Hispanic women have the lowest labor participation at only about 52 percent of women working in 1995, and although their labor force participation is increasing rapidly, it lags behind both African-American and White women.

Table 4-1. Labor Force Participation Rates for African-Americans, Whites, and Hispanics, Men and Women

	African-American		White		Hispanic	
	1970	2006	1970	2006	1980*	2006
All Civilian, %	61.8	63.1	60.2	67.8	64.0	65.8
Men, %	76.5	65.4	80.0	74.3	81.4	77.1
Women, %	49.5	61.3	42.6	61.7	47.4	54.3

* 1970 Not Available

Source: 1999 Statistical Abstract of the U.S. Table No. 650

Contrary to the trends in women's labor force participation, men's labor force participation is declining. White and Hispanic men have the highest participation rates, with small declines since 1970. African-American men have lagged behind Whites, and are projected to decline even faster. African-American teens still suffer unemployment rates of nearly 30 percent—a number that hasn't changed much in 20 years.

Future trends already may be apparent looking out over the next quarter century, especially at the projections in growth of the population and the characteristics of the labor force. Most of the workers of

the future will be older versions of the workers of today whether living in the U.S. or elsewhere. Of the people who will be working in 2006 in the U.S., 80 percent are already in today's labor force.

The differences between employment rates for men and women are likely to continue into the future. While women's rates are rising and men's are falling, women are still expected to periodically leave the labor market to assume child-rearing roles. Future trends in workforce composition are hard to predict, especially in the wake of the baby boom. Between 2011 and 2029 the baby boomers will be reaching the traditional retirement age of 65, and economists are wondering whether they will retire from the work-force or continue to work. Fulfilling the workforce requirements may require dependence on increased immigration as well as full participation by women and men.

Comparisons

The end of the century was an era of work—the unemployment rate dropped from 6.3 percent (December 1990) to 4.1 percent (December 1999) in the last decade. The NPTS data show that the percent of households with no workers dropped for all racial/ethnic groups in the five years between 1990 and 1995, and the average number of workers per household increased. Almost 10 percent more Hispanic households had at least one person in the family working in 1995 than in 1990. For African-American and White families, the increase was closer to 5 percent. There was also a significant shift for all racial/ethnic groups to dual-income households with two employed members, and a drop in the number of families where only one person worked. The percent of households with no workers, one worker, two workers, or three or more are shown in Table 4-2.

Table 4-2. Percent of Households by Number of Workers

	African-American		Hispanic		White		Other	
	1990	1995	1990	1995	1990	1995	1990	1995
No Workers	27.9	26.0	17.6	15.9	27.6	23.3	20.7	19.3
One Worker	43.9	36.7	40.9	37.7	36.1	33.7	42.4	38.0
Two Workers	22.8	29.8	31.8	36.8	30.9	35.3	28.5	32.2
Three or More	5.4	7.5	9.7	9.6	5.5	7.8	8.4	10.6
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: NPTS

Households with no workers range from those who are comfortably retired, to those who are struggling and unemployed. Even having a job does not guarantee financial security for all households. Although nearly three-fourths of the working poor are White workers, African-American and Hispanic workers experience poverty rates twice as high. Nine million American workers in 1998 made incomes that fell below the official poverty level of $16,700 for a family of four[1]. In addition:

- 12 percent of working African-Americans earned below poverty and 23 percent earned below 150 percent of poverty level (about $25,000 a year)
- 14 percent of working Hispanics earned less than poverty and 29 percent less than 150 percent of poverty level
- 15 percent of immigrants (non-citizens) live below poverty, and 30 percent below 150 percent of poverty level (Kim, 1999).

[1] The "Working Poor" are defined by the Bureau of Labor Statistics as individuals who spent at least 27 weeks in the labor force, but whose income fell below the official poverty threshold.

The working poor are highly concentrated in a few job sectors—30 percent are employed in service occupations and 15 percent work in sales. These jobs are some of the lowest paying and most unstable. Workers with the highest rates of poverty work as child care providers and cleaners in private households. Services such as waitress, food service worker, janitor, and Licensed Vocational Nurse have the next highest rate of poverty.

Table 4-3. Poverty Status by Occupation of Workers, 1996

Occupation	Percent of Workforce	Percent of Those Workers in Households Below Poverty
Service Occupations	13.4	29.9
Technical, Sales, and Administrative Support	29.4	23.0
Operators, Fabricators, and Laborers	14.5	20.6
Other Occupations	42.7	26.5

Source: Bureau of Labor Statistics (BLS), Report 918, Table B

Men and women have different levels of poverty, especially within racial and ethnic groups. Whereas White working women and men were about equally likely to be poor, Black working women had a poverty rate of 14.2 percent—almost twice that of Black working men (8.6 percent) (Dept. of Labor, 1996). Education levels make a tremendous difference for this group: the poverty rate for Black women who did not graduate high school was 30.6 percent compared with 18.1 percent for Black men. With a high school diploma, Black women still had almost twice the poverty rate of Black men (18.0 percent vs. 9.3 percent). Among college graduates, the differences between men and women disappear.

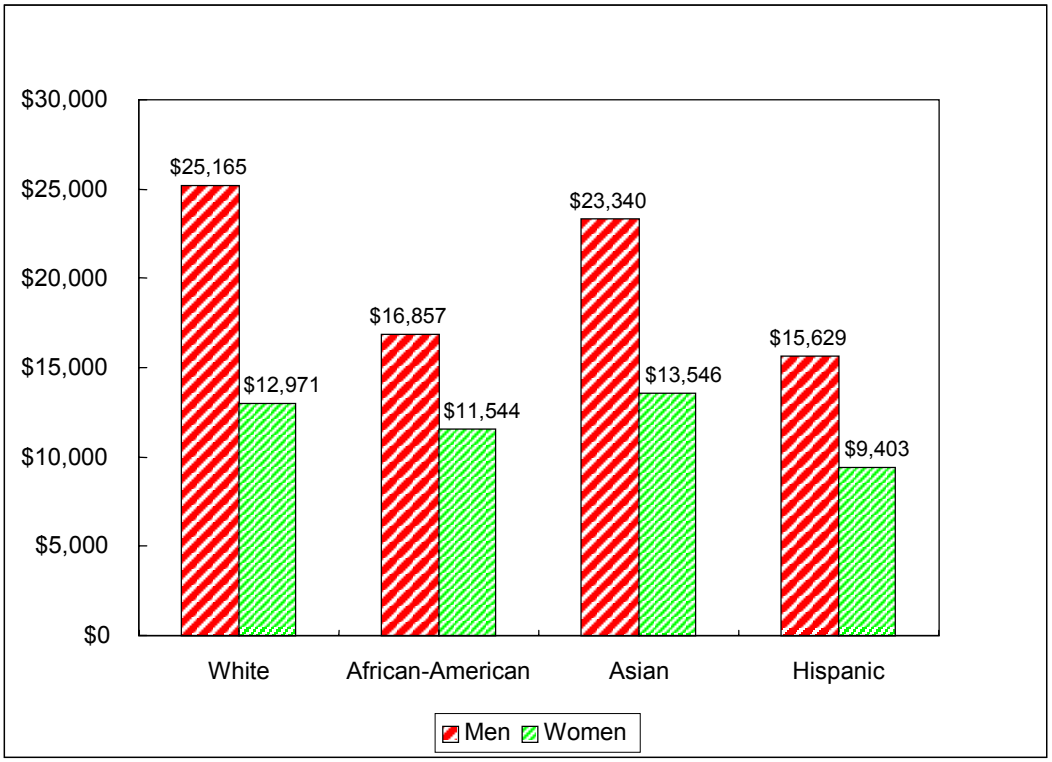
Although the pay gap has been shrinking as occupational segregation decreases and women's educational attainment and work experience become comparable with men's, women have yet to achieve full parity with men. The ratio of earnings of African-American women to men is the closest overall, but they still earn the second-lowest median income of all workers (Figure 4-1). Only Hispanics earn lower overall wages, which may reflect the high concentration of immigrants.

In general, working women are overrepresented in low-paid service jobs. Even though women of color are about as likely to work full-time as White women, they are more likely to have low-wage service jobs. Service and retail trade sectors are projected to account for the most job growth in the next decade. Table 4-4 shows the percent of women in service jobs in metro areas and in central cities.

Whereas 25 percent of all households in 1998 were headed by married couples with children, 8 percent of all households (7,693,000) were headed by single women with children. Of these households, 46 percent are headed by an African-American woman. In 1975, 16 percent of mothers with children under six did not have a spouse in the household; by 1998, the figure was 26 percent.

Working women who were the sole supporters of their families have the highest poverty rate–over one out of five earned less than poverty level (BLS, Report 918, 1996). As employed mothers, women of color may have fewer jobs available close to their homes than White women. Also, they do not gain the financial pay-off longer commutes provide to White men, for instance. So, improving access to jobs and providing child care options that extend beyond the traditional 7 a.m. to 6 p.m. time frame are an important part of the public policy debate.

Figure 4-1. Men's and Women's Median Incomes—1995



Source: Statistical Abstract of the U.S. 1999, Table No. 757.

Table 4-4. Employment Characteristics of Women by Race and Ethnicity (1990 Census)

	White	African-American	Hispanic	Asian	Native American
U.S. Metro Areas					
Percent in Labor Force	57.8	60.7	56.5	60.2	59.4
Percent in Service Occupations	14.2	24.3	23.0	15.8	21.6
Percent Employed Female Head of Household	63.0	54.2	50.1	63.1	53.3
Percent Working w/ Child(ren) under 6 yrs.	59.5	63.6	51.8	57.6	54.5
Central Cities					
Percent in Labor Force	56.7	58.1	54.7	58.5	59.0
Percent in Service Occupations	14.7	25.8	24.4	16.4	22.3
Percent Employed Female Head of Household	59.2	51.1	46.3	58.9	49.7
Percent Working w/ Child(ren) under 6 yrs.	59.3	60.3	49.7	54.6	53.0

Source: Excerpted from Table 1 of "Location, Race, and Labor Force Participation," Johnston, 1996.

Technological change may increase the gap between skilled and unskilled workers. The premium paid to skilled workers offers opportunities for lower-income families to escape poverty. But the impacts of the rising cost of higher education, economically segregated neighborhoods, and barriers to advancement set forth by discrimination and segregation into certain occupations and industries may be felt much more by people of color than by Whites.

In the next decades more workers will be needed to fill existing jobs left free through retirement and to provide for continued labor force growth. Wage inequality between middle- and low-wage earners also may narrow if increases in the minimum wage are made. If a tight labor market persists, all workers may benefit as employers hire from non-traditional sources and provide training. If baby-boomers remain in the labor force past the traditional retirement age of 65—whether in full- or part-time jobs—the labor market may be more competitive. But employment equality—between White workers and people of color, between men and women—will depend on policies to address a wide range of labor market and social barriers that survive as artifacts in the current social and economic fabric.

AUTOMOBILITY

Households without vehicles are a rarity in today's society. In fact, there are currently more cars than licensed drivers in the U.S. Increasing vehicle ownership reflects not only increasing reliance on private vehicles for day-to-day travel, but also the economic prosperity of the last part of the 20th century. These changes, however, are not benefitting all people equally.

Nearly 25 percent of African-American households do not have a car. In the last 20 years, the proportion of African-American and Hispanic households without vehicles declined significantly. For African-Americans the proportion has declined from about one-third of households without a vehicle to just over a quarter of households. For Hispanic households, the proportion has declined from nearly 22 percent to about 15 percent.

Table 4-5. Decline in Proportion of Households Without a Vehicle by Race, 1980–1997

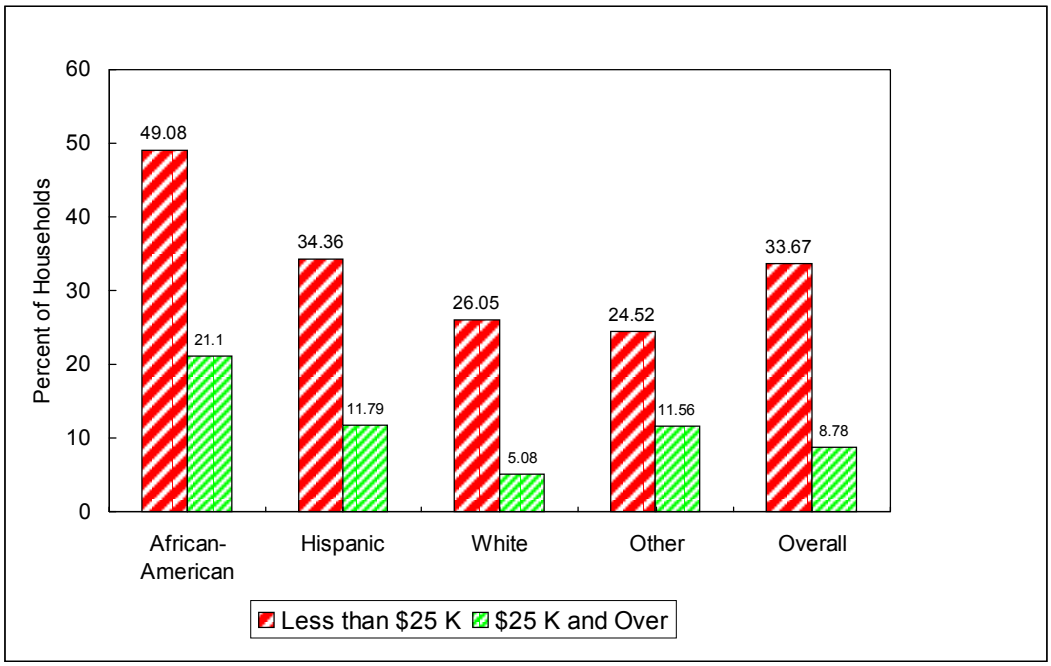
	1980*	1990*	1995**	1997***
All, %	12.9	11.5	9.8	9.5
White, %	10.2	8.7	--	--
African-American, %	32.5	30.4	24.7	24.1
Hispanic, %	21.7	19.0	17.1	15.3

Source: * Decennial Census
** 1995 American Housing Survey
*** 1997 American Housing Survey

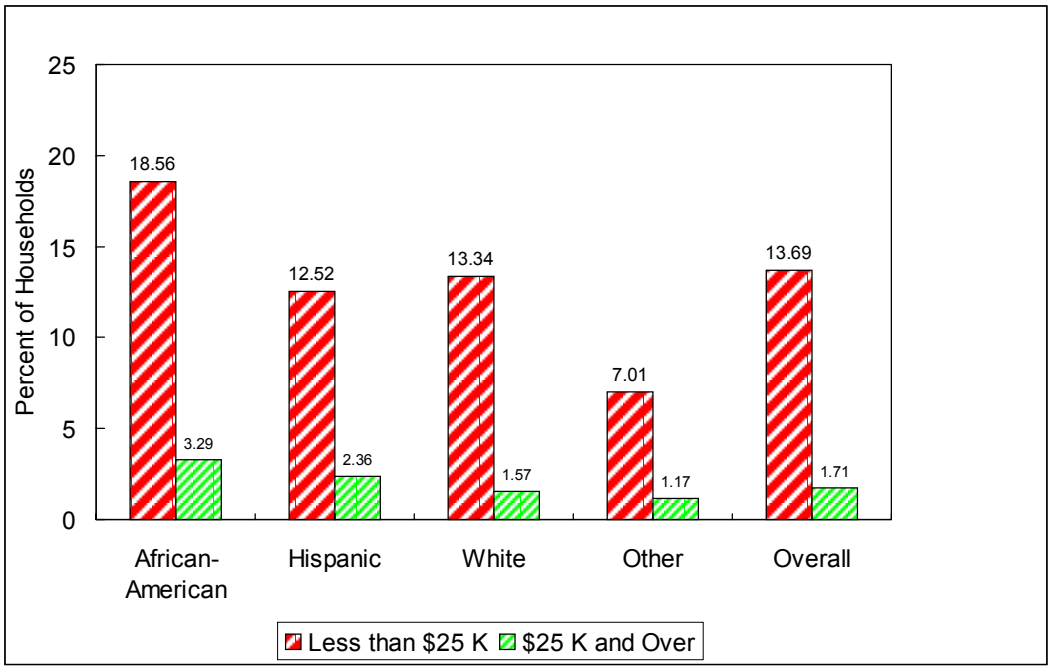
Thirty percent of the U.S. households without a car are located in the New York or Philadelphia metropolitan areas, according to the 1995 NPTS. These two states account for only 12 percent of all households. This shows the dramatic effect of these older, centralized cities with fully developed transit service on the travel mode characteristics of the people who live there.

Although there are some people in large cities who live without a car by choice, when the household income grows above $25,000 (150% of the poverty rate for a family of four) and the residence is in a suburban area, most families acquire at least one car. Figure 4-2 shows the percentage of zero-vehicle

Figure 4-2. Urban and Suburban Households Without a Vehicle, Percent by Race and Income



a. Data for Urban Households



b. Data for Suburban Households

households by racial/ethnic group for urban and suburban area types where the family income is less than $25,000 or $25,000 a year or more. African-American and Hispanic families lag behind Whites in vehicle ownership, but the differences are negligible in the suburbs for households at income levels of 150 percent of poverty or above.

The acquisition of vehicles is especially interesting in the immigrant community. Newer immigrants have more than twice as many no-vehicle households than immigrants who have lived in the U.S. for ten years or more. The longer the immigrant family has been residing in the States, the more like U.S. born families their vehicle ownership characteristics are, but even immigrants who have been in the U.S. over a decade are twice as likely to continue to be without a car than U.S. born. Hispanic families that have been here that long still have 70 percent more households with no vehicle. Table 4-6 shows the proportion of zero-vehicle households for all immigrants compared to U.S. born, and for Hispanic immigrants (1990 Census Public Use Microdata Sample [PUMS] data). In 1997, Hispanics (of any race) accounted for 11.4 million, or 44 percent, of the foreign-born population.

Table 4-6. The Proportion of Households Without Vehicles by Number of Years Resident in U.S.

	3 Years or Less	4-5 Years	6-8 Years	9-10 Years	Over 10 Years Resident	U.S. Born
Hispanic	23.3	17.7	15.4	14.2	10.8	6.2
All	20.7	15.7	12.7	12.0	8.0	3.9

Source: 1990 Census PUMS data

A much higher proportion of immigrants live in the largest metropolitan areas—53 percent live in the eight metro areas with five million people or more, compared with only one-quarter of the native born population. In areas with between one and five million people, the proportions were not significantly different, and foreign born people were proportionately less likely to live in areas with less than a million population or in non-metropolitan areas (Current Population Reports, P23-195, U.S. Census).

In large cities, the cost of purchasing a vehicle may not be as much of an impediment as the cost of insurance, parking, and vehicle repairs. One out of five poor households own a vehicle 14 years old or more (pre-1981 vehicles from the 1995 NPTS), and these older vehicles are less dependable, require more repairs, and may be used sparingly. Even people in households with no cars still make almost half of their trips in a private vehicle; about a quarter of their trips are made by walking, and one in six trips by transit.

But as more workplaces locate in suburban areas, it becomes clear that lack of access presents a barrier to urban residents in a complex way. It is more difficult to learn about job opportunities in far-flung suburban locations, and it is difficult to commute to these workplaces without a vehicle. It is hard to make the decision to move to suburban locations, to leave known services and support systems and face neighbors who are different and neighborhoods with poor transit service. In isolation from family and friends, it is more difficult to get family support and informal child care. People of color who move to traditionally White neighborhoods may face overt or covert racism (*Washington Post*, 2000).

COMMUTING

Trips made to and from work account for only 18 percent of the person-trips and 22 percent of the person-miles traveled in an average year. But commute trips have a tremendous impact on local traffic—especially during peak periods.

One value of the NPTS is that it supplies more frequent data than the decennial Census, which asks only about the journey to work. NPTS obtains data on all trips, not just the work trip, so the journey to work trip data can be examined in the context of all travel made throughout the day. These data allow consideration of the activities and trips chained to the work trip, such as dropping children at school or day care, stops for shopping, and other errands people do on the way to and from work.

What is a "Usual" Day?

The decennial Census has historically asked about the journey to work by referring to the travel mode for the "usual" day. The question (from the Census 2000 long form) asks:

> "How did you/this person **usually** get to work LAST WEEK? If you/this person usually used more than one method of transportation during the trip, mark the box of the one used for most of the distance."

The boxes listed modes of transportation, such as car, truck, van, bus, bike, walk, etc.

The same reference to a "usual" day is made for estimates of travel time and the number of people in the vehicle. For a large majority of people who get up and go to work everyday, there is little difference between the usual day and any randomly assigned day. On the other hand, a usual day is harder to describe for people who work part-time, have multiple jobs, or have a lot of travel mode choices (such as a bus or subway stop nearby, an auto, catching a ride with a friend or spouse, and/or working close enough to walk or bike).

The NPTS asks workers both about their "usual" mode to work and obtains information about work trips made on the specific day for which respondents report their travel. The question on "usual" mode is made so that comparisons to decennial Census long form data can be made. However, comparing "usual" with a specific travel day reveals some patterns.

Table 4-7. Mode of Travel on Travel Day for Workers Making a Commute Trip Compared With "Usual Mode"

	On Travel Day Took:					
"Usually" Take:	Single Occupant Vehicle	Carpool	Transit	Walk	Bike	No Report/ Other
Private Vehicle, %	81.8	15.3	0.3	0.5	0.1	2.0
Transit, %	11.5	10.8	65.6	7.4	0.2	4.5
Walk, %	13.5	9.0	3.2	50.8	0.3	23.3
Bike, %	9.4	11.9	0.3	4.9	68.7	4.9

Overall, people who usually commute by private vehicle are very likely to use a private vehicle to commute on their assigned travel day. However, for those who usually use transit or walk to work, over

20 percent are likely to use a private vehicle to commute on any particular day. Using transit for work trips reflects an increasing proportion of workers for whom transit is used as a choice, and they are not captive to it.

Differences can also be seen in commute times when comparing actual reported times for a single day compared to what respondents say about their usual commute. Respondents of all types over-estimated their usual commute time to work, but only by a few minutes. On any given day the actual travel time to work ranges from between 7 and 11 percent less than what respondents report is their "usual" commute time. Distances were similarly overestimated for the "usual" distance to work.

The analysis presented here focuses on the description of travel by workers going to work on a single, assigned travel day.

Mode Choice

Table 4-8 and Figure 4-3 show the changes in choice of travel mode to work between 1990 and 1995 for Whites, African-Americans and Hispanics. Even in that short time frame, the proportion of commuters walking or taking the bus to work declined. Nearly 80 percent of Whites drive alone, and 95 percent use an auto on their commute trip. African-American commuters showed very little change in drive alone and carpooling to work, but had a 3 percent decline in travel by bus and a slight shift to rail. Walking to work by African-Americans declined from 5.1 to 2.8 percent. Hispanic commuters shifted from carpools to drive alone, and away from both bus and rail transit.

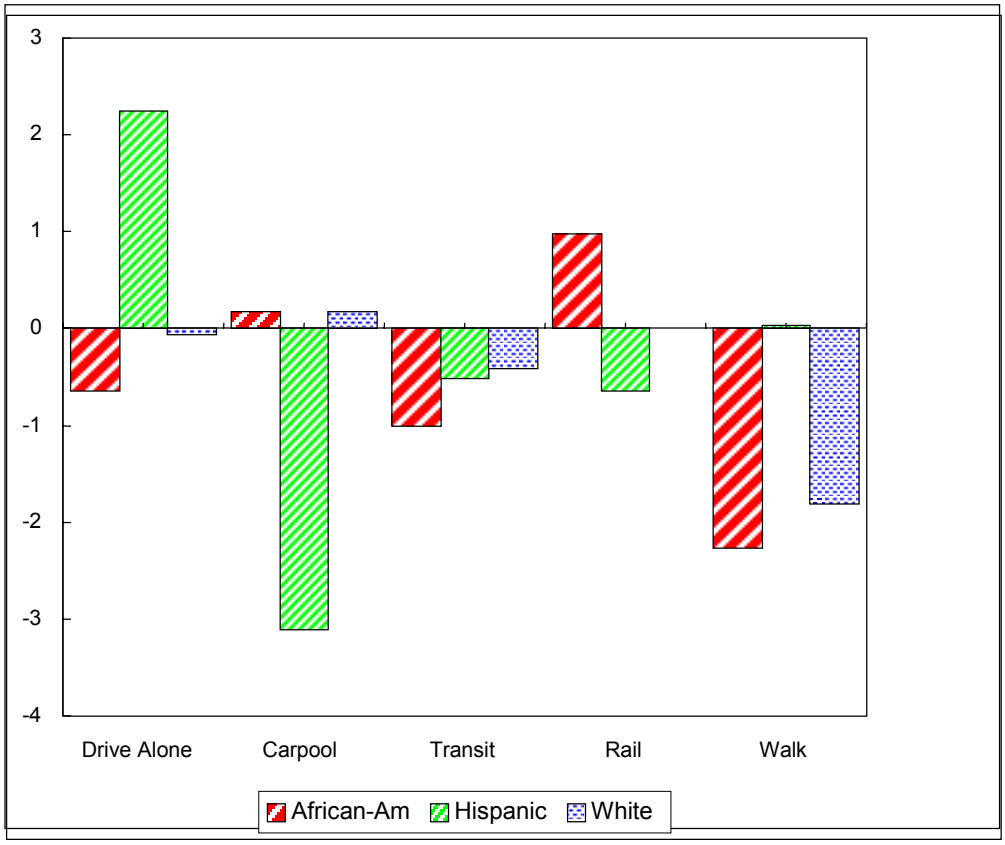
Table 4-8. Percent of Trips by Mode for Travel to Work by Race/Ethnicity in 1990 and 1995

	1990 NPTS			1995 NPTS		
Mode to Work:	African-American	Hispanic	White	African-American	Hispanic	White
Drive Alone	62.5	65.3	79.5	61.9	67.5	79.2
Carpool	19.9	22.7	13.8	20.1	19.6	14.0
Transit-bus	8.7	3.8	1.2	7.7	3.3	0.8
Transit-rail	2.6	3.3	1.1	3.6	2.7	1.1
Walk	5.1	3.8	3.6	2.8	3.9	1.8

There are significant differences in mode choices made by workers of different race and ethnicity, with African-Americans and Hispanic recent and not-so-recent immigrants forming a large share of the transit using market. But all commuters are leaving the bus as a choice of commute mode. Figure 4-3 shows the actual percentage point change in mode from 1990 to 1995. Hispanics are shifting dramatically to drive alone from carpools, which may be related to the continued growth in vehicle ownership. The decline in walking as a choice for work trips for African-Americans and White workers may reflect the continuing effect of suburbanized work and residence locations for these groups.

Slow modes of travel are constantly giving way to faster modes. Transit use and carpooling have declined, as the century progressed, as more and more people chose to drive alone to work. This is true not only for the White majority, but also for people of color. Still, while the pattern may be the same, African-Americans and Hispanic Americans continue to show much higher proportions using transit and walking than the White majority. Although African-Americans and Hispanics, and especially new immigrants compose the broad base of transit users in many areas, many workers shift to commuting by car when a car becomes available.

Figure 4-3. Percent Change in Modal Shares Between 1990 and 1995, Workers Making Work Trips on Travel Day



Source: 1990 and 1995 NPTS

Overall, there has been a remarkable shift to driving alone, especially for work travel. The average American worker now spends more time commuting than doing many other common daily tasks, on average about three hours a week. Table 4-9 shows the comparison of hours spent per week driving (from the NPTS) compared to hours per week for child care, hobbies, reading and working (shaded columns are from Robinson et al., 1996).

The commute times from NPTS (first column) are estimated by workers who make stops and those who travel directly to work, although dwell-times at the stops are not included. The respondent may work five days a week, but the average commute times are spread over all seven days. The number of hours worked (last column) by workers (includes full- and part-time workers) may seem low because it includes full-time and part-time, retirees and homemakers.

Another way to look at the choice of travel mode for commuting is to compare how people get to work with how they travel for other purposes throughout the day. Table 4-10 shows the percent of trips by all modes compared with the mode of travel to work on the travel day for travelers of different races and ethnic backgrounds. This table shows that people who drive to work are really auto captives—people who use vehicles for all trips during the day, regardless of their race or ethnicity. For respondents who drove alone on the their trip to work, 96 percent of all other trips in the travel day are by auto. People who carpooled to work are slightly more likely to walk or use another mode (such as taxi), but still make 92.3 percent of all other trips by auto. People who walk or take transit to work are many times more likely to walk for other purposes during the travel day.

Table 4-9. Hours per Week Spent on Driving Compared With Other Daily Activities

	Commuting (NPTS)*	American's Use of Time Diary Data				
		Total Travel	Hobbies	Child Care	Reading	Working (All Adults)
African-American	3.3	9.7	1.6	1.9	1.6	22.4
Hispanic	3.1	9.6	2.5	2.8	2.5	21.8
White	2.9	9.3	2.9	2.0	3.3	22.7
Asian	3.2	9.9	2.8	1.4	3.5	23.4

* Average commute times of workers making work trips on travel day times 5 days a week.

Table 4-10. Percent of Trips by Mode for All Purposes Compared With Commute Mode

AFRICAN-AMERICANS	Then Other Modes Used on Travel Day Were:						
If Mode to Work Was:	Private Vehicle		Transit-Bus	Transit-Rail	Walk	Other	Total
	Drive Alone	Carpool					
Drive Alone	64.5	31.2	0.2	0.1	2.6	1.4	100.0
Carpool	26.9	65.2	0.7	0.2	4.4	2.6	100.0
Transit-bus	7.4	18.2	38.3	4.5	21.1	10.6	100.0
Transit-rail	6.7	9.3	5.2	40.7	24.6	13.6	100.0
Walk	5.4	29.2	8.4	1.6	48.0	7.4	100.0
HISPANICS							
Drive Alone	66.0	29.2	0.0	0.0	2.1	2.8	100.0
Carpool	24.9	67.5	0.8	0.4	5.1	1.4	100.0
Transit-bus	6.0	26.9	32.0	3.7	28.9	2.4	100.0
Transit-rail	3.7	18.1	4.5	35.4	24.5	13.8	100.0
Walk	11.1	20.9	3.4	1.5	58.0	5.1	100.0
WHITES							
Drive Alone	68.3	28.0	0.1	0.1	1.9	1.8	100.0
Carpool	27.7	64.5	0.4	0.2	4.0	3.2	100.0
Transit-bus	13.4	23.2	27.7	1.5	26.8	7.6	100.0
Transit-rail	12.8	13.7	2.0	28.2	33.5	9.8	100.0
Walk	16.8	19.1	2.7	2.7	50.7	8.0	100.0

African-American transit commuters are much more likely to use transit for other trips during the day—almost 40 percent of non-work trips during the travel day are by transit. Whites are much more likely to use transit as a choice of work mode compared to African-Americans or Hispanics; Whites indicate that nearly 37 percent of non-work trips are by private vehicle. White commuters who use transit for commuting use transit the least for non-work trips—28 percent of White commuters vs. 38 percent of African-Americans. Hispanics use transit for one-third of other trips if they commute by transit. Hispanic transit commuters are more likely than African-Americans or Whites to carpool or walk for other trips on the travel day.

Nationwide, over 90 percent of workers use a private vehicle to get to work, and over three-quarters of workers drive alone. In larger metropolitan areas, there are greater shares of workers using transit and walking to work.

Table 4-11. Percent of Trips by Mode for Travel to Work

Mode	Percent of Work Trips		
	All Metro Areas	Metro Areas <1 Million	Metro Areas 1 Million and More
Drive Alone	76.9	79.4	75.0
Carpool	13.6	14.8	12.7
Bus Transit	2.0	0.8	3.0
Rail Transit	1.7	0.0	3.1
Walk	2.3	1.5	3.0

However, in spite of recent reports of increasing transit ridership (American Public Transit Association and Federal Transit Administration figures for 1999), bus ridership accounts for only 3 percent of work trips in large metro areas, about the same as rail/subway and walk. Some of the apparent increase in transit use may reflect the growth in metropolitan areas of one million or more, where transit accounts for 6.1 percent of all work trips, compared with the smaller metro areas where transit is used for less than 1 percent of commute trips. Another dimension is the distribution of (resident) workers by race by metro area size. For instance, Whites compose nearly three-quarters of the U.S. workforce (73.3 percent), but account for only two-thirds of the workers living in metro areas of one million or more (67.2 percent). Hispanic and African-American workers are much more likely to be residents of larger metro areas, and much more likely to be transit users.

Table 4-12. Percent of Workers by Race and Metro Area Size

Mode	Workers by Race		
	All Metro	Metro Areas <1 Million	Metro Areas 1 Million and More
African-American	11.4	8.1	13.8
Hispanic	10.1	6.9	12.5
White	73.3	81.6	67.2
Other	5.2	3.4	6.6

Travel Time

There is research to indicate that people have a travel time "budget," a set amount of time each day that the average person will spend on travel. The implication is that those who spend time traveling for one purpose, such as commuting, will spend less time traveling for other trip purposes. In the NPTS data, there seems to be a relationship between the number of daily trips and the distance workers travel to work—those who work closer to home (often women) make more daily trips overall than those who work farther from home. Table 4-13 shows the number of recorded trips **for all purposes** by the distance of the worker's daily commute.

Table 4-13. Number of Annual Trips by Distance to Work

If the workplace is:	The commuter makes:
Less than 10 miles	1825 annual trips (for all purposes)
10 – 20 miles from home	1679 annual trips
More than 20 miles from home	1642.5 annual trips

Table 4-14 shows the amount of time spent in commuting by men and women in different racial/ethnic groups and the total time spent traveling on the reporting day. Figure 4-4 shows the commute time in minutes for commuters who stop and do not stop on the way to and from work. For the commuters who made stops, the travel time was summed for the segments from home to the stop location and then to the workplace, and from work to the stop location and back to home. Dwell times at the stops were not included in the time estimates. For trips for other purposes, travel times were summed for the trips made from home to non-work locations for all other trips made on the travel day. Remember, these are trips by workers who made work trips on the randomly assigned travel day, and these estimates do not include non-workers making other trips.

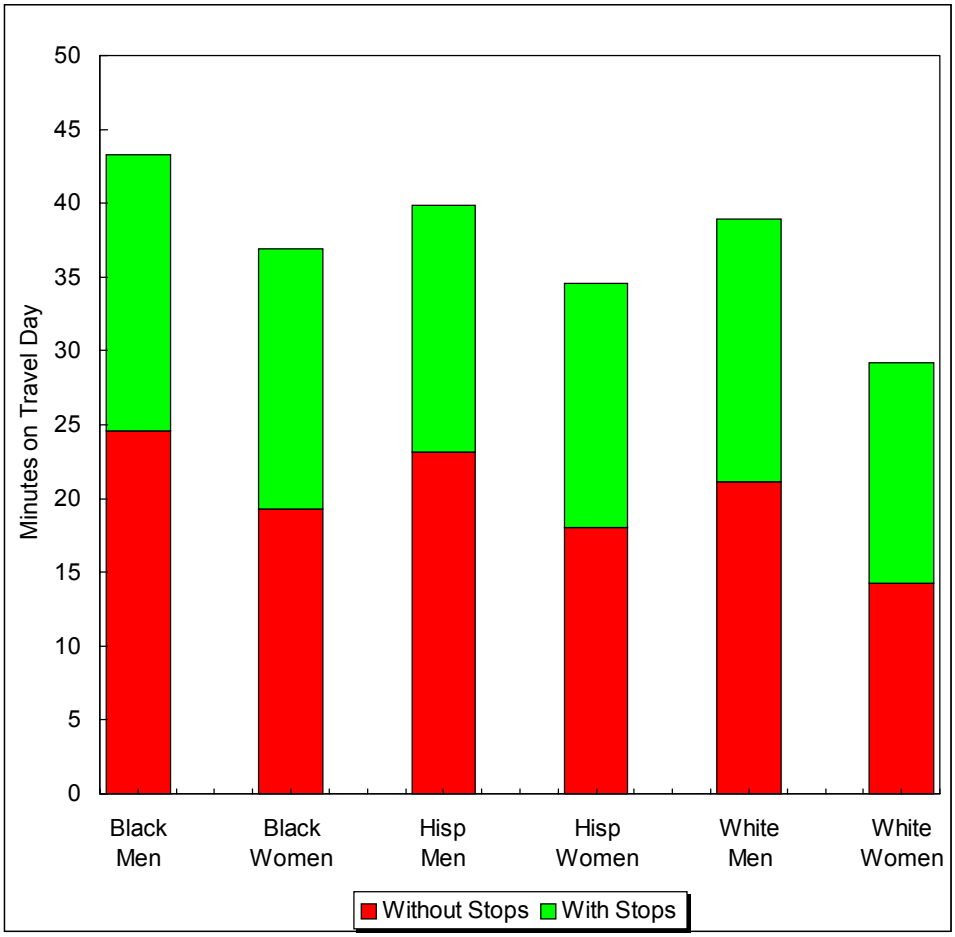
Table 4-14. Total Minutes Reported for Trips to and From Work and for Non-Work Travel

	Total Commute	Other Travel	Total
African-American Men	43.3	44.1	88.3
African-American Women	37.0	50.3	87.4
Hispanic Men	39.8	50.4	91.4
Hispanic Women	34.6	49.4	84.4
White Men	39.0	54.6	94.2
White Women	29.2	51.0	80.3

A consistent observation in travel research is that women travel shorter times to work than men. While this is true for all three racial/ethnic groups shown in Table 4-14, the difference between men and women is larger for Whites (10 minutes more for men) and less for African-American (6 minutes more for men).

When comparing within gender, the longest commutes are made by African-American men, who spend 3.5 minutes a day longer in commuting than Hispanic men, and almost 4.5 minutes longer than White men. African-American women spend more time traveling to work than other women, almost 8 minutes longer per day than White women. Although a few minutes a day may seem small, they amount over a year of working (240 work days per year) to a remarkable difference: African-American men spend over 17 hours more in traveling to work than White men, and African-American women spend over 31 hours more in commute time than White women.

Figure 4-4. Minutes Spent Commuting to and From Work



A number of ramifications of the inequity in travel to work that concern people of color in particular and society in general are noted by Johnston (1996). Spending more time to cover the same distance amounts to a time burden (cost) that is paid by non-Whites. Johnston says that this time burden could lead to lower motivation to seek employment, and for those with jobs, it could mean more tardiness and absenteeism at work. She also notes that it could lead to poorer job performance, poorer promotion prospects, and less economic gains in the lifetime earnings of women of color.

Doyle and Taylor (2000) report that traveling via public transit contributes far more to increasing commute time than any demographic, location, or wealth variable. African-American women have the highest rates of transit use and have commute times longer than all other women. In addition to the effect of using transit, some researchers hypothesize a "spatial mismatch" theory, first expressed by John Kain (1992). According to this theory, African-American inner-city residents have less access to jobs because of the suburbanization of economic growth. Lack of access leads to high rates of unemployment, and for those who find work, long commutes.

More recent research into this hypothesis (Ihlanfeldt et al., 1998) has suggested complicated factors, such as worker skill levels, differences of age and gender of workers, mobility barriers to suburban jobs (e.g., inadequate public transportation), lack of information about job opportunities, as well as discriminatory practices, contribute to this phenomenon. The complexity of the interaction of these economic and social contributing factors reveals a need for more research into the spatial mismatch theory.

However, the time spent commuting is closely linked to the choice of travel mode and the residence and work locations, as well as the need to stop on the way to or from (which might take the commuter out of his or her way). Tables 4-15 and 4-16 show the reported distance and the calculated speed of the commute to work by mode and race/ethnic origin.

Table 4-15. Distance in Miles Traveled to Work by Mode and Race

	Drive Alone	Carpool	Transit	Rail	Walk
African-American	10.6	10.9	10.0	14.1	1.2
Hispanic	11.7	10.6	9.6	11.0	0.7
White	11.8	13.2	12.1	17.3	0.7
Asian	11.4	8.9	10.7*	16.6*	0.5

* Small sample size

Table 4-16. Calculated Travel Speeds by Mode and Race (mph)

	Drive Alone	Carpool	Transit	Rail	Walk
African-American	30.3	28.8	14.8	22.4	3.8
Hispanic	30.6	29.6	15.6	15.5	3.2
White	31.1	31.0	16.0	22.1	3.8
Asian	30.1	26.6	16.3*	21.9*	3.5

* Small sample size

People walk less than a mile to work, on average, but African-Americans walk nearly twice as far (1.2 miles), compared to other groups. Driving alone and carpooling are the next shortest times, averaging between 18 to 22 minutes for one-way travel for all racial and ethnic groups, with average trip lengths of 9 to 12 miles. Trips to work using rail take the longest, with average one-way commutes of over 40 minutes for all groups. Not surprisingly, rail trips are long, with average distances of 12 to 17 miles for all groups.

Transit trips to work are typically similar in distance to those made by driving alone or carpooling; however, the travel times are nearly double. In other words, the travel speed of transit trips is only half that of private vehicle travel (16 miles an hour compared with 31 miles an hour).

Given these differences in travel speeds and total travel time for those using transit to work, it makes sense that, at the individual decision-making level, many people will acquire a vehicle and either drive alone or carpool to work. Based on the adage, "time is money," under current conditions, in most cases, it is faster (and therefore cheaper) to get to work using a private vehicle.

Immigrants are now a key component of transit users. Recent immigrants are much more likely to ride public transit than other workers and make up a significant proportion of total transit commuters—e.g., 45 percent of bus riders in Southern California are immigrants (Myer, 1997). Recent immigrants (less than 10 years) per capita transit use shares are four times greater than those of their native-born counterparts.

Transit use for native-born Americans is increasingly by choice rather than because no vehicle is available to the traveler. To preserve transit markets, planners need to understand and serve the needs of customers and make it attractive for people to continue to ride the bus, even if a vehicle is available.

FUTURE TRENDS

Technology will be the greatest element of societal change in the next decade, and advances will continue to change daily lives—both in a personal way, such as how people communicate, and through larger economic and social impacts. The changes will be multifaceted and hard to predict.

The social/economic impacts already can be seen in the landscape of new suburban development. For example, over the last decade the formula for new development has included rapid population growth scattered across the suburban fringe and clusters of high-tech businesses in "technology corridors" along interstates. As a result, many have already changed the way they work, how they shop, where they go and when.

White households are more likely to be early adopters of technological change. Close to half of White households (46.6 percent in 1998) had a computer, and 21.5 percent had e-mail. At the same time, African-American and Hispanic households were about half as likely to have a computer (23.2 percent and 25.5 percent, respectively) and very unlikely to have e-mail (less than 8 percent for both). The acquisition of communication technology in the home is fast growing—but faster for White families, which increases the differences (Department of Commerce, 1999).

This digital divide separates some households from information and opportunities, such as job postings, apartment and real estate listings, financial information, as well as adversely affecting the ease with which children in families without computers adapt to such a powerful information source. As technology becomes more instrumental to economic and community participation, the differences between White families and people of color will become more problematic.

Large numbers of immigrants, especially from Latin America and Asia, are expected to continue to come to the U.S. The U.S. will need to open its borders to help fill jobs vacated by retiring baby-boomers and to fuel the job growth that has rocketed the last three decades of the 20th century. The immigrants will mirror the affluence and high education of the workers they replace, but will also include large numbers of low-skilled workers to work at low wages in the service and retail sectors.

The end of the Industrial Revolution, especially the last decades of the 19th century, were marked by massive migration to the cities to work in the new industries, and immigration of staggering proportions in the early decades of the 20th century followed. A nascent transformation that will bring about the same magnitude of change may be in the making. The technology revolution is changing the face of America's suburbs, drawing immigrants from Latin America and Asia to fill the demand for highly qualified technicians as well as low-skilled service workers.

During the 1900s American cities were melting pots, waysides to assimilation and upward mobility. The defining myth of the Industrial Revolution was Horatio Alger; lowly born and poor but hard-working, he was able to raise himself from rags to riches. Immigrants arriving today are sharply polarized according to educational attainment—at one end Ph.D.'s working as mathematicians and engineers, and at the other end those with less than a high-school education working as cooks and cleaners. Manufacturing provided a middle-class with middle-incomes during the 19th century. In the new economy, lack of education and language skills could provide an impenetrable barrier to prosperity.

CONCLUSIONS

"Basic demographic data can reveal hidden truths about complex social questions. The data have this power because demographic trends explain how society changes on the deepest level. When income distributions or immigration patterns change, for example, the behavior of individuals often change in response, on a mass scale" (Edmonson, 1999).

The U.S. saw an added 25 million people every decade from 1950 to the year 2000. Immigrants were one-third of that increase in population. Census forecasts for 2020 show an ongoing trend of adding 8 to 10 million population in net immigration for 2000-2010 and 2010-2020. Some economists project that at least half of the labor force of the future will consist of immigrants, both with very low and very high education levels. The growth in the service sector of employment will add to both high-skilled niches and lower-skilled and support jobs.

The trough in working-age population following the baby-boomers' retirement will require greater participation in the labor force by those over 60 years of age, African-American men (who are currently underrepresented), and new immigrants (Pisarski, 1999). Policies will have to focus on loosening of traditional retirement age, on getting African-American teenagers into the workforce, and on the evolving diversity of the workplace.

Commuting will be very different as the workforce changes and as the characteristics of work and workplaces change. More part-time and temporary jobs will result from the flexible workforce. Longer commutes on a more sporadic basis and more midday trips can be expected. Although some see the growth of telecommuting as the answer to congestion, the prediction could easily be made that less work travel means more travel for other purposes.

Land use has been linked to transportation choices in traditional models, but the linkage may be weakening because of the impact of technology. New patterns will emerge, and spatial and temporal flows may begin to be seen in an entirely new way—as part of a matrix including transportation, land use, and telecommunications (Wachs, 1999). For example, as people are freed from downtown workplaces as the destination of their daily commutes, they may live further and further from the economic center. Commuters may be willing to travel 30 to 100 miles to work, if they commute only once a week.

And equity will continue to be a major concern. Transportation and the civil rights movement have always had links—from the bus boycotts of the 1950s to the recent demands for environmental justice and a fair share of transportation investments. Inequality in transportation may continue to affect people of color and low-income communities, but progress is being made to include such considerations in the decision-making process. The U.S. Department of Transportation has new guidance to encourage transportation agencies to examine the cumulative effect of transportation investments, and to focus on how to promote equitable access (The President's Order on Environmental Justice). Presidential attention has been directed to reducing the digital divide because of the impact on access to jobs, information, and opportunity.

Progressing into the new century, remember that transportation has always been, and will continue to be, integrated with information exchange and technology. As the labor force changes, so will the characteristics of travel. Throughout history, greater communication has led to greater travel.

Some researchers believe that the differences between the White majority and people of color will lessen in the future: "commute patterns of white and minorities are converging rather than diverging over time, even among low-skilled workers" (Taylor, 1995). However, there is evidence for deeply ingrained

residential and industrial segregation, and such a structural disadvantage requires persistence and time to change. Convergence may be on the far horizon.

One of the aftermaths of the vast divergence in wealth in the early industrial age was the violent worker riots of the early part of the last century. In the "information age," inequalities in mobility must be dealt with in a constructive manner or groups will continue to be disenfranchised from the social, political, and economic benefits of the society. These groups are the working poor, newer immigrants, and, to some extent, African-Americans. Both the Census 2000 and the 2000 NPTS will help determine if there is a trend toward convergence in travel to work and vehicle availability for people of different races and ethnic backgrounds.

Researchers always want **more** data; however, to understand these trends, **better** data are needed. These better data need to include enough people of each segment of the population to reveal characteristics of the niche markets, for transit, for example. The next NPTS will include questions on whether the respondent was born in the U.S. and when he or she immigrated to this country. Previous NPTSs have had poor representation of Hispanics because the forms and materials were in English, whereas the next NPTS will include Spanish-language forms and Spanish-speaking interviewers. Also, serious attention is being paid to improving response rates of low-income households.

One lesson has been underlined in many studies; for transit to stay viable, it needs to focus on keeping riders who have access to other modes, especially a vehicle. For instance, travel speeds by transit need to be more comparable with speeds by private vehicle. Because of access and egress times and wait times for transfers, the actual time spent traveling must indeed be short. Los Angeles MTA will be experimenting with a new bus system modeled after Curatiba, which are more like rail—one mile distance between stops. In less densely developed areas it makes sense to disperse the stop points.

If transit as a mode cannot compete in travel speed, much of the transit market is going to be limited to immigrant households that have yet to acquire a private vehicle. Transit planners should be attentive to the residential choices made by immigrant households, as well as the locations of low-skilled service jobs, and provide service that will make continued ridership more enticing, even after a private vehicle is acquired, or that can delay the acquisition and use of private vehicles.

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Chapter 5
Residential Location Differences in People of Color

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INTRODUCTION

This chapter examines the relationship between residential location and travel among ethnic and racial population segments using the 1995 Nationwide Personal Transportation Survey (NPTS) data[1]. Using measures of total daily travel, the effects of metropolitan location and local neighborhood characteristics are explored. There is extensive literature on residential location and travel; however, little is known regarding how relationships between location and travel may differ across racial and ethnic groups. For example, minority persons are more likely to use transit; transit use is related to ethnicity, immigrant status and household income. In addition, minority households tend to be concentrated in higher density, inner city neighborhoods which are typically well-served by transit. The question is, then, how much does transit access or the higher cost of using private vehicles in inner city areas (as reflected by residential location) contribute to the observed higher rate of transit use among these population groups?

It is important to understand the interplay between travel, minority status and residential location for several reasons. First, there is growing public policy concern that transportation resources be equitably distributed. The recent series of lawsuits against major metropolitan transit agencies, such as the Los Angeles County Metropolitan Transportation Authority (LACMTA), argues that transit service and fare policy discriminate against racial minorities. Second, ethnic and racial minorities are disproportionately represented among the unemployed and welfare-dependent, and access to jobs is critical to achieving the goals of the new federal welfare policy. Third, racial and ethnic minorities tend to be concentrated spatially, in inner city areas and the central parts of older suburbs. It is of interest to determine whether such spatial segmentation leads to related mobility constraints. Finally, there is growing interest among transportation planners in fostering higher density, transit- and pedestrian-oriented development. Understanding these linkages would shed light on whether such policies would lead to higher levels of mobility and accessibility for minority households.

This chapter is organized in four sections. First, the literature on residential location and travel is briefly reviewed. Second, basic travel and location characteristics are compared across race and ethnic population segments. The third section presents an analysis of daily travel patterns and residential location. A summary and discussion of research results are presented in the conclusion section.

[1] This research was sponsored by the U.S. Department of Transportation, through a subcontract with Battelle Memorial Institute. Mr. Hsi Hua Hu, Ph.D. candidate, prepared all data files and assisted with all parts of the analysis. His assistance is greatly appreciated. All errors and omissions are the responsibility of the author, and not Battelle or the U.S. Department of Transportation.

PRIOR RESEARCH ON RESIDENTIAL LOCATION AND TRAVEL

The relationship between land use and transportation has been subject to extensive research by geographers, planners, urban economists and others.[2] The history of the twentieth century is one of growing car ownership and use, declining use of transit and other modes, and decentralizing both population and employment. Trends in travel and land use have complemented and re-enforced one another: growing car ownership generated demand for highways, development of the highway system changed accessibility patterns, and population and jobs responded to these new patterns of accessibility.[3] By 1990, the suburbs of U.S. metropolitan areas were home to about 62 percent of the metropolitan population and 52 percent of the jobs. At the same time, per capita car ownership and travel have reached all-time highs (Pisarksi, 1996).

From a broad perspective, there is no question that land use and transportation trends are closely related. However, the historical record does not necessarily provide useful evidence for understanding land use and transportation at a single point in time, and the empirical research on relationships between daily travel and land use characteristics is far less clear. A review reveals that literature is quite limited with respect to the question of residential location and race/ethnicity. Much of it is focused on the issue of urban sprawl, hence the interest in commuting, transit use and automobile ownership. Only a few studies examine travel for all purposes, either in terms of trips or miles traveled. In addition, this literature is remarkable in its lack of attention to population (traveler) characteristics. Because the literature is extensive, only selected works are cited here.

Metropolitan Density

Extensive research has been conducted on the relationship between metropolitan density and modal split, commute trip length and total automobile travel. The emphasis on density as the primary measure of urban form is both theoretical and practical. Theoretically, as density increases, all else being equal, trip origins and destinations become more spatially concentrated. More concentrated trip origins and destinations imply shorter distance trips and more trips by transit and non-motorized modes. Lower densities imply just the opposite: more dispersed origins and destinations, longer trips and more reliance on the automobile. Population density is used in comparative studies because it is one of the few widely available measures of urban form.

Inter-Metropolitan Comparisons

Newman and Kenworthy (1989a, 1989b) conducted comparative studies of per capita gasoline consumption and metropolitan densities. A comparison of cities around the world yielded a non-linear relationship of increasing per capita gasoline consumption with declining density. Their analysis showed that per capita gasoline consumption was higher in U.S. cities even after controlling for the differences in gasoline prices, income and vehicle fuel efficiencies. The authors used their findings to argue for compact city form as a way of reducing automobile use and improving environmental quality. Their work has been extensively criticized, primarily because per capita fuel consumption is an indirect measure of auto travel and because they fail to account for many other factors that affect automobile use, such as the employment rate or household size (Gordon and Richardson, 1989; Gomez-Ibanez, 1991). In addition, high density is associated with congestion, so any environmental benefits of reduced per capita auto use may be offset by the added damage of more congestion (Wachs, 1993).

[2] For recent reviews, see Giuliano, 1995; Anas, Arnott, and Small, 1998; Pickrell 1999.
[3] For historical reviews of suburbanization, see Jackson, 1985; Muller, 1981 and 1995.

Several studies have examined the relationship between metropolitan density and commuting. A landmark study by Pushkarev and Zupan (1977) documented a positive relationship between population density and transit use, using data from 105 urbanized areas for 1960 and 1970. Population density was found to be less significantly related to transit use than the presence of rail transit or the concentration of downtown office space. The authors attributed the rather weak relationship for population density to the relatively small variation in average density across the metropolitan areas studied.

Gordon, Richardson and Jun (1991) compared automobile commute times across the 20 largest metropolitan areas in the U.S. and found that cities with higher average densities have longer automobile commute times than those with lower average densities. Noting that density is a measure of concentration, the authors concluded that shorter commutes indicate greater efficiency of low density urban form: decentralizing both population and jobs allows people to economize to a greater extent in selecting their job and housing locations. However, city size is correlated with density, so the most dense cities are also the largest cities, and longer commutes are an expected characteristic of large cities.

Intra-Metropolitan Comparisons

Pushkarev and Zupan's work (1977) also included an analysis of car ownership as a function of residential density. A significant but small relationship was found: a large increase in residential density is associated with a small decrease in car ownership. Schimek (1996) used 1990 NPTS data for a similar study and found a modest relationship between the two variables. Schimek concluded that the primary determinants of household car ownership were household income, household size and the number of workers per household. Transit availability also was found to be significant. Schimek also examined the relationship between residential density, vehicle miles traveled (VMT) and the number of vehicle trips. Results showed that both VMT and vehicle trips have a significant but small relationship with density: a 10 percent increase in density is associated with a 0.7 percent decrease in VMT. Downs (1992) used simple simulation studies to demonstrate the same result for commuting distance: very large increases in metropolitan density are required to achieve rather modest reductions in average commute length.

Niemeier and Rutherford (1994) used 1990 NPTS data to examine non-motorized travel. Higher density is associated with fewer daily VMT and fewer daily trips by all modes. The daily walking trip rate increases with population density greater than 5,000 persons per square mile. Walking trips also are most frequent in urban areas with populations of 1 million or more and presence of rail transit. However, the observed relationships do not control for demographic factors that also are related to urban density (e.g., age, family size, household income) and therefore likely overstate the actual relationship of density to trip rates and VMT. Residents of high density areas are more likely to be elderly, have low income and live in single person households, all factors associated with less travel.

Neighborhood Characteristics

The New Urbanism movement has generated great interest in the relationship between travel and the spatial characteristics of the local environment. New Urbanism (NU), a set of urban design concepts intended to improve neighborhoods and communities, promotes higher density, transit- and pedestrian-oriented urban design as a means of reducing automobile use and hence reducing its associated environmental damage (Calthorpe, 1993; Duany and Plater-Zyberk, 1994). Although widely embraced by urban planners, the movement was created by architects, and its claims regarding transportation-related environmental benefits remain largely unproven. Many studies were conducted to validate the New Urbanism claims; these suffer from serious methodological problems (e.g., not controlling for factors other than density that affect travel patterns) and therefore are not mentioned here.

Studies that have attempted to control for other factors provide little evidence that neighborhood characteristics significantly affect travel patterns. Cervero and Gorham (1995) conducted a "matched pairs" analysis, using communities from the Los Angeles and San Francisco metropolitan areas. They found that "NU" type communities in San Francisco had less solo driving and a higher proportion of transit and non-motorized trips than otherwise similar non-NU type (control) communities. However, in Los Angeles, transit use in NU-type communities was lower than in the control communities. The authors attributed the Los Angeles results to generally lower transit accessibility and more dispersed spatial patterns.

Handy conducted a series of studies on local accessibility to shopping and other activities, density and travel (1992, 1993, 1996). The first two studies used data from the San Francisco area, and the last study used data from Austin, Texas. Results of these studies may be summarized as follows: 1) walk trips to local shopping areas are more frequent in neighborhoods where such areas are nearby; 2) average shopping trip distance is inversely related to shopping accessibility; 3) local walking trips are not necessarily substitutes for auto shopping trips, and 4) total trips (all modes) to local shopping destinations decline as accessibility to such destinations declines. In related research, Ewing, Haliyur and Page (1994) found that people who live far from shops and other services have very efficient trip patterns: they combine many stops in the same trips, and make fewer trips.

One of the most detailed studies of the effects of accessibility on local travel used travel data from Uppsala, Sweden (Hanson and Schwab, 1987). The study found that measures of home-based accessibility were positively related to the share of non-motorized trips, and that home-based accessibility had more effect than work-based accessibility. However, household characteristics were not fully controlled, so these results are only suggestive.

Kitamura, Mokhatarian & Laidet (1997) conducted a comparative study of total daily travel across five San Francisco metropolitan area neighborhoods of widely divergent spatial form and transit access. Controlling for individual demographic and socio-economic characteristics, they found significant relationships between person-trips and transit-trips and the following geographic factors: location within the region, BART access and high density. Their results are consistent with earlier studies. Local access to bus stops or services was not significant. Also included in the model were general attitudinal measures (e.g., indicators of whether the person was "pro-transit," preferred a suburban lifestyle, etc.). The attitudinal factors had the strongest explanatory powers of all groups of factors examined.

Spatial Mismatch and Related Literature

None of the work discussed above explicitly addresses differences between racial or ethnic population segments. A different perspective is reflected in the spatial mismatch literature. The concept of spatial mismatch was developed by Kain (1968). The argument is that suburbanization has been selective: the more affluent white population has suburbanized, while the minority (and predominantly poor) population has remained in the central city. Differential rates of suburbanization are explained by many factors, including exclusionary zoning practices and discrimination in the housing market. As jobs have suburbanized (particularly low wage jobs), central city workers have experienced a relative decline in job accessibility, which has in turn led to both higher unemployment rates and longer commutes for those who are employed. Less job accessibility implies fewer job opportunities, and hence less likelihood of finding a job, while longer commutes imply lower net wages.

Kain's work touched off an extended academic debate that has persisted to this day. Are the higher unemployment rates observed among central city Blacks and other minorities the result of this spatial mismatch or the result of discrimination by employers, lack of job skills, lack of access to social networks that provide access to job opportunities, or some combination of these factors? The spatial mismatch

hypothesis has been tested by comparing unemployment rates, commute distances, or net wages across otherwise similar workers living in central cities and suburbs. There is some evidence of spatial mismatch in studies using average commute distance of low wage workers, meaning that workers residing in central cities have longer commutes than workers residing in the suburbs (Ong and Blumenberg, 1998). Taylor and Ong (1995) explain observed longer commute travel times as the result of lower rates of car ownership and greater use of public transit by minority central city residents. Evidence based on unemployment rates is mixed; lack of access to jobs explains very little of the differences in unemployment rates between central city and suburban residents (O'Regan and Quigley, 1996 and 1998). In a related study, however, Ihlandfeldt (1996) found that transit access to suburban low wage jobs was significantly related to the probability of Black workers filling those jobs. Despite extensive research on this issue, the evidence on spatial mismatch remains mixed.

Residential Location and Commuting

Several studies have compared commuting patterns across cities and suburbs, and some have addressed racial or ethnic differences. Differences in commuting are explained by household characteristics, gender and mode. Commutes within central cities are shorter in distance but slower in speed due to both congestion and more use of public transit. Commutes within suburbs are longer in distance and faster in speed. Commutes between central cities and suburbs are longer than commutes within either central cities or suburbs. Because low income and minority households are concentrated in central cities, they are more likely to use public transit and have slower commutes (Johnston-Anumonwo, 1995). However, it has also been observed that Blacks are more likely to use public transit than other racial/ethnic groups regardless of residential location (Pisarski, 1996; Millar, Morrison and Vyas, 1986; Rosenbloom, 1998). McLafferty and Preston (1997) found that Black women residing in the central city have the longest average commute times among all race and gender groups.

Jobs-Housing Balance

Related to the more general issue of accessibility and commuting is the concept of jobs-housing balance. Jobs-housing balance addresses the relative distribution of residences and jobs in the metropolitan area. Since commuting is a cost, it is assumed that workers prefer jobs closer to home (or prefer homes closer to jobs), all else being equal. When jobs become spatially concentrated (e.g., in city centers or suburban employment centers), the labor force must be drawn from a larger area, resulting in a longer average commute. The greater the concentration of jobs relative to workers (jobs-housing imbalance), the longer the commute. Similarly, areas with few jobs (e.g., bedroom suburbs) force workers to seek jobs further away, again resulting in longer commutes. As job accessibility increases, land values increase, and as land values increase, housing prices increase. It has been argued that jobs-housing balance problems are especially serious for low and moderate wage workers due to the lack of affordable housing near major employment centers (Cervero, 1989).

Jobs-housing balance is related to residential location theory. The standard urban economic model of residential location states that workers trade off housing consumption and commuting (Mills and Hamilton, 1989). Workers are willing to incur greater commuting costs in return for lower per unit housing cost. Residential location theory leads to a city form in which both residential density and unit land value decline with distance from the center. It follows that average commute distance increases with city size.

Commuting data are generally consistent with residential location theory and jobs-housing balance. The average commute does increase with metropolitan size. The average commute to jobs located in the central business district (CBD) is longer both in terms of distance and time than commutes to jobs located in other parts of the central city or the suburbs, as expected (Pisarski, 1996). Metropolitan areas that have

retained a relatively large proportion of jobs in the central city (e.g., Washington DC) or that have experienced rapid job growth in a constrained housing market (e.g., California's Silicon Valley) have longer average commutes. Gordon, Richardson and Jun (1991) explain the observed stability in average commute travel time as a consequence of decentralizing both population and jobs. As with the research on metropolitan density and neighborhood characteristics, this literature does not address issues of race or ethnicity.

This brief review indicates that the primary question of this research, whether the relationship between residential location and travel differs across racial or ethnic groups, remains unanswered. Only the spatial mismatch literature addressed race/ethnicity explicitly, and it dealt only with the work trip. While differences in commuting patterns across racial groups have been observed, whether these differences are explained by location, income, and other characteristics has yet to be resolved. The larger issue of travel more generally and how location may affect daily patterns of travel for all purposes remains to be explored.

TRAVEL AND LOCATION PATTERNS AMONG PEOPLE OF COLOR

Prior research based on the various waves of NPTS data, U.S. Census data, and other survey data has provided extensive information on U.S. travel patterns. In the most general terms, travel is largely a function of resource availability and life cycle. Household income is the best predictor of resource availability: as household income increases, so does consumption of all types of goods and services, including private vehicles. Increased levels of consumption leads to more demand for travel and trip making. Hence, income is associated with car ownership, and as car ownership increases, so does travel, in terms of both person-trips and distance.

Using the 1995 NPTS data, Pucher, Evans and Wenger (1998) show that average trips per day per person range from 3.4 for the lowest income category to 4.2 for the highest income category, and average miles per day per person range from 17.4 to 28.6. The greater difference in travel mileage across income categories is explained by differences in car ownership and modal use. While only 8.5 percent of all households do not have cars, one-third of the lowest income households have no car, and almost half have one car. Limited resources leads to relatively more use of alternative modes—walking and transit—but the vast majority of all person-trips take place in private vehicles, even among the lowest income households.

Life cycle and household characteristics also are important. Adults who are employed travel more than those who are not employed; adult members of families with children make more trips and more frequently travel with others; elderly persons travel fewer miles, make fewer trips, and are less likely to have a private vehicle (Rosenbloom, 1995; Lave and Crepeau, 1994).

Travel Patterns Across Racial and Ethnic Categories

The key question for this research is whether observed differences in travel characteristics across ethnicity and race are due to socio-economic or location factors associated with race and ethnicity, or whether such differences exist even when other factors are taken into account. It is therefore useful to begin with a brief description of travel characteristics.

Data

This research focuses on general measures of mobility: total daily travel, measured in terms of total distance traveled, total time spent traveling, number of person-trips, and trip mode. A total travel data file

was constructed by aggregating all travel day trips and their characteristics for each person, using the 93,560 observation NPTS person file as the working file. Travel period trips and trips longer than 75 miles were excluded from the analysis. All of the results reported in this paper are based on the person file. The final sample used in this analysis includes 83,590 observations.

A very complex weighting procedure was developed for the NPTS data, as the weights must adjust for various types of response bias as well as the over-sampling of large metropolitan areas with rail transit and of areas that contracted with NPTS for larger samples. The weights also expand the sample to estimates for the U.S. population. To conduct statistical tests, the person weights were adjusted to scale down the sample to its original size. This is a second-best procedure, as the weighting scheme in theory requires statistical calculations that are not available in most statistics software packages. The effect of using conventional statistics is to bias downward estimates of variance and therefore increase the probability of Type I errors (reject the null hypothesis when it should be accepted). Increasing the stringency of statistical significance tests compensated for this problem.

Total Daily Travel Distance, Time and Trips

Tables 5-1 and 5-2 give group mean, median and standard deviation for total daily travel distance (person-miles) and total daily travel time (person-minutes). In each case, information is given for all persons, and for adults, defined as persons 18 years or older. The sample is segmented into five racial/ethnic categories: White (74 percent of sample), non-Hispanic Black (12 percent), Hispanic (10 percent), non-Hispanic Asian (2 percent), and non-Hispanic Other (2 percent). Since non-Hispanic Other is a composite of many different ethnic groups, there is no reason to expect any unique behavior to characterize this group. It is included here for completeness. These categories are based on the reported race/ethnicity of the household's "reference person," i.e., head of household; hence, ethnic or racial mix within the household is not captured. For ease of expression, these categories are referred to as "White," "Black," etc., in the remainder of this chapter. One-way analysis of variance (ANOVA) tests show that all differences are significant. F-statistics (or Chi squares) and significance levels are given in the last row of each table.

Average daily person miles traveled is about 42 miles for all persons. Table 5-1 shows that Whites have the highest average daily travel distance, and Asians have the lowest daily average. As expected, when the sample is restricted to adults, the group averages increase. Means are skewed by a long tail of high values; median values are much lower than mean values. Note the very large standard deviations in all cases: there is great variability within each group, which means that the average is not a very good indicator of differences between groups.

Table 5-2 gives the same data for total daily travel time. The average is 78 minutes for all persons and 83 minutes for adults. Median values range from 55 to 66 minutes. Again, the mean values are skewed by a small number of very large values. The highest average travel time is for Blacks, followed by Whites. The differences between travel distance and travel time suggest slower travel speeds for Blacks. Slower speeds are due to differences in mode, as will be shown later. Asians have the lowest average total travel time. Standard deviations for travel time are large (about the same magnitude as the average), but not as large as for travel distance.

One way to adjust for the skewed distribution of these travel measures is to transform them. Taking the natural log of total daily travel distance and time yields mean values that are much closer to the median: about 22 miles and 57 minutes, respectively, for the total sample.

Table 5-1. Total Daily Travel Distance (miles)

Group	All Persons			Adults (18 years or older)		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
White	43.6	25.0	73.1	47.2	28.0	77.1
Hispanic	36.2	20.0	52.6	40.4	24.0	55.4
Black	35.5	19.0	66.2	39.1	22.0	67.6
Asian	30.5	20.0	33.4	34.1	24.5	34.6
Other	43.0	22.0	79.7	43.4	25.0	69.1
All	41.7	24.0	70.2	45.3	27.0	73.6
F-stat, sig.	52.84, 0.000			35.17, 0.000		

Table 5-2. Total Daily Travel Time (minutes)

Group	All Persons			Adults (18 years or older)		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
White	78.2	60	76.8	82.6	63	80.1
Hispanic	77.6	60	69.2	83.6	66	70.8
Black	80.1	60	76.1	85.0	66	77.3
Asian	67.2	55	50.8	72.9	30	52.3
Other	77.0	60	77.3	82.9	65	78.7
All	78.1	60	75.6	82.8	64	78.4
F-stat, sig.	10.93, 0.000			7.05, 0.000		

Trip making behavior is much more consistent both between and within racial/ethnic groups, as shown in Table 5-3, although differences between groups are significant. The groups means are distributed in a tight range of 4.3 to 5.0 and 4.5 to 5.1 for all persons and adults, respectively. The median is 4 for all groups, and is not shown in the table. Standard deviations are of much smaller magnitude, with most in the range of 2.7 to 2.9. In addition to traveling the longest distance, Whites also have the highest number of average trips. Similarly, Asians have the lowest trip average. These results are consistent with prior studies; trip rates tend to be less variable than travel time or distance.

Combining daily travel distance, time and number of trips for adults gives information on average trip length, trip time, and travel speed, as shown in Table 5-4. Whites have both the longest average trip length and the highest average speed. Travel speeds are lower for Hispanics and Asians, and lowest for Blacks. Asians have the shortest trip length and also shortest average trip time. These differences are largely a function of travel mode. The last column of Table 5-4 give the average share of daily trips made by modes other than privately operated vehicle (POV). This is calculated as the percentage of each

Table 5-3. Total Daily Person-Trips

Group	All Persons		Adults (18 years or older)	
	Mean	Std. Dev.	Mean	Std. Dev.
White	5.0	2.8	5.1	2.9
Hispanic	4.8	2.8	5.1	2.9
Black	4.6	2.8	4.9	2.9
Asian	4.3	2.3	4.5	2.4
Other	4.6	2.7	4.9	2.8
All	4.9	2.8	5.1	2.9
F-stat, sig.	69.68, 0.000		25.29, 0.000	

Table 5-4. Average Trip Length, Time, Speed, and Non-POV Trip Share, Adults

Group	Distance (miles)	Time (minutes)	Speed (mph)	Non-POV (%)
White	11.6	19.4	30.1	8.1
Hispanic	9.2	18.5	26.4	14.8
Black	9.6	20.4	25.2	21.9
Asian	8.6	18.1	26.7	14.8
Other	11.0	20.4	27.8	15.3
All	11.1	19.4	29.1	10.5
F-stat, sig.	19.32, 0.000	3.86, 0.000	33.93, 0.000	485.24, 0.000

person's trips that are made by non-POV modes. Whites use non-POV modes far less frequently than other groups. The share for Hispanics, Asians, and Others are around 15 percent, while Blacks have the highest non-POV share at 21 percent.

Modal Shares

Modal shares are calculated for all recorded person-trips. Personal vehicle trips account for 89.3 percent of all person-trips in the sample. Walking accounts for 5.6 percent, transit for 1.8 percent, and the remainder is bicycle and other miscellaneous modes. Modal shares by race/ethnicity are given in Table 5-5. Whites have the highest POV mode share and the lowest transit and walk shares. Note that the bicycle share for Whites is about the same magnitude as the transit share (0.93 percent). The transit mode share for Whites is less than half of that for any other group. In contrast, Blacks have the lowest POV share and highest transit and walk shares. The transit share is more than twice that of any other group, while the walk share is about the same for Blacks, Hispanics and Asians. The transit share for the remaining groups is in the range of 2 to 3 percent. Note that for all groups but Blacks, the walk share is two to three times as large as the transit share.

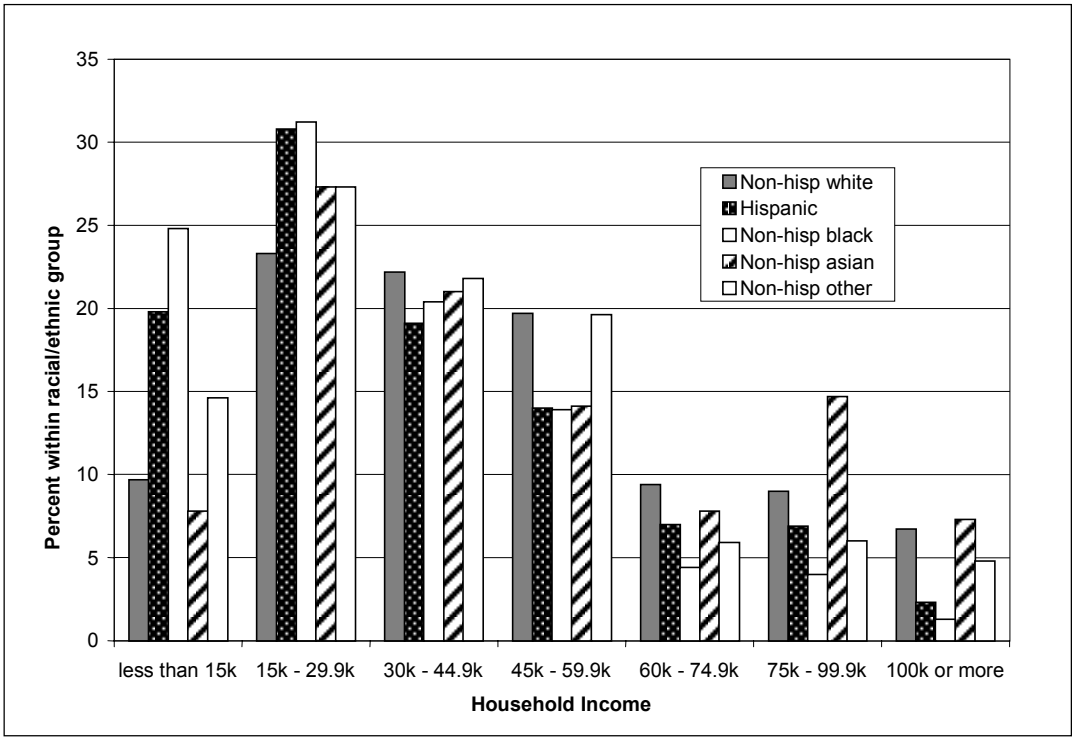
Table 5-5. Modal Shares by Race/Ethnicity, All Person Trips

Group	Mode			
	POV	Transit	Walk	Other
White	91.5	0.9	4.5	3.1
Hispanic	84.7	3.2	8.6	3.4
Black	79.4	7.0	9.2	4.4
Asian	85.5	3.1	9.0	2.5
Other	86.8	2.3	7.8	3.2
All	89.3	1.8	5.6	3.3
Chi-sq., sig.	3742.36, 0.000			

Socio-Economic Characteristics Across Racial and Ethnic Categories

Possible explanations for differences in travel behavior include differences in socio-economic characteristics, especially household income, employment status, and life cycle characteristics. Figure 5-1 gives household income distribution by race/ethnicity for the weighted NPTS person sample. Whites and Asians are under-represented in the under $15,000 category and over-represented in the over $75,000 categories. Conversely, household incomes for Hispanics and Blacks are skewed towards the lowest income categories. The differences in income distribution are consistent with differences in travel patterns for Whites, Blacks and Hispanics, but not for Asians.

Figure 5-1. Household Income and Race/Ethnicity



In measuring total daily travel, it follows that employed persons may travel more on average than those who are not employed. Figure 5-2 gives employment status by race/ethnicity. There are no large differences in full-time or part-time employment, but there are some differences among those not employed and retired. Hispanics and Asians have the lowest percentage of retired persons, while Whites have the lowest percentage of not employed persons. Some of this difference may be due to age differences, given that Hispanics and Asians are more likely to be immigrants, and immigrants are drawn from a relatively younger population. The relatively younger age distribution of Hispanics, Blacks and Asians is illustrated in Table 5-6. Whites have the relatively oldest age distribution.

Figure 5-2. Employment Status by Race/Ethnicity

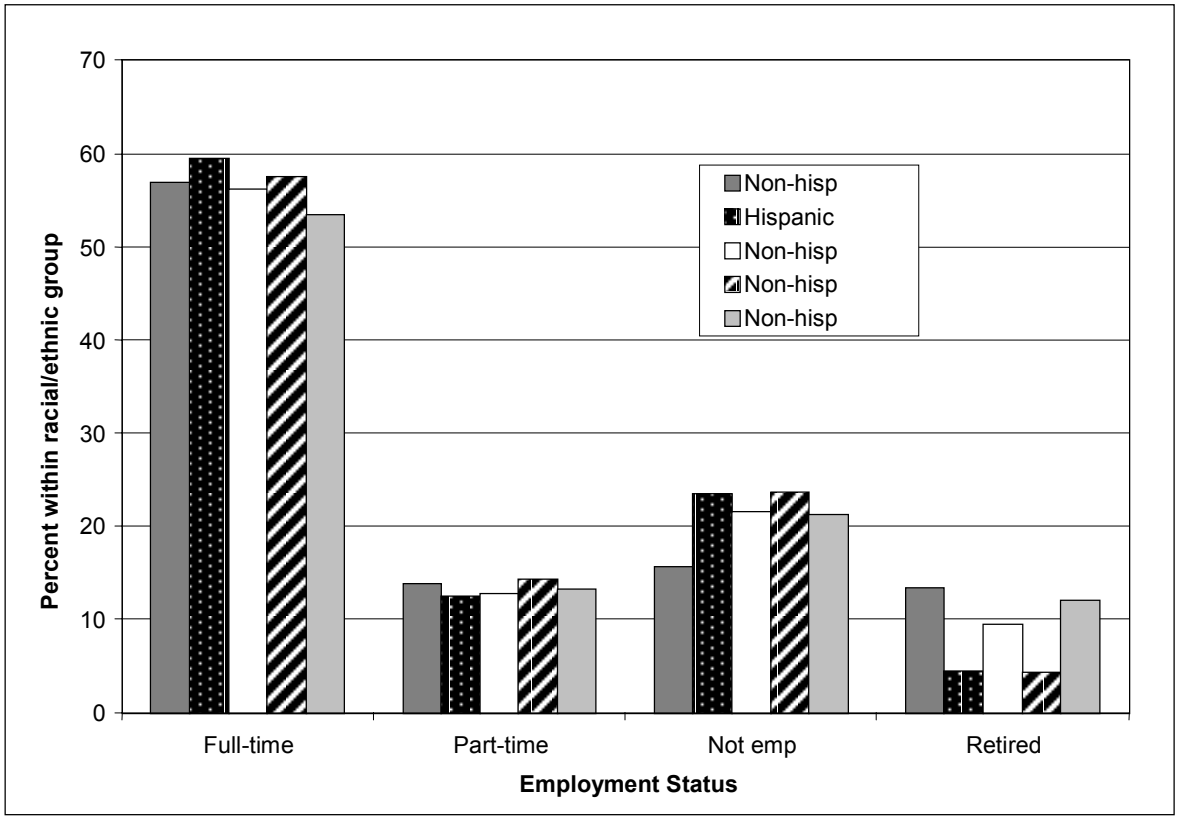


Table 5-6. Age Distribution by Race/Ethnicity

	Age (percent within group)						
Group	**#17 yrs**	**18 - 24**	**25 - 34**	**35 - 44**	**45 - 54**	**55 - 64**	**∃65**
White	19.9	8.7	18.0	18.4	14.0	8.7	12.3
Hispanic	25.2	14.0	23.5	17.5	9.8	6.1	3.9
Black	24.2	12.8	19.1	18.0	11.0	7.1	7.8
Asian	19.2	13.6	28.5	17.4	11.4	7.3	11.9
Other	21.4	11.3	18.5	17.2	12.5	7.3	11.9
All	20.9	9.8	18.9	18.3	13.2	8.2	10.8
Chi-sq., sig.	1585.34, 0.000						

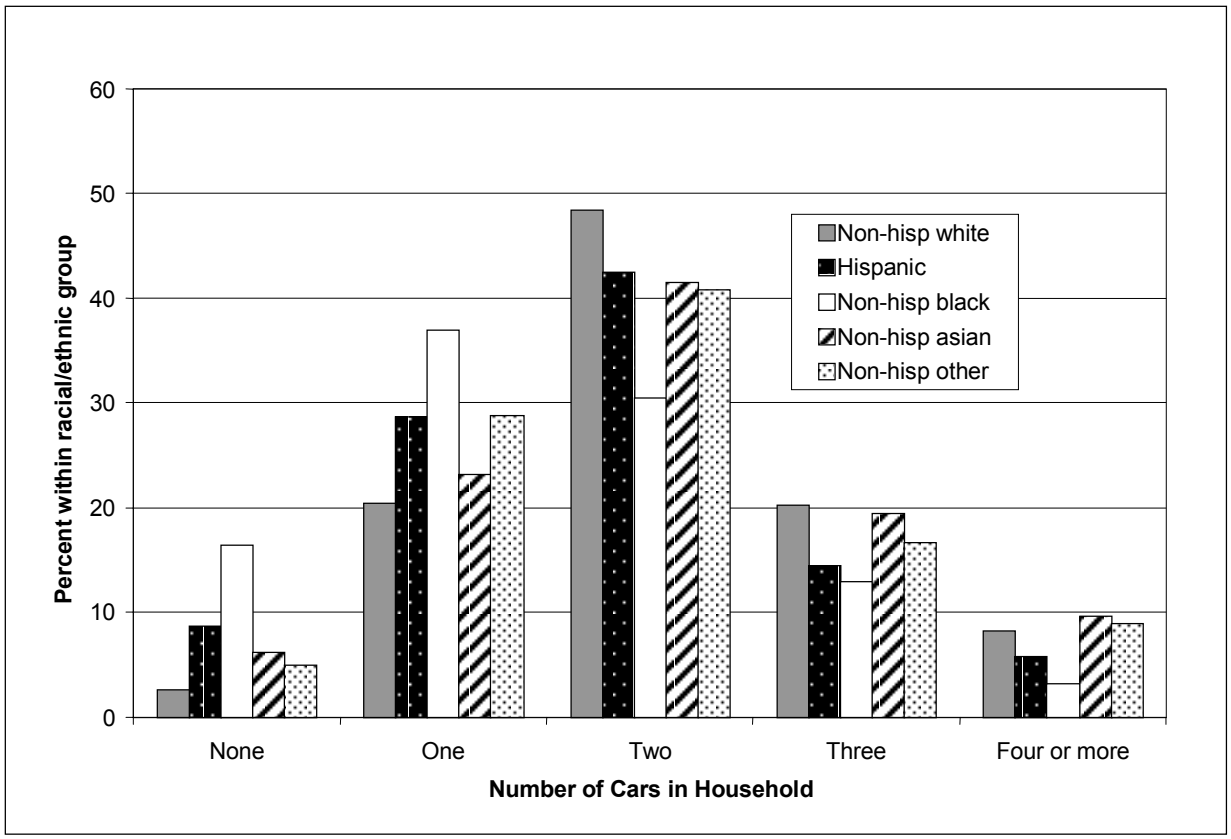
Table 5-7 give life cycle status by race/ethnicity. Note that this table is based on persons, so the percentages give the share of persons in each life cycle category. Within the category of households with no children, Asians have the largest percentage of persons living in households with two or more adults. Blacks have the largest share of persons in single adult households, followed closely by Asians. Hispanics have the largest share of persons in households with children, followed by Asians and Blacks. However, Blacks have a much larger share of single parent households. Among retired persons, Whites and Others have the largest shares. Note that retired persons living alone are rare among Hispanics and almost non-existent among Asians, suggesting the continued existence of extended family living arrangements. These differences in employment, age and life cycle status are likely reflected in differences in daily travel patterns.

Table 5-7. Life Cycle Status by Race/Ethnicity

Group	**1 adult, no kids**	**∃2 adults, no kids**	**1 adult with kids**	**∃2 adults with kids**	**1 adult retired, no kids**	**∃2 adults retired, no kids**
White	17.1	24.5	3.9	32.7	8.43	13.3
Hispanic	12.6	21.5	7.9	48.4	2.9	6.7
Black	20.3	17.9	12.5	32.5	8.5	8.3
Asian	18.6	29.0	3.3	42.5	0.7	6.0
Other	16.8	21.9	5.9	34.8	9.0	11.7
All	17.1	23.6	5.3	34.1	7.9	12.0
Chi-sq., sig.	3,308,503, 0.000					

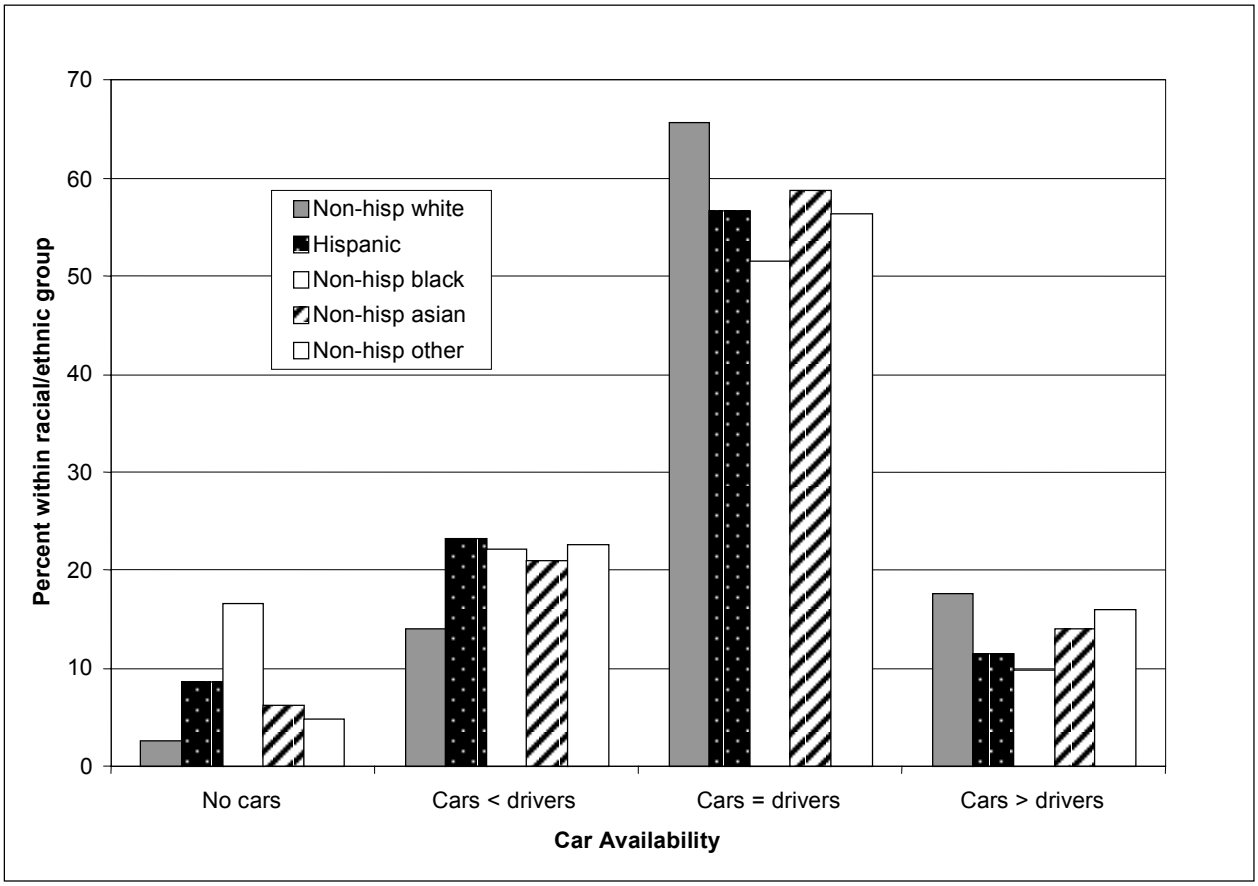
Car availability is a key indicator of mobility, since most trips are made in cars. Figure 5-3 shows the distribution of persons in households by the number of cars in the household and race/ethnicity. For the entire sample, just 4.9 percent of persons are members of households with no cars. However, for Blacks, the share is 16.6 percent. Overall, household car ownership is highest among Whites and lowest among Blacks, followed by Hispanics.

Figure 5-3. Share of Persons in Households by Number of Cars, Race/Ethnicity



A better way of measuring car availability is to compare the number of cars with the number of drivers in the household, as shown in Figure 5-4. The same pattern across racial/ethnic groups is apparent. Figure 5-4 is based on adult persons; "no cars" includes adults with a driver's license residing in households with no cars. For Blacks, 16.6 percent reside in households without cars, and an additional 22.1 percent reside in households with fewer cars than drivers. The percentages for Hispanics are 8.6 and 23.2, respectively. Most households in all racial/ethnic categories have an equal number of cars and drivers, ranging from just over half for Blacks to two-thirds for Whites. Whites have the highest level of car availability: 83 percent of adults reside in households with at least as many cars as drivers. Note that these differences cannot be explained by income effects alone. Recall from Figure 5-1 that Asians have the highest income distribution.

Figure 5-4. Car Availability by Race/Ethnicity



Residential Location Characteristics Across Race/Ethnicity

The literature review indicated that travel patterns differ across location. Transit use is concentrated in the central parts of the largest metropolitan areas, and there is some evidence that VMT is inversely related to residential density. Therefore, differences in location patterns across racial and ethnic groups may explain observed travel differences. There are significant differences in these location patterns. Table 5-8 gives the share of persons living in an urbanized area by racial/ethnic group. The NPTS sample population (note that NPTS includes persons 5 years or older) is about two-thirds urbanized. However, the share of Hispanics, Blacks, and Asians living in urbanized areas is much larger, and the share of Whites is much smaller than the average.

There are also large differences both across and within metropolitan areas. Figure 5-5 gives the distribution of the NPTS sample across metropolitan statistical areas (MSAs) by size. Whites have the largest share (23 percent) not residing in an MSA, followed by Others. Asians are the most concentrated: 62 percent reside in the largest MSA category. Hispanics and Blacks also are heavily concentrated in the largest MSAs.

Table 5-8. Share of Group Population That is Urbanized

Group	Share Urbanized (%)
White	58.3
Hispanic	80.1
Black	81.2
Asian	85.4
Other	65.5
All	63.9
Chi-sq., sig.	59.42, 0.000

Figure 5-5. MSA Population Shares by Race/Ethnicity

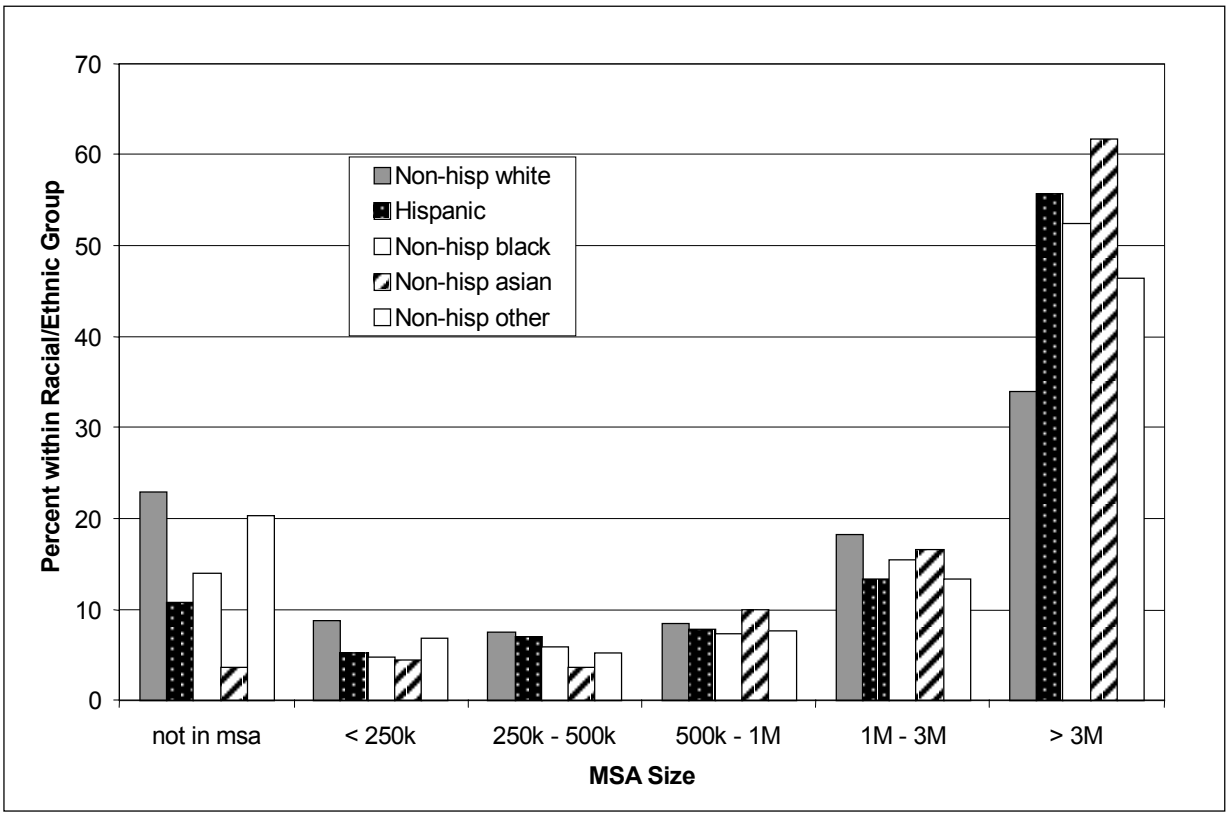


Table 5-9 gives the share of persons within each MSA size category living in the central city, by race/ethnicity. Differences both within and between each racial/ethnic group are significant. The last column gives the average for each group across all MSAs. Several points can be drawn from the table. First, for all but the largest MSA category, the majority of persons reside in the central city; this share declines with MSA size because the central city makes up a relatively larger portion of smaller MSAs.

Second, the central city share of White persons is consistently lower than that of any other group. Third, the Asian central city share is highest overall, but the shares for Asian, Black and Hispanic are virtually the same for the largest MSA category. Fourth, both the Asians and Hispanics are relatively more concentrated in central cities than Blacks. Fifth, patterns are quite different between the largest MSAs, MSAs of 1 to 3 million, and the remaining smaller MSAs.

Table 5-9. Share of Persons Residing in Central City, by MSA Size, by Race/Ethnicity (Percent)

Group	Less than 250K	250K - 500K	500K - 1M	1M - 3M	More than 3M	Total within group
White	78.0	71.3	62.1	52.6	44.9	55.0
Hispanic	82.8	80.0	83.7	70.0	62.5	68.0
Black	77.5	81.3	78.2	54.3	62.5	64.5
Asian	93.3	93.7	83.9	84.7	62.0	70.8
Other	73.6	91.2	87.5	47.0	58.0	62.6

ANALYSIS

What is the appropriate measure of overall mobility? This is a matter of current debate (e.g., Hanson, 1995; Handy and Niemeier, 1997). On the one hand, it can be argued that the more one travels, the more benefits from travel one obtains. However, travel is costly, both in time and money, so the rational individual seeks to minimize these costs. Therefore, more travel could be construed as a cost, rather than a benefit. Discussions of mobility often involve accessibility; to the extent that activities are more concentrated in space, less travel (mobility) is required to achieve a given level of activity benefits. However, controlling for land use pattern, more travel should indicate more consumption of goods and services (activities) or more investment in travel to consume preferred bundles of goods and services. Travel demand is an indirect demand: one travels to consume goods and services that are spatially dispersed. Willingness to travel reflects willingness to pay for the expected benefits of the activity at the destination.

Consider an ideal measure of mobility. Following the work of Hagerstrand (1970), mobility reflects an individual's "activity sphere": the geographic range of activities conducted over the course of the day. The activity sphere is determined by resources and constraints of the individual and by the spatial distribution of activity locations. Resources include such things as income, supply of transportation services, and time. Constraints may be resource related (e.g., no car, no transit available) or schedule related (e.g., fixed work hours, fixed operating hours of business establishments). The spatial distribution of activities determines the number of opportunities that may be accessed for a given quantity of travel resources. Travel outcomes are the result of the individual's activity choices, given his/her set of resources, constraints and spatial opportunities. An ideal measure of mobility would capture all of these factors. Unfortunately, however, the data are not available to construct such a measure.

It is clear that an appropriate measure should capture travel for all purposes. The NPTS data can be used to measure total travel in terms of trips, distance, and time. Trips capture the total number of activities conducted, but provide limited information. Many trips are mandatory, in the sense that household maintenance requires some amount of trip making, and most jobs require traveling to work, hence the greater regularity of trip frequency across population segments. The more interesting question is where

people choose to shop or work. The spatial range of travel over the course of the day is captured by distance and time. Of these, distance is the more appropriate measure of mobility. Travel time is problematic because it is determined both by distance and speed.

Higher travel speed is better, all else being equal, as it reduces the time cost of traveling a given distance. Nonetheless, low travel speed may indicate spatial forms (mainly high density development) that provide higher levels of accessibility. Total daily travel time is included as a means for comparing effects of location characteristics. An additional travel measure, home-to-work travel chains, is included because of the critical importance of the work trip in defining daily activity and travel patterns.

There are many factors that are known to affect travel behavior between racial/ethnic groups. Hence, a multivariate approach is required for testing hypotheses regarding these differences. The general model is

$$\boldsymbol{Y = f(X,T,L)}$$

where

Y = travel measure
X = vector of attributes of individual
T = vector of travel resources of individual
L = vector of residential location attributes.

The ***X*** variables include gender, age, household income, and employment status. Prior literature shows these to be key variables (e.g., Hanson, 1995; Hu and Young, 1993). Males travel more than females, the elderly and the very young travel less than other adults, and travel increases with household income. People who are employed travel more than those who are not employed. The ***T*** variables include car availability and whether the person has a driver's license. Also included are the share of trips made by non-POV modes and the total number of trips. The share of non-POV trips is included because such trips are generally slower trips, and because they are typically an indicator of transit dependency (e.g., limited travel resources). Whether trips should be entered as an independent variable is a matter of judgment. In this case, it is used as a scaling factor to determine whether distance is affected by factors other than the number of trips made.

The ***L*** vector includes two sets of variables, one set for metropolitan location and one set for neighborhood characteristics. Metropolitan location includes MSA size, location inside or outside a central city, and location inside or outside an MSA. Neighborhood characteristic variables are drawn from updated U.S. Census data and are measured at the census tract level. Variables include measures of these characteristics: spatial, population, and housing stock. Different sets of neighborhood variables are used for each of the dependent variables. Reasons for selecting each set of neighborhood variables are discussed in later sections. A complete list of variable names, definitions and descriptive statistics is available in the appendix to this chapter.

How should race/ethnicity be incorporated into this model? The question is whether race/ethnicity matters, once socio-economic and geographic factors are controlled. One possibility is to add dummy variables, which tests whether race/ethnicity has an independent effect on travel. A second possibility is to estimate models for each racial/ethnic group separately. Whether race/ethnicity affects the relationship between a given independent variable (e.g., gender) and travel is tested by comparing the value of coefficients across models.

A third possibility is to do both: use dummy variables to test independent effects and interaction variables to test these potential interactive effects. Here the third alternative is chosen; therefore, the model to be estimated is

$$Y = f(X, T, L, XR, TR, LR, R),$$

where R = vector of race/ethnicity dummy variables, with Whites as the omitted category.

Total Daily Travel Distance

The model to be estimated includes the two sets of control variables (the X and T variables), metropolitan location variables, neighborhood variables, and the associated racial/ethnic dummies. There are six metropolitan location dummy variables: one for inside or outside the central city, four for MSA size category, and one for inside or outside an MSA. The smallest MSA size (under 250,000 population) is the omitted category. As noted previously, most of the research on the effects of metropolitan location have focused on the work trip. What about travel for all purposes? Because location within the central city implies a higher level of accessibility, less total daily travel is expected. The relationship of total travel distance with metropolitan size could be positive or negative. As MSA size increases, there are both more numerous and more distant total destination opportunities; therefore, travel may increase. On the other hand, density increases with metropolitan size, so there are more nearby destination opportunities; therefore, travel may decrease. The effect of location outside an MSA also is uncertain. Lack of available opportunities may suppress travel, while dispersed land use patterns may increase travel.

Another way of testing for the effects of metropolitan size and location within metropolitan areas is to construct dummy variables that capture possible interactive effects between MSA size and location inside or outside the central city. Results using these interactive variables showed that none of the "in MSA, outside central city" coefficients were significant, but all of the "in MSA and inside central city" coefficients were significant. That is, living inside the central city is associated with shorter travel distance regardless of MSA size. Therefore, the simpler set of dummy variables is used.

The second set of location factors to be examined are local neighborhood characteristics. The NPTS data provide a wide variety of neighborhood variables that are drawn from the U.S. Census. The variables used here are 1995 estimates from a proprietary database that are based largely on 1990 Census values. Data are available both for census tract and census block place of residence. Census tract level data are used, since they provide a better indication of the general surroundings of the respondent's residence. Several density measures, measures of household income, population age distribution and housing characteristics are examined. These measures are correlated with one another, as well as with some of the other independent variables. Density measures proved especially troublesome. If population density is entered into the model by itself, it is significant and has the correct sign. If income-related variables are added to the same equation (e.g., share of persons in poverty), population density becomes either insignificant or significant with the wrong sign. Several specifications were tried in an effort to include variables that had as little correlation with each other as possible, while being conceptually satisfactory.

Four measures of neighborhood characteristics are used. The share of foreign born is an indicator of immigrant neighborhoods and is used here as a surrogate for density and mixed land use. Such neighborhoods are likely to be located in the larger MSAs and have relatively high population and residential densities. Therefore, less total travel distance is expected as the share of foreign born households increases. The share of owner occupied housing is related to household income, but also represents lower residential densities, and therefore is expected to have a positive relationship with total travel distance. The share of housing units less than 10 years old is an indicator of more recently developed neighborhoods that

presumably have a more dispersed land use pattern. Again, a positive relationship is expected. Employment density is a rough measure of general accessibility to activities, and therefore should be negatively related to total travel distance.

Race/ethnicity effects are tested by including four dummy variables with White as the omitted category, plus four sets of interactive variables for each independent variable, again with White as the omitted category. The full model therefore has 105 independent variables. Finally, because of its skewed distribution, the natural log form of the dependent variable is used.

Results

The model was estimated using a stepwise regression procedure so that the contribution of each set of independent variables could be assessed. Table 5-10 gives the adjusted R^2 for each group of variables. The interactive dummies are included in each group. The significance of each group of variable coefficients was tested, and all groups were found to be significant. The travel characteristic variables contribute most of the explanation, and within this group, number of trips has the most influence. If the model is estimated without the race/ethnicity dummy variables, R^2 is 0.244.

Table 5-10. Change in R^2 for Variable Groups

Dependent variable: ln(distance)

Variable	R^2(adj)
Individual characteristics: gender, age, household income, employment status, race/ethnicity	0.083
Travel characteristics: driver's license, car availability, trips, non-POV trips	0.235
Metropolitan location characteristics: inside/outside central city, MSA size, outside MSA	0.239
Neighborhood location characteristics: share foreign born, owner-occupied housing, new units, employment density	0.248

Table 5-11 gives full results. Because of the statistical problems noted earlier, the significance level is set at $p \leq 0.05$. For ease of interpretation, only significant coefficients are given. The first column of results applies to the entire sample. Each of the subsequent columns gives results for the corresponding set of interactive dummies. Starting with the race/ethnicity dummies, results indicate that, when controlling for individual and location characteristics and for the relationship between race and these characteristics, race/ethnicity has no significant independent effect on total daily travel distance.

Individual Characteristics. Gender, age, household income and employment status as the primary factors that explain travel distance are controlled. The coefficients for the sample as a whole are significant and of the expected sign (first column of results): males travel longer distances than females, people over 65 years and children 16 years or younger travel less, people in high income households travel more and people in low income households travel less than people in middle income households, and people who are employed travel more than those who are not employed, all else being equal. It is useful to recall that the null hypothesis for this research is that individual characteristics, travel resources,

Table 5-11. Full Model, Dependent Variable: ln(distance)

Variable	All	Hispanic	Black	Asian	Other
Constant	1.830				
Race/ethnicity		NS	NS	NS	NS
Male	0.167**	NS	NS	-0.151**	0.134*
Person 65 or over	-0.229**	0.227	NS	NS	-0.209*
Child 16 or younger	-0.154**	NS	0.113*	-0.279*	NS
HH income > $75K	0.090**	NS	NS	-0.169*	-0.505**
HH income < $15K	-0.119**	-0.163**	-0.230**	NS	-0.202*
Employed adult	0.177**	0.170**	NS	NS	NS
Has driver's license	0.102**	NS	NS	NS	NS
Car/driver ratio	0.057**	NS	-0.045*	NS	NS
No. trips	0.136**	NS	NS	NS	NS
Share non-POV trips	-1.054**	NS	0.272**	0.214*	NS
In central city	-0.097**	0.102*	0.083*	NS	NS
MSA 250K - 500K	NS	NS	NS	0.503**	-0.371*
MSA 500K - 1 M	NS	0.309**	NS	NS	NS
MSA 1 M - 3 M	NS	0.246**	0.160*	NS	-0.336*
MSA > 3 M	0.055**	NS	0.200**	NS	NS
Not in MSA	NS	0.305**	0.185**	NS	-0.270*
% foreign born	-0.005**	NS	NS	0.006*	0.012**
% owner-occ. hsg.	0.005**	-0.004**	NS	NS	NS
% units # 10 yrs.	0.005**	-0.003*	0.004**	NS	0.007**
CT emp. density	NS	NS	NS	NS	-0.008*
R^2 (adj.)	0.248				
F					
N	66508				

NS = Not significant
* Significant at $p \leq 0.05$
** Significant at $p \leq 0.01$

and location have similar effects across racial/ethnic groups. That is, observed differences in travel patterns across groups are due to differences in these characteristics and not due to behavioral patterns that are unique to race or ethnicity.

Each row of coefficients provides comparisons across racial/ethnic categories, with all comparisons being *relative to Whites* (since White is the omitted category, the All coefficients represent Whites). If the

coefficient of an interactive dummy variable for a given racial/ethnic group is not significant, there is no difference in the effect of that variable between Whites and the target racial/ethnic group (all else being equal). If the coefficient of an interactive dummy variable is significant, the effect for the target group is the *sum of the values of the two coefficients* (e.g., All coefficient + target group coefficient). Take gender as an example. Gender is not significant for Hispanics and Blacks, meaning it does not have a differential effect across these groups, relative to Whites. However, the gender coefficient is significant for Asians and Others. The value of the negative coefficient for Asians approximately offsets the value of the positive coefficient for Whites, meaning that Asian males do not travel more than Asian females. The positive gender coefficient for Others suggests that the difference in daily travel miles between Other males and females is greater than that for Whites.

Older age is not significant for Blacks and Asians, again meaning that, relative to Whites, age does not have a differential effect. In contrast, elder Hispanics do not travel less than other age groups, while elder Others travel significantly less relative to Whites. White, Hispanic and Other children travel less than those who are over 16 years. Among Blacks, there is little difference in total daily travel distance between adults and children. The relationship is just the opposite for Asians: Asian children travel significantly less than their White counterparts.

For Whites, Hispanics and Blacks, members of high income households travel more than members of middle income households. However, for Asians and Others, members of high income households do not travel more. This is consistent with the descriptive information presented in Section 2 for Asians, but not for Others. The effect of being a member of a low income household is not significantly different for Whites and Asians (e.g., less travel relative to middle income households). However, the negative effect of low income is more pronounced for Hispanics, Blacks and Others, perhaps because a greater share of these groups have extremely low income. Being employed has the same positive effect on total daily travel for all groups except Hispanics, for which the effect is more pronounced.

These results suggest that individual characteristics which have been traditionally accepted as basic explanatory factors in travel behavior do not work the same way across racial/ethnic groups, even when other factors are controlled. Take age as an example. Children are not expected to travel as far as adults, and older adults are not expected to travel as far as younger adults. The model results are consistent with these expectations for Whites, Asians and Others, although the magnitude of the effect is different. They are not consistent for Hispanics (no difference for old age) and for Blacks (no difference for young age). More research on such questions is clearly warranted.

Travel Resource Characteristics. Total daily travel is positively associated with having a driver's license, having more access to a car, and making more trips, as expected. Also as expected, the greater the share of non-POV trips, the less total distance traveled. As noted earlier, there is no reason to expect these findings to differ across racial/ethnic groups. Results for having a driver's license and total trips are consistent with expectations. Results for total trips implies that observed differences across racial groups are more a function of trips than trip length. Access to a car, as measured by the ratio of cars to drivers within the household, has the same effect for Whites, Hispanics, Asians and Others. However, for Blacks, car access has no effect on total travel distance, perhaps because a relatively larger share of total travel takes place via transit. Share of non-POV trips has a similar negative effect for Hispanics, Others, and Whites. The effect is less negative for Blacks and Asians, probably due to greater propensity to use transit; hence, the non-POV share has a smaller proportion of non-motorized trips relative to the other racial/ethnic groups.

Metropolitan Location. As expected, residence within a central city is associated with less travel distance for Whites, Asians and Others. However, there is no significant difference among Blacks and Hispanics living inside or outside central cities. MSA size of 250 K–500 K has no significant relationship

with total daily travel distance for Whites, Hispanics and Black. Asians living within these MSAs travel more, while Others travel less. MSA size of 500 K–1 M has a significant positive relationship only for Hispanics. MSA size of 1 M–3 M has a significant positive relationship for Hispanics and Blacks, but a negative relationship for Others. MSA of greater than 3 M is associated with more travel distance for all groups, with the positive effect more pronounced for Blacks. Residing outside an MSA has no significant relationship for Whites and Asians, but a positive relationship for Hispanics and Blacks, and a negative relationship for Others. Taken together, there are no apparent patterns regarding MSA size and total travel distance across racial/ethnic groups. The relationship between travel distance and metropolitan location is different for each racial/ethnic group.

Neighborhood Location. Results for share of foreign born households within the census tract are as expected for Whites, Hispanics and Blacks, but not for Asians, while there is a slight positive relationship for Others. The expected positive relationship for share of owner-occupied housing is observed for all groups except Hispanics. Share of units less than 10 years old is an indicator of newer suburbs, with lower densities and more dispersed land use patterns. The relationship is positive for all groups but Hispanics, with the effect more pronounced for Blacks and Others. This variable has no effect for Hispanics. Employment density within the census tract (an indicator of nearby job opportunities, and therefore potential for shorter commutes) has no effect on total travel distance for all groups except Others, for which it is negative.

Results on the location variables are difficult to interpret. There are no clear patterns across racial/ethnic groups. As with the metropolitan location variables, the pattern is different for each racial/ethnic group. The relatively small sample size for the minority groups (particularly Asians and Others) is a potential problem; the results may have as much to do with the distribution of these groups across regions of specific metropolitan areas as anything else.

Interpreting the Results: Some Illustrations

A discussion of the regression estimation results provides information on significance and direction of relationship, but does not provide a sense of the meaning or magnitude of these relationships for differences in travel across racial/ethnic groups that are related to location. Therefore, a few illustrations are provided, using prototype "average persons" to estimate total daily travel distance for selected location conditions based on the regression results. Table 5-12 summarizes the assumptions: the "average person" is male, within the middle age and income categories, and is employed. He has a driver's license, and he is assigned the racial/ethnic group mean values for the other travel variables. Estimates for three locations are computed: 1) in MSA of 3 million or more and residing in the central city; 2) in MSA of 3 million or more and residing outside the central city; and 3) residing outside an MSA.

The racial/ethnic group mean values are used for the neighborhood variables. Note that there are some large differences in these mean values; hence, the estimates reflect both the "average" neighborhood characteristics for each racial/ethnic group, as well as metropolitan location. Hispanics and Asians live in areas with high concentrations of immigrants. Whites live in areas with the greatest share of owner-occupied housing (an indicator perhaps more of homogenous suburbs than of neighborhood affluence). It is somewhat surprising that there is little difference in the average share of new units across racial/ethnic groups.

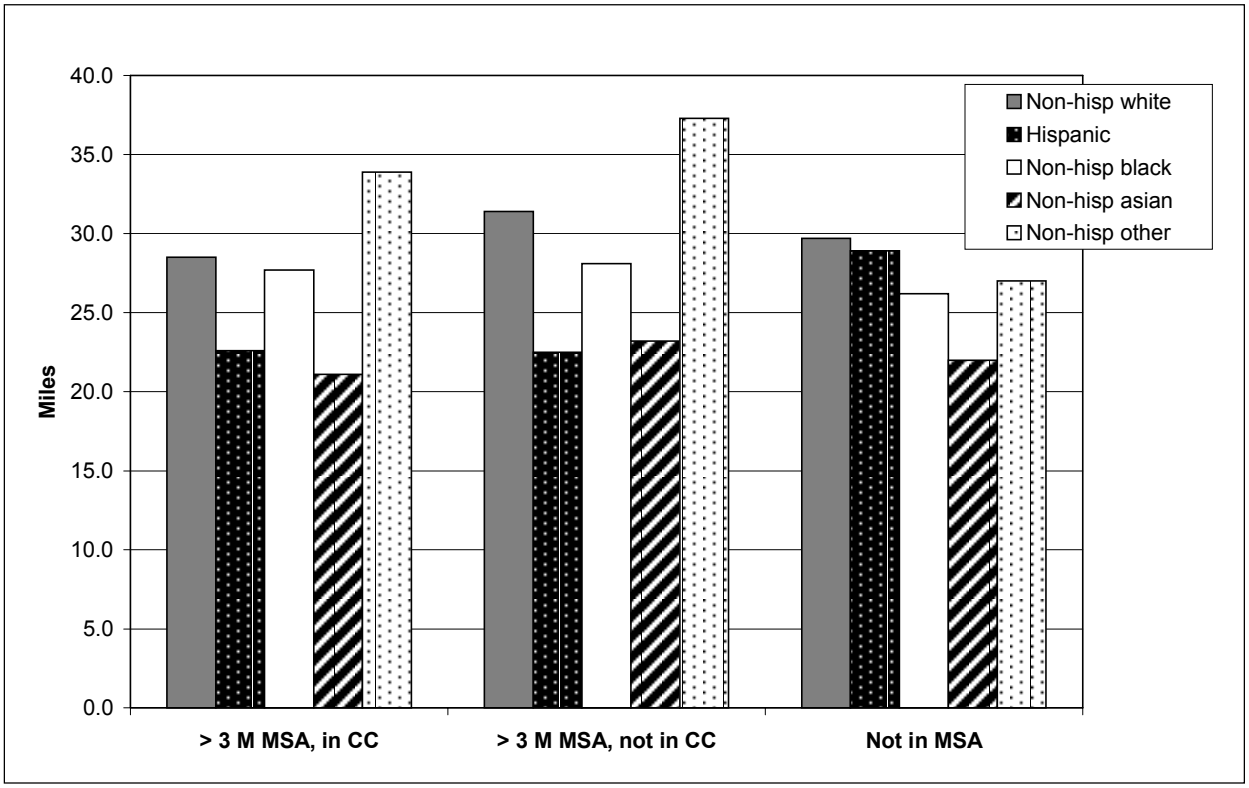
Table 5-12. Assumptions for Estimated Travel Distance Calculations

Variable	All groups				
Gender	male				
Age	middle category				
HH income	middle category				
Employed	yes				
Driver's license	yes				
Cars/drivers	within-group mean				
No. trips	within-group mean				
Share non-POV	within-group mean				
Variable	**White**	**Hispanic**	**Black**	**Asian**	**Other**
% foreign born	5.3	17.4	7.2	18.6	10.4
% owner-occ. hsg.	71.1	58.3	56.0	56.1	64.5
% units # 10 yrs	13.4	12.8	9.2	13.1	13.7
CT emp. density	1.4	2.8	2.8	4.5	2.1

Results are shown in Figure 5-6. Recall that the natural log form of the dependent variable was used in the regressions. The estimated distances are therefore transformed from the log values. Starting with the two MSA comparisons (first and second sets of columns in Figure 5-6), the conventional expectation of less travel distance for central city residents is demonstrated only for Whites and Others. Differences within the other racial/ethnic groups are not significant (see model results in Table 5-11). Estimated distances are about the same for Hispanics, Blacks and Asians. Estimated distance is greatest for Others, followed by Whites. Blacks have the next highest value, at about 28 miles, which suggests that shorter distances traveled by Blacks is more a function of individual characteristics (e.g., Blacks are more likely to have low income) than metropolitan location. Hispanics and Asians have the lowest estimated travel distances.

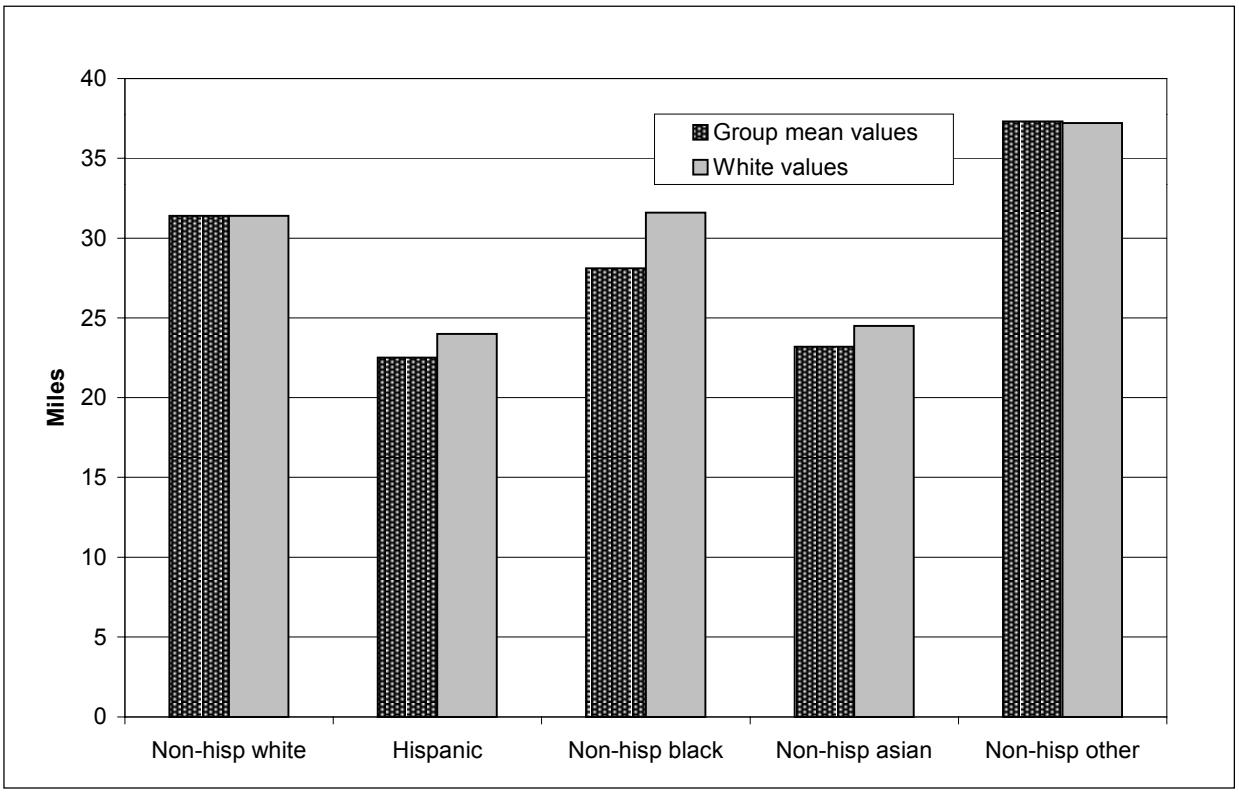
Estimates for the "average person" living outside an MSA have quite a different rank order, with the highest estimate for Whites and Hispanics, followed by Others, Blacks and Asians. For Whites, Blacks and Asians, there is little difference across metropolitan locations (estimates are within 3 miles of one another in all cases), suggesting that travel behavior of these groups is relatively independent of location. For Hispanics and Others, the differences are much larger. Perhaps this reflects longer travel distances for population segments living and working in rural areas, but it may simply be an artifact of this particular sample. In all cases, differences between racial/ethnic groups within a given location category are greater than differences within racial/ethnic groups across location categories. That is, metropolitan location does not affect total daily travel distance very much and does not account for much of the difference observed across racial/ethnic groups.

Figure 5-6. Estimates of Total Daily Travel Distance by Location



Considering the effect of neighborhood characteristics, Table 5-12 shows that there are rather substantial differences in the average characteristics of census tracts in which each group reside. Figure 5-7 gives total daily travel distance estimates, first using the group mean values for the neighborhood values as in Figure 5-6, and then using the White group mean values for all groups. This is equivalent to asking, what if all groups lived in the same type of neighborhood? Again, location outside the central city and in an MSA of 3 million or more (the middle set of columns in Figure 5-6) is assumed. There is no change for Whites by assumption. There is also no change for Others. The estimated increase for Hispanics is 1.5 miles, for Blacks 3.5 miles, and for Asians 1.3 miles. These estimates suggest that, under the same circumstances, Blacks and Whites have very similar travel behavior, at least in the case of total daily travel distance. In contrast, Hispanics and Asians travel substantially less distance. A tentative conclusion is that differences observed between Whites and Blacks are a function of differences in individual and local characteristics. In contrast, differences between Whites and Hispanics and Asians are a function of more fundamental differences in travel behavior. Note also that these results cannot be explained as the result of neighborhood characteristics of Hispanics and Asians being more like those of Whites.

Figure 5-7. Estimates of Total Daily Travel Distance, Group Mean Neighborhood Characteristics vs. White Neighborhood Characteristics



Conclusions on Total Daily Travel Distance

The following conclusions may be drawn from this part of the analysis. First, the great variability of total daily travel distance makes it difficult to estimate relationships between total travel and its explanatory factors with precision. The percent of variance explained in these regressions is relatively modest. Second, race/ethnicity as an independent factor has no relationship to total daily travel distance. When individual characteristics and geographic factors, including both metropolitan location and neighborhood characteristics, are controlled, race/ethnicity has no independent statistical significance. Third, relationships between total daily travel distance, individual characteristics, and location characteristics are different across racial/ethnic groups. Models estimated on the basis of a predominantly White population will yield different results when applied to other racial/ethnic groups. This suggests that travel behavior is fundamentally different: choices about when and where to travel are made in a different way. Of particular interest are differences in the effect of characteristics that are by now assumed to be fact, e.g., the lack of significance of gender within the Asian sample. The question is, do these findings apply only to total daily travel distance or do they apply to other measures of travel as well, such as total daily travel time?

Total Daily Travel Time

Travel time and travel distance are of course correlated. In this case, total daily travel time and distance have a correlation of 0.796. The question is, then, why examine both? As noted earlier, travel time is determined by both distance and speed. Hence, travel time may have a different relationship with land use patterns. Areas with high levels of congestion should be associated with longer travel times because of lower travel speeds and possibly greater use of non-POV modes. On the other hand, if congestion is

related to the density of activities, travel times may be negatively associated with such areas, because travel distance is reduced. If distance dominates, then central city residential location should be related to less total travel time. Because of the possible combined effects of both longer travel distances and more congestion, it is expected that travel time is positively associated with MSA size.

The same process as used with total daily travel distance is followed. The set of independent variables is the same, except for the neighborhood characteristics. Several different measures of density, population mix, population characteristics, and activity mix were examined. Coefficients for these variables were much more stable than was the case with the distance analysis. Five measures of neighborhood characteristics are selected. The share of persons older than 65 years is an indicator of the age of the neighborhood. The more elderly persons, the more likely the neighborhood will consist of older housing stock, narrower streets, more local shopping, etc. This variable could have either a negative or positive effect, depending on trip distance vs. travel speed. The share of families with income below poverty level is a measure of inner city location (and possibly transit access) and is expected to have a negative effect on total travel time. Population density is a measure of concentration and activity mix and is also expected to have a negative effect. The share of housing units built within the last 10 years is an indicator of more recently developed neighborhoods with lower development densities and more dispersed land use. The share of owner-occupied housing units represents lower densities and relatively higher income neighborhoods. These last two variables are expected to have a positive sign because of longer travel distances.

Results

Table 5-13 gives the adjusted R^2 for each group of variables. As before, the interactive dummies are included in each group. The significance of each group of variable coefficients was tested, and all groups were found to be significant. As with distance, travel characteristic variables contribute most of the explanation, and within this group, number of trips has the most influence. Estimating the model without and with the race/ethnicity dummy variables yields R^2 of 0.267 and 0.273, and the group of dummies is significant.

Table 5-13. Change in R^2 for Variable Groups

Dependent variable: ln(time)

Variable	R^2(adj)
Individual characteristics: gender, age, household income, employment status, race/ethnicity	0.041
Travel characteristics: driver's license, car availability, trips, non-POV trips	0.265
Metropolitan location characteristics: inside/outside central city, MSA size, outside MSA	0.269
Neighborhood location characteristics: population over 65, poverty families, population density, new units, owner-occupied housing	0.273

Table 5-14 gives full model results, and it is structured the same as Table 5-11. The first column of results applies to the entire sample, and each of the subsequent columns gives results for the

Table 5-14. Full Model, Dependent Variable: ln(time)

Variable	All	Hispanic	Black	Asian	Other
Constant	2.917**				
Race/ethnicity		NS	0.258**	-0.454**	0.575**
Male	0.101**	NS	-0.068**	-0.096*	NS
Person 65 or over	NS	NS	NS	NS	NS
Child 16 or younger	-0.161**	NS	NS	NS	-0.253**
HH income > $75K	0.073**	NS	NS	NS	-0.274**
HH income < $15K	NS	NS	NS	NS	NS
Employed adult	0.085**	0.078**	NS	0.129*	NS
Has driver's license	NS	NS	-0.089**	NS	-0.229**
Car/driver ratio	0.017**	NS	NS	NS	-0.058*
No. trips	0.145**	0.026**	0.017**	0.024**	0.020**
Share non-POV trips	-0.145**	0.114**	0.220**	0.228**	NS
In central city	-0.055**	0.047*	0.116**	NS	NS
MSA 250K - 500K	0.035*	0.124*	-0.234**	0.442**	NS
MSA 500K - 1 M	NS	0.289**	NS	0.333**	NS
MSA 1 M - 3 M	0.050**	0.250**	NS	NS	NS
MSA > 3 M	0.079**	0.235**	NS	0.207*	NS
Not in MSA	-0.050**	0.322**	NS	NS	NS
% pop 65 or over	-0.003**	0.006**	NS	NS	NS
% fam. below pov.	0.005**	-0.004**	-0.006**	NS	-0.006**
CT pop. den.	0.004**	-0.003**	NS	NS	NS
% units < 10 yrs.	0.002**	-0.003**	NS	NS	NS
% owner-occ. hsg.	0.003**	-0.004**	-0.002	NS	-0.003*
R^2 (adj.)	0.273				
F					
N	68874				

NS = Not significant
* Significant at $p \leq 0.05$
** Significant at $p \leq 0.01$

corresponding set of interactive dummies. In this case, the independent effects of race/ethnicity are significant. Holding all other factors constant, including the interactive effects of race with other independent variables, Blacks and Others spend more time traveling, and Asians spend less time, relative to Whites and Hispanics.

Individual Characteristics. Coefficients for All (Whites) are generally as expected. Males spend more time traveling than females, and persons from high-income households and those who are employed have longer daily travel times. Older age is not significant, nor is low income. Children spend less time traveling than adults. Time depends on both speed and distance, so expected effects of independent variables are less clear than in the case of distance.

Male gender has the same effect for Whites, Hispanics and Others. The negative coefficients for Blacks and Asians indicate that gender is not associated with more travel time for these groups. Older age is not significant for any group. Effects for children are the same across all groups except Others, for which the effect is more negative, meaning that the difference in total travel time between children and adults is greater for Others. For Whites, Hispanics, Blacks and Asians, persons from high-income households have greater travel times. The relationship is just the opposite for Others, a counter-intuitive result. Low income is not significant for any group. Less travel distance is offset by lower travel speed. Being employed has a positive relationship with total travel time for all groups, but the relationship is more positive for Hispanics and Asians, relative to Whites, Blacks and Others. This is consistent with the results on distance for Hispanics, which may indicate that work travel makes up a greater share of total travel for Hispanics.

Travel Resource Characteristics. Having a driver's license is not significant, suggesting that greater travel distance associated with having a driver's license is offset by slower speeds of other modes. Total daily travel time is positively associated with access to a car and number of trips, and negatively associated with the share of non-POV trips. If total travel time increases when non-POV trip share decreases, the implication is that non-POV trips are very short in distance relative to POV trips.

Comparing across racial/ethnic groups shows that having a driver's license is negative for Blacks and Others. There is no obvious explanation for this result. Perhaps for Blacks, this indicates more car use and consequently less transit use. The car/driver ratio has the same effect for all groups except Others. Number of trips has a positive relationship with total travel time, with the relationship more positive for all minority groups relative to Whites. This is likely due to the relatively greater proportion of non-POV trips among minorities, hence slower average travel speeds. Note that this is consistent with the findings on travel distance: trips are longer in time for minority groups, but not necessarily longer in distance. The positive coefficient on the share of non-POV trips for Hispanics approximately offsets the negative coefficient for All (Whites). The positive coefficients for Blacks and Asians suggest a net positive effect, meaning that total travel time increases with share of non-POV trips. This may indicate the relatively greater share of transit within the non-POV category. However, per Table 5-5, results should be the same for Hispanics as well.

Metropolitan Location. For Whites, Asians and Others, residence within a central city is associated with less total travel time, the same pattern as in the case of distance. The slight positive effect for Blacks may again be due to Blacks' greater use of transit.

There is no clear pattern for effects across MSA size. For Whites, travel time is greater for those who reside in larger MSAs (the exception is MSA of 500 K–1 M population), and less for those living outside MSAs. For Hispanics, travel time is greater than that for Whites across all MSA size categories, and this relationship is even more pronounced for residence outside an MSA. Others share the same pattern as Whites. For Blacks, residence within a central city is associated with longer travel times. This could be

due to differences in modal share: Blacks living outside central cities are more likely to use POVs, so speed is greater. For Asians, there is a slight pattern of travel time decreasing with city size, perhaps suggesting that Asians take advantage of the higher level of accessibility available in large metropolitan areas. As was the case for total travel distance, the relationship between metropolitan location and total travel time is different for each racial/ethnic group.

Neighborhood Location. The relationship between total travel time and neighborhood characteristics is the same for Whites and Asians. Living in a census tract with a larger percentage of poor families is associated with more travel time for Whites, but not for Hispanics, Blacks and Others, perhaps because extreme poverty increases non-motorized trips for these groups. Population density has no effect for Hispanics, but a positive effect for all other groups. The same pattern across racial groups is evident for share of units less than 10 years old. Share of owner-occupied housing has a positive effect for Whites and Asians, but no effect for other groups. It is tempting to explain this as a function of relative modal shares. Hispanics, Blacks and Others who live in new suburban areas spend less time traveling than their counterparts in other areas because they make more car trips. Note that for Hispanics, none of the neighborhood variables is significant (the sum of the coefficients is approximately zero in all cases). Considering the entire group of these variables, relationships are the same for Whites and Asians, and the same for Blacks and Others. Results for Hispanics stand out for both sets of location variables.

Illustrative Results for Total Daily Travel Time

The "average person" is used again to estimate total daily travel time for selected location conditions based on the regression results. As for the distance analysis, the same assumptions and metropolitan location categories are used. The racial/ethnic group mean values are used for the neighborhood variables; these are given in Table 5-15. Note the differences in poverty families and census tract population density. On average, Blacks and Hispanics live in areas with high concentrations of poor families. Hispanics, Blacks and Asians live in areas with relatively high population density. Whites, in contrast, live in areas with low population density.

Table 5-15. Assumptions for Estimated Travel Time Calculations

Variable	**All Groups**				
Gender	male				
Age	middle category				
HH income	middle category				
Employed	yes				
Driver's license	yes				
Cars/drivers	within-group mean				
No. trips	within-group mean				
Share non-POV	within-group mean				
Variable	**White**	**Hispanic**	**Black**	**Asian**	**Other**
% pop 65 or over	13.1	11.0	11.5	11.3	12.8
% fam below pov	8.5	14.1	18.1	9.6	11.2
CT pop den	3.2	10.3	9.2	8.4	7.3
% units # 10 yrs	13.3	12.6	8.9	13.0	13.5
% owner-occ hsg	70.9	57.4	55.7	55.7	63.9

Results are shown in Figure 5-8. Given the regression results, it is not surprising that Hispanics have the highest estimated travel time in all three location categories. However, there is no apparent reason for

this result. The log transformed average total daily travel time for Hispanics is 58 minutes. Coefficients on other independent variables do not account for the high estimate. Estimates for the other groups are more in line with expectations. Overall, estimated travel time is lowest for the Not in MSA category. Asians have the shortest travel time, consistent with their shorter travel distance. As with travel distance, there is more variation within each location category than within racial/ethnic groups across location categories. That is, metropolitan location does not account for much variation in total travel time, but race/ethnicity does.

Figure 5-9 gives results for comparing the effects of neighborhood location characteristics. Assumptions are the same as before: Metropolitan location of 3 M or more, outside the central city, and the group mean values as shown in Table 5-15. Estimated total travel time is then calculated, assuming all groups have the same neighborhood variable values as Whites. Figure 5-9 shows what Table 5-14 shows: neighborhood characteristics have a negligible effect on total travel time. Observed differences in travel time across racial/ethnic groups is not explained by differences in neighborhoods.

Conclusions on Total Daily Travel Time

Conclusions regarding total travel time are similar to those for distance. First, the regression results explain a small portion of total variance; the great variability of total daily travel limits the precision of these estimates. Second, race/ethnicity as an independent factor is significant for Blacks, Asians and Others. Third, travel characteristics dominate the travel time regressions; other groups of variables have relatively minor effects. Fourth, relationships between total daily travel time, individual characteristics, and location characteristics are different for each racial/ethnic group. The conclusions drawn from the travel distance analysis hold here as well. Travel behavior is different among racial/ethnic groups, and much of our understanding is apparently limited to the White majority population.

Home-To-Work Chains

The final part of this analysis is the examination of home-to-work chains. Although work trips are a decreasing share of all trips, trips to and from work remain of paramount interest to transportation planners and policy-makers. Work trips are longer than trips for other purposes except recreation; they have the lowest vehicle occupancy, and they are generally made during peak periods. In addition, decisions regarding place of residence and work are fundamental to the household. Households trade off access to work for preferred residential location characteristics, from housing characteristics to school quality, access to amenities, and a host of other factors. These decisions define the local environment in which most non-work trips are made.

Distance, Time and Stops

The NPTS survey asks the respondent about distance and travel time for the journey to work. The reported distance and time reflect the respondent's perception of the typical or average trip to work, and may or may not include the extra time and distance involved in making stops along the way. Prior research using NPTS and other data has shown that trip chaining is an increasingly frequent practice (Kitamura, 1983; Liao, 1997; Strathman, Deucker and Davis, 1994). Consequently, reported work trip distance and time are likely to be underestimated. Therefore, home-to-work chains are used for the analysis.

Figure 5-8. Estimates of Total Daily Travel Time by Location

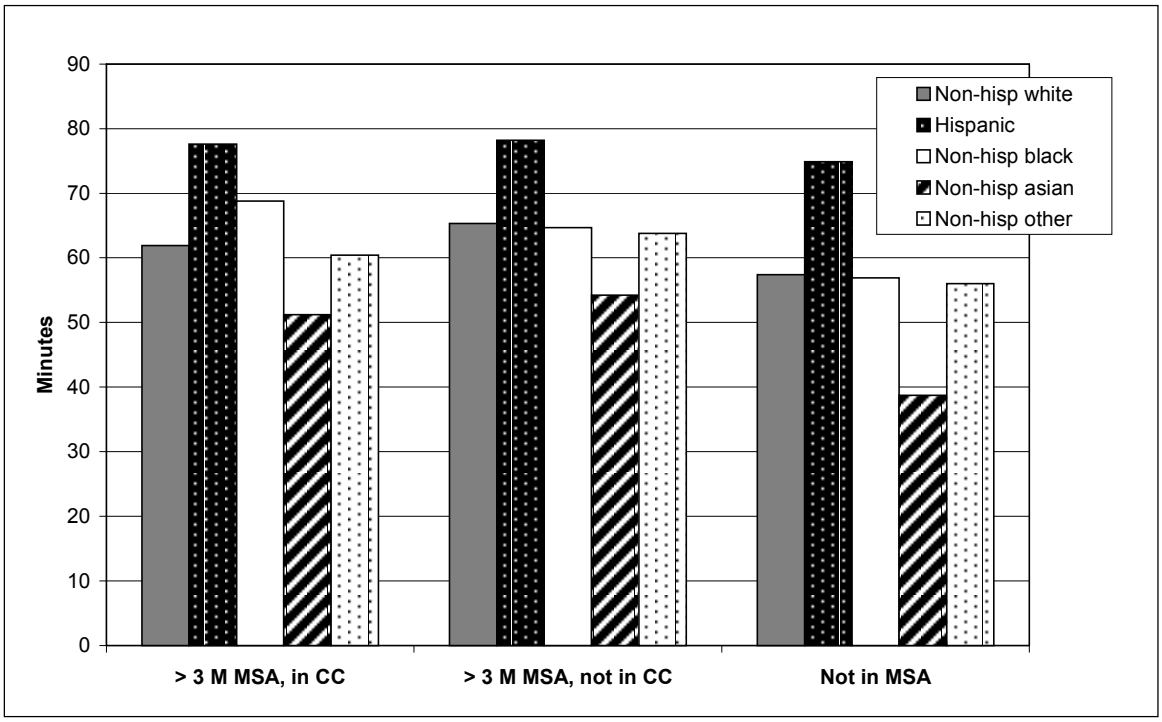


Figure 5-9. Estimates of Total Daily Travel Time, Group Mean Neighborhood Characteristics vs. White Neighborhood Characteristics

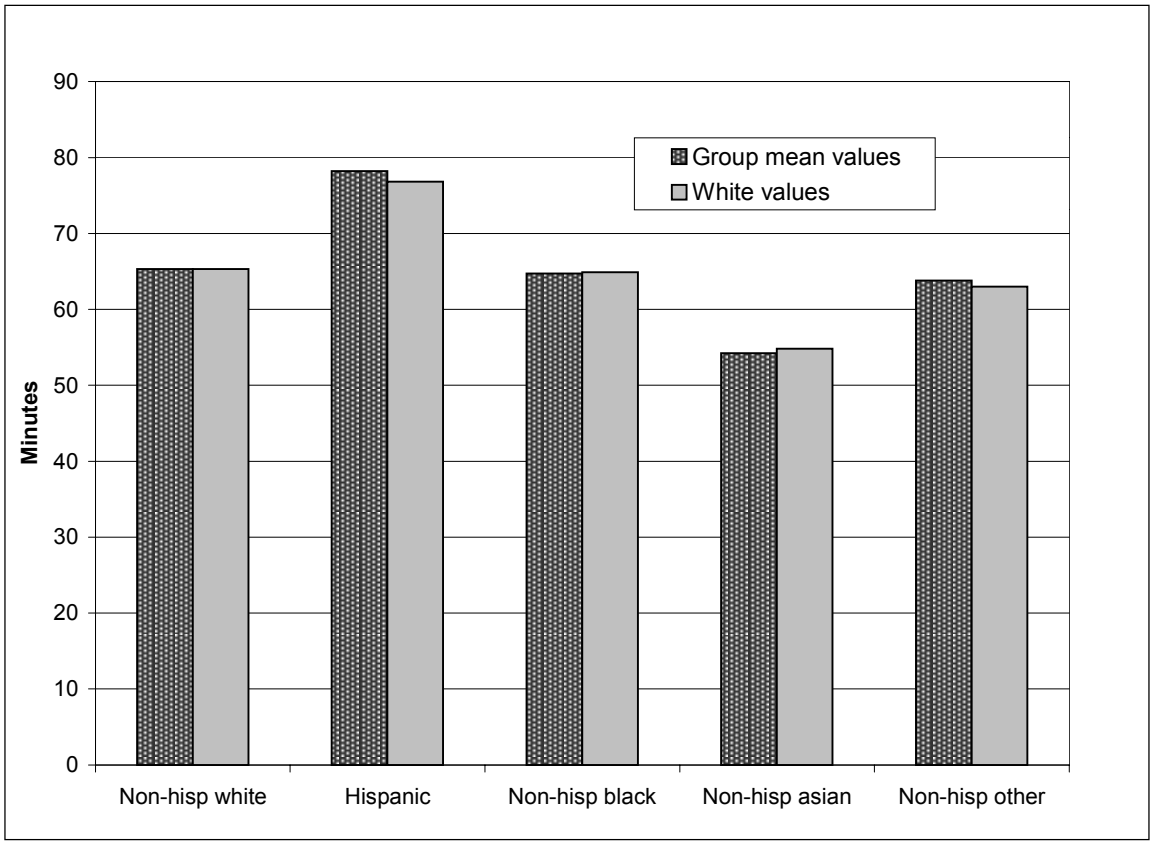


Table 5-16 gives descriptive statistics for both measures of distance and time. In each case, the sample was truncated at distance over 100 miles and time over 120 minutes. As expected, the chain-based distance and time means are somewhat greater, and the measures are highly correlated with each other. The standard deviations are large (relative to mean values), but not as large as those of the total travel measures. The table also gives number of observations. Note that the total number of respondents who provided information on their typical work trip is larger than the number of respondents who provided trip chain data. This is expected, since not every worker would make a work trip on a given day, and some dairies were completed on weekend days.

Table 5-16. Work Trip Distance and Time

Measure	Mean	Std. Dev.	N	Pearson's R
Distance - reported	12.0 mi.	12.3	42556	0.828
Distance - HW chain	13.2 mi.	13.3	30039	
Time - reported	21.7 min.	17.1	42732	0.758
Time - HW chain	24.5 min.	18.4	29731	

Making stops along the way to work is relatively infrequent, with about 75 percent of all workers making no stops along the way, 18 percent making one intermediate stop, and the remaining 7 percent making two or more intermediate stops (transfers between modes are not counted). Comparing means of these variables only for those who did not stop on the way to work shows that the differences in Table 5-16 are due to the stops and not to any reporting bias (not shown in table).

Table 5-17 gives means for distance, time and number of intermediate stops by race/ethnicity. Differences for distance are effectively insignificant; differences for time and stops are significant. Whites have the shortest mean travel time, while Blacks have the longest travel times. Note that mean number of stops is the same for both groups, meaning that the difference is likely reflective of the higher rate of use of non-POV modes by Blacks. Asians and Others make the fewest stops.

Table 5-17. Average Distance, Time and Number of Intermediate Stops by Race/Ethnicity

Group	Distance (mi.)	Time (min.)	Stops
White	13.4	23.9	0.38
Hispanic	12.9	25.2	0.34
Black	12.7	27.4	038
Asian	13.6	26.4	0.30
Other	13.8	25.4	0.27
All	13.2	24.5	0.37
F-stat, sig.	2.90, 0.021	30.96, 0.000	5.54, 0.000

Regression Analysis

These comparisons do not consider other factors that may affect differences between groups. Once again, a regression model similar to those in the previous sections is used; the natural log form of the dependent variable is used, and both independent and interactive dummy variables are included. Factors known to affect the work trip include gender, household income, occupation, presence of children, number of workers in the household, job status, and mode (Pisarski, 1996). Males have longer commutes than females, and commute distance increases with household income. Occupation is correlated with income; in addition, highly specialized workers may be willing to travel greater distances in order to earn higher wages and hence have longer commutes. The NPTS data do not include standard occupational codes. The non-public sample asks about occupation as an open-ended question, but there is no straightforward way of generating occupational categories. Education level is used as a surrogate, but the coefficients on these variables were not significant, and they were eliminated from further analysis.

Presence of children may affect commuting by their effect on residential location choice decisions. All else being equal, families with children may seek more space, be more concerned with schools and other neighborhood amenities, etc., and hence be willing to commute longer distances. The number of workers may lead to longer commutes, as households trade off commute burdens among working household members. Several combinations of variables were tried to represent these factors; ultimately, dummy variables for number of adults and presence/absence of children were selected.

If commute distance is positively associated with income, it follows that those who work part-time will commute shorter distances than those who work full-time. Finally, mode may be a significant factor in travel time: average speed is lower for transit than POV, so transit commutes should be longer. No prior expectations exist regarding distance, except that non-motorized commutes of course will be shorter in terms of distance, if not in terms of time.

Location variables affect the work trip (Pisarski, 1996). The larger the metropolitan area, all else being equal, the more congestion, and the more possibilities for longer distance work trips. Therefore, trips longer in terms of both time and distance are associated with the largest metropolitan areas. Within metropolitan areas, living inside the central city leads to shorter trips, since jobs are relatively more concentrated in central cities. In addition, having a job in the central city leads to longer commutes, since there are relatively fewer opportunities to live close to work. At the neighborhood level, the only variable that should affect commuting is job density. The more job opportunities close to home, the more possibility there is for working close to home.

The home-to-work analysis is limited by sample size. Because of both missing data and the relatively small number of persons who made a work trip on the travel diary day, the sample is reduced to about 17,000, and there are less than 500 observations for Asians and Others. One of the major culprits is the "work in central city" variable, which had a lot of missing data. Omitting this variable from the model for the sake of preserving sample size was considered. Because it was highly significant, however, omitting it would cause an obvious specification error. Results therefore must be interpreted with great caution, since differences could easily be due to highly specific individual or location factors.

Home-to-Work Chain Travel Distance

As with the previous analysis, the natural log form of the dependent variable is used, and the variables are entered in groups. Table 5-18 gives the adjusted R^2 for each group of variables. The interactive dummies are included in each group, and the significance of each group of variable coefficients was tested. All groups were found to be significant. The adjusted R^2 for the model without and with the race/ethnicity dummy variables is 0.064 and 0.083, respectively. There are three observations to be drawn from

Table 5-18. First, a very small proportion of the variance in home-to-work travel distance is explained by this model. Second, travel characteristics do not provide most of the explanation, as was the case for total travel distance. Third, the location variables have more influence, particularly the metropolitan location variables.

Table 5-18. Change in R^2 for Variable Groups: HW Chains

Dependent variable: ln(distance)

Variable	R^2(adj)
Individual characteristics: gender, household income, employment status, household composition, race/ethnicity	0.039
Travel characteristics: stops, mode	0.061
Metropolitan location characteristics: inside/outside central city, MSA size, outside MSA	0.074
Job access characteristics: employment density, work in central city	0.083

Individual and Travel Characteristics. Table 5-19 gives full results. Starting with the race/ethnicity dummy variables, only the coefficient for Blacks is positive and significant, meaning that Blacks travel further to work, all else being equal. This is consistent with the spatial mismatch hypothesis. Turning to individual characteristics, gender has no effect on home-to-work chain distance, suggesting either that women's commutes are no longer shorter than men's, or women do more trip chaining, which increases total trip distance to work. As expected, household income is positively related to home-to-work distance, and part-time workers work much closer to home than full-time workers. Household status results are mixed. People living in households with more than one adult, with or without children, have longer commutes than people in households with one adult. This is probably related to household income and home ownership. The number of stops adds to travel distance, while using non-motorized modes reduces travel distance. Travel by transit or as a private vehicle passenger has no significant relationship with total home-to-work travel distance.

There are many differences in the relationship of these variables across racial/ethnic groups. Household income has a more pronounced effect for minorities, relative to Whites. High income is associated with significantly longer commutes for Blacks and Asians, relative to Whites. It is possible that this reflects constraints on residential location (e.g., discrimination in the housing market). Low household income is associated with significantly shorter commutes for Hispanics and Blacks relative to other groups. Again, this may reflect extremely low household income within these groups. Working part-time leads to much shorter commutes for Hispanics and Asians, relative to other groups, suggesting that perhaps these groups economize on commuting to a greater extent than other groups.

Household status has very different effects across groups. Relative to the omitted group (1 adult household, no kids), Hispanics have longer commutes in each household status category. The effect is especially pronounced for single parent households, contrary to expectations. For Blacks, the relationship is just the opposite, with single parents having shorter commutes relative to other categories of Blacks, and also shorter than those for single parents in other racial groups.

Table 5-19. HW Chains: Dependent Variable: ln(distance)

Variable	All	Hispanic	Black	Asian	Other
Constant	1.169**				
Race/ethnicity		NS	0.568**	NS	NS
Male	NS	NS	NS	NS	0.437**
HH income > $75K	0.139**	NS	0.388*	0.358**	NS
HH income < $15K	-0.234**	-0.418**	-0.607**	NS	NS
Part-time worker	-0.498**	-0.419**	NS	-0.469*	NS
> 1 adult HH, no kids	0.167**	0.500**	NS	NS	NS
1 adult HH, kids	NS	1.346**	-0.492**	-1.833**	NS
> 1 adult HH, kids	0.258**	0.573**	NS	NS	NS
No. stops	0.226**	NS	0.183**	NS	0.243*
POV passenger	NS	NS	NS	NS	NS
Transit	NS	NS	0.358*	NS	1.363**
Walk/bike	-1.085**	NS	NS	NS	NS
In central city	-0.187**	NS	NS	0.388*	NS
MSA 250K - 500K	0.174**	-1.136**	NS	NS	NS
MSA 500K - 1 M	0.246**	NS	-0.793**	NS	NS
MSA 1 M - 3 M	0.284**	NS	-0.876**	NS	NS
MSA > 3 M	0.400**	NS	-0.917**	NS	-0.732*
Not in MSA	NS	-0.446*	NS	NS	NS
CT emp. density	NS	-0.003**	NS	NS	-0.036**
Work in central city	0.304**	-0.275**	-0.302**	NS	-0.483**
R^2 (adj.)	0.083				
F					
N					

NS = Not significant
* Significant at $p \leq 0.05$
** Significant at $p \leq 0.01$

There are few significant differences in the travel characteristic variable coefficients between racial/ethnic groups. Number of stops has a greater effect on distance for Blacks and Others. Transit use has a similar

pattern. Greater distance for the transit mode among Blacks suggest that Blacks travel longer distances when using transit relative to other groups.

Location Characteristics. Residence inside the central city is associated with shorter travel distance as expected. This relationship holds for all groups but Asians. There is an interesting pattern for the MSA size variables. For all groups except Blacks, distance increases with MSA size, as expected. Larger MSAs provide more job opportunities located in a larger area; hence, people have more choice regarding where to work and where to live. For Blacks, the pattern is just the opposite: increasing MSA size is associated with decreasing trip length. How can this be interpreted? Does the larger concentration of jobs in the central city provide more job opportunities for Blacks (who are concentrated in the central city), or are Blacks in the largest MSAs poorer and so commute shorter distances, or are Blacks relatively more concentrated in the central city of larger MSAs?

Higher employment density within the census tract of residence reduces travel distance for Hispanics and Others, but not for other groups, once again supporting the notion that Hispanics tend to economize more on commute distance. The effects of the spatial distribution of population segments is reflected by the effect of having a job in the central city. For Whites and Asians, working in the central city leads to longer commutes, a logical consequence of most Whites living outside central cities. In contrast, working in the central city leads to shorter commutes for Hispanics and Black, a logical consequence of these groups being concentrated in the central city.

Home-To-Work Travel Time

Table 5-20 gives overall results for the home-to-work travel time regression. Once again, all groups of variable coefficients are significant. Compared to home-to-work travel distance, this model provides somewhat more explanation. Table 5-20 also indicates that number of stops and mode contribute most of the explanation, and the metropolitan location variables have more effect than in the previous models. Estimating the model without the race/ethnicity dummy variables results in R^2 of 0.159.

Table 5-20. Change in R^2 for Variable Groups: HW Chains

Dependent variable: ln(time)

Variable	R^2(adj)
Individual characteristics: gender, household income, employment status, household composition, race/ethnicity	0.027
Travel characteristics: stops, mode	0.125
Metropolitan location characteristics: inside/outside central city, MSA size, outside MSA	0.154
Job access characteristics: employment density, work in central city	0.165

Table 5-21 gives full results. The main observation is the lack of significance of the racial/ethnic variables. None of the independent dummies is significant, and there are few significant coefficients among the interactive dummy variables. Results for individual characteristics are similar to those for the home-to-work distance model. In this case, however, the gender coefficient is positive, consistent with prior research. High income has the same effect as with distance above (e.g., more positive effect for Blacks and Asians), but low income is not significant for any group. Shorter distance trips are offset by

Table 5-21. HW Chains: Dependent Variable: ln(time)

Variable	All	Hispanic	Black	Asian	Other
Constant	2.155**				
Race/ethnicity		NS	NS	NS	NS
Male	0.033**	NS	NS	NS	NS
HH income > $75K	0.062**	NS	0.170*	0.268**	NS
HH income < $15K	NS	NS	NS	NS	NS
Part-time worker	-0.252**	NS	NS	-0.243*	NS
> 1 adult HH, no kids	0.070**	-0.159*	0.157*	NS	NS
1 adult HH, kids	NS	NS	NS	NS	NS
> 1 adult HH, kids	0.064**	NS	0.211**	NS	NS
No. stops	0.283**	NS	0.054*	NS	NS
POV passenger	NS	NS	-0.221**	NS	NS
Transit	0.587**	NS	NS	NS	NS
Walk/bike	0.149**	NS	NS	NS	NS
In central city	-0.081**	NS	NS	0.207*	NS
MSA 250K - 500K	0.090**	NS	NS	NS	NS
MSA 500K - 1 M	0.082**	0.272**	NS	0.442*	NS
MSA 1 M - 3 M	0.210**	0.201*	NS	NS	NS
MSA > 3 M	0.352**	0.226**	NS	NS	NS
Not in MSA	NS	NS	NS	NS	NS
CT emp. density	NS	-0.001**	NS	NS	NS
Work in central city	0.213**	NS	-0.203**	NS	NS
R^2 (adj.)	0.165				
F					
N					

NS = Not significant
* Significant at $p \leq 0.05$
** Significant at $p \leq 0.01$

slower speeds (travel in congested areas as well as non-drive alone modes). Working part-time has less effect on time than on distance for the reasons stated previously, and the effect is the same across all groups except Asians, for which the effect is more pronounced.

For Whites, longer travel times for multi-adult households are consistent with the longer distances observed above. For Blacks, multi-adult households have longer times (relative to the omitted group of single adults with no kids). That is, the effect of multi-adult households is greater for Blacks than for other racial groups. The lack of significance for single parent households across all groups is likely explained by shorter distance trips being offset by slower travel speeds.

Number of stops adds to travel time, as does using transit or non-motorized modes. These relationships hold for all groups. For Blacks, private vehicle passenger is associated with shorter travel times. This is an unexpected result.

Results for the metropolitan location variables are similar to those for distance. Residence inside the central city reduces travel time for all groups except Asians. The same pattern of travel time increasing with metropolitan size is also observed. As with distance, there is no difference in travel time between the smallest MSAs and non-MSA areas. The effect of residential location in the larger MSAs is more pronounced for Hispanics (compare with the total travel time results in Table 5-14). The relationship is the same for all other groups, with the exception of Asians living in MSAs of 500 K to 1 M population. It is worth noting that the shorter distances for Blacks do not translate into shorter travel times. Census tract employment density is significant and negative only for Hispanics. Having a job in the central city increases travel time for all groups except Blacks, for which the relationship is just the opposite. Note that in this case the shorter distances for Hispanics are not offset by shorter travel times.

Conclusions on Home-to-Work Chains

The results presented here are consistent with prior research for the sample as a whole. Longer commutes, both in terms of distance and time are associated with higher household income, full-time employment, and multi-adult households. Transit use is associated with both longer travel distance and travel time. Workers who reside in the central city have shorter commutes, as do workers residing in census tracts with higher employment density, but those working in the central city have longer commutes. Both commute distance and time increases with MSA size.

When home-to-work chains are compared across racial/ethnic groups, these conclusions are valid only for Whites. Few of the control variables are significantly related to commuting for Asians, and the relationship between single parent household and commuting has opposite signs for Hispanics and Blacks. Few MSA size variable coefficients are significant for home-to-work distance among the non-White groups; and for Blacks, larger MSA size is associated with shorter distance commutes. Effects of MSA size on home-to-work time is more consistent, but there are many differences across racial/ethnic groups. Because of the very small size of the non-White samples, these results are only suggestive.

The analysis of home to work chains suggests that race/ethnicity differences are not as pronounced as for total travel distance and time. That is, work travel is more consistent across racial/ethnic groups. Finally, the regressions explain very little of the variance in home-to-work travel.

CONCLUSIONS

The purpose of this research was to examine the relationships between travel, race/ethnicity and residential location. Four measures of travel were selected: total daily travel distance and time, and home-to-work travel distance and time. Race/ethnicity could affect travel in two different ways. There may be preferences unique to racial/ethnic groups that lead to differences in travel behavior. There may also be unique characteristics that interact with individual or location characteristics and thus lead to different travel outcomes. This analysis tested for both possibilities, and the results showed that race/ethnicity plays a significant and complex role in travel behavior.

The traditional explanation for the observed differences in travel characteristics across racial/ethnic groups has been differences in socio-economic or location characteristics. For example, the traditional explanation for the fact that minority groups use transit more than whites is that minorities tend to have lower incomes and are more likely to live in central cities than whites. Underlying such traditional explanations is the assumption that race/ethnicity does not affect travel behavior, all else being equal. Simply stated, the presumption is that different groups exhibit different travel behavior because they have different incomes or household characteristics, or they live and work in different places. Motivations and preferences for travel are mostly the same for everyone. The results presented here show that such an assumption is unwarranted.

Racial/ethnic differences are not limited to effects explained by different location patterns, but rather by fundamental differences in what motivates travel and location choices. Gender, age, income, and household status or lifestyle indicators do not have the same effect on travel across racial/ethnic groups. For Hispanics, there is no significant difference in total daily travel distance between adults and the elderly. For Blacks, there is little difference in total daily travel distance between adults and children. Age-related patterns are similar for Whites and Asians, but the difference between adults and children is more pronounced for Asians. Gender has no relationship with total daily travel among Asians, and high household income is not associated with more travel distance. Asians consistently travel less, whether measured in total distance or total time, relative to other groups. These results reflect difference in travel habits that merit further examination.

Effects of location factors differ greatly across racial/ethnic groups, but overall do not account for much of the difference in travel between racial/ethnic groups. For total daily travel distance and time, the effect of metropolitan location differs for each racial/ethnic group. Residence inside a central city is associated with less total travel distance and time for Whites and Asians, but with more total travel distance and time for Hispanics and Blacks. Results for MSA size are mixed. Neighborhood location explains little of the difference between racial/ethnic groups, as illustrated by estimating expected travel distance and time for average persons across racial/ethnic groups.

The traditional wisdom of commute travel increasing with MSA size is confirmed for Whites and Asians in terms of travel distance, and for all groups in terms of travel time. For Hispanics, the positive relationship is more pronounced for travel time. Home-to-work travel distance decreases with MSA size for Blacks. Residence in the central city is associated with shorter home-to-work chains for Whites, Blacks and Hispanics, but with longer chains for Asians. Having a job in the central city is associated with longer distance chains for Whites and Asians, but not for Hispanics and Blacks. Working in the central city is associated with shorter home-to-work travel time for Blacks. Relationships between location and home-to-work travel are generally consistent with residence and job location patterns across racial/ethnic groups, but there are many results that are not consistent. For example, Hispanics, Blacks and Asians are all concentrated in central cities and in the largest MSAs, but only Black home-to-work chains get shorter with increasing MSA size.

There are several conclusions to be drawn from this research. First, geography matters, but it matters in different ways for different population segments. In some cases, spatial location patterns seem to provide a reasonable explanation (e.g., home-to-work travel distance for Whites, Blacks), but in others it does not (e.g., Asian total travel). Second, location differences do not account for much of the difference in travel observed across racial/ethnic groups. Third, there seems to be more consistency in work travel than in total travel across racial/ethnic groups. This makes sense; differences in preferences likely play a greater role in discretionary travel. Fourth, like most of this type of research, the regression models provide limited explanation of the variability in travel. Despite the many variables included in these models, most of the variance in travel remains unexplained. Finally, there appear to be fundamental differences in what motivates travel choices across racial/ethnic groups. Our understanding of daily travel behavior is based on models and empirical evidence of the White population. Whites comprise about three-fourths of the U.S. population. When race/ethnicity is not explicitly taken into account, the behavior of Whites dominates travel analysis. More research on the travel patterns of racial and ethnic minorities is clearly in order.

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Chapter 5 Appendix

Variable Descriptions	
Variable	**Description**
ln(distance)	natural log of daily travel distance
ln(time)	natural log of daily travel time
Male	1 = male
Person 65 or over	1 = person 65 years old or over
Child 16 or younger	1 = person 16 years old or younger
HH income > $75K	1 = annual household income greater than $75,000
HH income < $15K	1 = annual household income less than $15,000
Employed adult	1 = person is an employed adult
Has driver's license	1 = person has a driver's license
Car/driver ratio	0 = no cars; 1 = cars < drivers; 2 = cars = drivers; 3 = cars > drivers
No. trips	number of daily person trips
Share non-POV trips	(number of daily trips by non-POV) / (number of daily trips by all modes)
In central city	1 = person residing in a central city
MSA 250K - 500K	1 = person residing in a MSA with 250,000-499,999 population
MSA 500K - 1M	1 = person residing in a MSA with 499,999 - 999,999 population
MSA 1M - 3M	1 = person residing in a MSA with 1,000,000 - 2,999,999 population
MSA > 3M	1 = person residing in a MSA with more than 3 million population
Not in MSA	1 = person residing out of a MSA
MSA 250K - 500K, not in CC	1 = person residing in a MSA 250-500K and not a central city
MSA 500K - 1M, not in CC	1 = person residing in a MSA 500K-1M and not a central city
MSA 1M - 3M, not in CC	1 = person residing in a MSA 1M-3M and not a central city
MSA > 3M, not in CC	1 = person residing in a MSA >3M and not a central city
MSA < 250K, in CC	1 = person residing in a MSA <250K and a central city
MSA 250K - 500K, in CC	1 = person residing in a MSA 250-500K and a central city
MSA 500K - 1M, in CC	1 = person residing in a MSA 500K-1M and a central city
MSA 1M - 3M, in CC	1 = person residing in a MSA 1M-3M and a central city
MSA > 3M, in CC	1 = person residing in a MSA >3M and a central city
% foreign born in CT	percent foreign born 1990, census tract
% owner-occ. hsg.	percent owner-occupied housing, census tract
% units $\leq$ 10 yrs	percent units built last 10 years, census tract
CT emp. density	jobs per square mile, census tract (by 1,000)
% pop $\geq$ 65 yrs	percent 65 & older, census tract
% fam. below pov.	percent families below poverty, census tract
CT pop density	population density, census tract (by 1,000)
Work in central city	1 = person's job location is in central city
Hispanic	1 = hispanic
Black	1 = non-hispanic black
Asian	1 = non-hispanic asian
Other	1 = non-hispanic other

Descriptive Statistics for Variables Used in Home-to-Work Chain Analysis

Variable	Mean	Std. Deviation	N
ln(distance)	1.954	1.585	30,207
ln(time)	2.934	0.811	29,902
HH income > $75K	0.139	0.346	69,808
HH income < $15K	0.125	0.331	69,808
Part-time worker	0.194	0.395	48,115
> 1 adult HH, no kids	0.247	0.431	72,984
1 adult HH, kids	0.064	0.245	72,984
> 1 adult HH, kids	0.598	0.490	72,984
No. stops	1.371	0.785	31,680
POV passenger	0.091	0.288	31,167
Transit	0.037	0.188	31,167
Walk/bike	0.009	0.096	31,167
In central city	0.464	0.499	82,568
MSA 250K - 500K	0.072	0.258	82,568
MSA 500K - 1M	0.083	0.275	82,568
MSA 1M - 3M	0.173	0.378	82,568
MSA > 3M	0.391	0.488	82,568
CT emp. density	10.106	90.532	83,590
Work in central city	0.379	0.485	33,295
% fam. below pov.	10.204	9.396	82,904
CT pop density	13.179	90.726	83,590
Valid N (if include 'work in central city')			17,168

Chapter 6
Mode Choice by People of Color for Non-Work Travel

Findings from the Nationwide Personal Transportation Surveys

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INTRODUCTION

This chapter provides a comprehensive picture of mode choice by people of color for their non-work travel. This mode choice analysis relies on the 1983, 1990, and 1995 Nationwide Personal Transportation Survey (NPTS) of U.S. personal travel.

Background and Context

Transportation investments in facilities and services can be most wisely planned and issues such as demand, impacts and equity best addressed in the context of a rich understanding of travel behavior. The transportation planning community is best prepared to be responsive to travelers when they have a strong knowledge base of travel behavior. A broad understanding of travel behavior involves many aspects, including why, when, and how people travel; how far, how fast and how often people travel, and how each of these aspects varies with time, geography, and population group characteristics. A rich understanding, however, requires focused analysis. This chapter takes a comprehensive look at mode choice behavior of people of color for their non-work travel.

There are several reasons to focus on travel behavior of people of color. The number of people of color is growing and is expected to continue to grow much faster than the number of whites well into the next century—thus, this is an increasingly important share of total travel demand. Travel behavior of this population segment is changing rapidly with significant increases in travel and changes in mode choice—old data is no longer relevant for these segments of the public. Finally, a high level of mobility is essential to the lifestyles and economic well-being of all people and historically many characteristics of people of color, however, have limited them from having as high a level of mobility as that enjoyed by Whites in this country.

Non-work travel is becoming increasingly important to people's lives and the transportation system. Non-work travel includes travel for personal and family business, school activities, religious activities, health care, and social and recreational activities. From 1969 to 1995, work travel declined from more than 26 percent to about 20 percent of all local travel.[2] Although work travel was growing substantially during this period, non-work travel was growing even more dramatically. The fast growth in non-work travel has important implications to transportation planning because it influences both temporal and spatial distributions of travel in our metropolitan areas.

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[1] The following provided comments and suggestions on earlier versions of the chapter: Francis A. Cleland, Federal Highway Administration, and Philip L. Winters (CUTR), and Battelle Memorial Institute.

[2] The 1969 number is derived from Hu, Patricia S., and Jennifer Young (1993), *1990 NPTS Databook*, Washington, D.C.: FHWA, while that for 1995 is computed from the 1995 NPTS by the authors.

Mode choice determines how people travel and is an important part of travel behavior. This analysis looks at six travel mode alternatives: driving privately operated vehicles, riding in privately operated vehicles as passengers, public transit, bicycle, walking, and others.[3] While many factors determine what mode people choose for their non-work travel, the availability of alternative transportation means is a key determinant. Making alternative means available is an important public policy issue. A better understanding of mode choice is critical to support policymaking regarding investments in various modes.

Comparing mode choice behavior for non-work travel across racial and ethnic groups can be misleading at the aggregate level. Racial and ethnic groups differ not only in their racial and ethnic background but also in a variety of other characteristics. This chapter goes beyond the aggregate level in three ways. First, it compares modal differences across these groups by examining how patterns of difference in mode choice vary with personal, household, geographic, and trip characteristics. For each age cohort selected, for example, the analysis examines whether the pattern of modal differences among these racial and ethnic groups differs, both qualitatively and quantitatively, from the general pattern observed at the aggregate level.

Second, the chapter examines which of these characteristics may be largely responsible for the modal differences observed at the aggregate level across racial and ethnic groups. Suppose that modal distributions differ little across the racial and ethnic groups among people with high household incomes. The chapter tries to identify the reasons for such a pattern of modal difference. Is it attributable to the fact that people with high incomes are more likely to be licensed drivers? Is it because people with high incomes own more vehicles? Or is it just because high incomes generate activity demands which create travel demands?

Third, the chapter investigates the role of racial and ethnic background in whether public transit is used for a given non-work trip by simultaneously controlling for many of the personal, household, geographic, and trip characteristics examined earlier.

People of Color

The concepts of race and ethnicity used in this paper are based on self-identification of persons into one of several pre-determined racial and/or ethnic groups in their response to the NPTS or decennial census questions. Respondents do not have the option to indicate a multi-racial or multi-ethnic background. Racial groups are typically defined as White, Black, Asian (including Pacific Islanders), and a residual category identified as "Other Races." Ethnic groups are based on Hispanic origin: Hispanics and non-Hispanic. This paper uses a joint definition of race/ ethnicity with analysis centering on Hispanic, non-Hispanic Whites, non-Hispanic Blacks, non-Hispanic Asians, and non-Hispanic Others (the last four groups will be referred to throughout the rest of this chapter as White, Black, Asian, and Others).

Literature Review

The literature offers little on non-work travel by people of color, in general, and mode choice by people of color for non-work travel, in particular. However, several branches of the literature offer some relevance to the subject of this chapter. The first is the literature on the spatial mismatch hypothesis between

[3] Privately operated vehicles mean motor vehicles that are privately owned and operated, including automobiles, vans, sports utility vehicles, pickup trucks, other trucks, recreational vehicles, motorcycles, and others. Public transit includes bus, commuter train, streetcar/trolley, and subway/elevated rail. School bus is included in the "others."

employment sites and residences among people of color.[4] This hypothesis, however, focuses on commuting behavior. The second is the literature on non-work travel, in general. Some of the work on the subject discusses how non-work travel may be modeled.[5] Other research focuses on the effect of land use patterns, especially neighborhood design, on mode choice and trip generation of non-work travel.[6] The third area is the literature on the analysis of non-work travel using household surveys.[7] None of the research based on household surveys focuses specifically on people of color. Some of it, however, does include racial and ethnic background in the analysis.[8] Other research in the third area focuses on the importance of non-work travel or the relationship between work and non-work travel.[9]

Data

The primary data source for this work is the 1983, 1990 and 1995 Nationwide Personal Transportation Surveys for the mode choice analysis.[10] This is the latest three in a series of five surveys since 1969 conducted for the U.S. Department of Transportation. While these surveys contain the most comprehensive data available on person travel throughout the nation, some qualifications regarding the surveys are

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[4] Gordon, Peter, Ajay Kumar, and Harry W. Richardson (1989), "The Spatial Mismatch Hypothesis: Some New Evidence," *Urban Studies* 26: 315-326. Kain, John F. (1992), "The Spatial Mismatch Hypothesis: Three Decades Later," *Housing Policy Debate* 3: 371-460. Taylor, Brian D., and Paul M. Ong, "Spatial Mismatch or Automobile Mismatch? An Examination of Race, Residence and Commuting in US Metropolitan Areas," *Urban Studies* 32: 1453-73.

[5] Adler, Thomas Jay (1976), *Modeling Non-Work Travel Patterns*, Unpublished Ph.D. Dissertation, Department of Civil Engineering, Massachusetts Institute of Technology. Comsis Corp. (1977), *Refinement of San Diego Region Mode Split Models for the Non-Work Trip Purposes: Final Report*, Mountain View, California. Horowitz, Joel (1978), "A Disaggregate Demand Model for Non-Work Travel that Includes Multi-Destination Travel," Paper prepared for presentation at the 57th Annual Meeting of the Transportation Research Board. United States Environmental Protection Agency. Purvis, Charles L. (1996), "Incorporating Work Trip Accessibility in Nonwork Trip Generation Models in San Francisco Bay Area," *Transportation Research Record* 1556: 37-45.

[6] Handy, Susan (1993), "Regional versus Local Accessibility: Implications for Nonwork Travel," *Transportation Research Record* 1400: 101-107. Seubert, Matthew John (1996), *Residential Neighborhoods and Modal Splits in Non-Work Travel*, Thesis, Department of city and Regional Planning, University of California at Berkeley. Young, Elizabeth Gene (1997), *An Examination and Comparison of Non-Work Travel in Mixed Use and Typical Urbanized Neighborhoods*, Thesis, University of Washington. Boarnet, Marlon G., and Sharon Sarmiento (1998), "Can Land-Use Policy Really Affect Travel Behavior? A Study of the Link between Non-Work Travel and Land-Use Characteristics," *Urban Studies* 35: 1155-69.

[7] Pucher, John, and Fred Williams (1992), "Socioeconomic Characteristics of Urban Travelers: Evidence from the 1990-91 NPTS," *Transportation Quarterly* 46: 561-81. Taylor, Brian, and Michael Mauch (1997), "Gender, Race, and Travel Behavior: An Analysis of Household-Serving Travel and Commuting in the San Francisco Bay Area," Women's Transportation Conference, Baltimore, Maryland, circa 1997. Lockwood, Philomena Byrne (1993), *Non-Work Travel: A Study of Changing Behavior*, Thesis, University of Virginia.

[8] For example, Pucher, John, and Fred Williams (1992), "Socioeconomic Characteristics of Urban Travelers: Evidence from the 1990-91 NPTS," *Transportation Quarterly* 46: 561-81.

[9] Richardson, Harry Ward (1989), "Counting Nonwork Trips: the Missing Link in Transportation, Land Use, and Urban Policy," *Urban Land* 48: 6-12. Bhat, Chandra R. (1997), "Work Travel Mode Choice and Number of Non-Work Commute Stops," *Transportation Research-B* 31: 41-54.

[10] Data files from the 1983 and 1990 surveys are contained in a CD-ROM available from the Bureau of Transportation Statistics, U.S. Department of Transportation: *Nationwide Personal Transportation Survey: 1983 and 1990*, BTS-CD-09. Data files from the 1995 survey are available at the following web site: www-cta-ornl.gov/npts. Documentation for the 1983 survey is *User's Guide for the Public Use Tapes: 1983-1984 Nationwide Personal Transportation Study*, U.S. Department of Transportation (1985). Documentation for the 1990 survey is in *User's Guide for the Public Use Tapes: 1990 Nationwide Personal Transportation Survey* (1991). Documentation for the 1995 survey is at the web site listed above.

required. Some of these issues are important in any analysis of NPTS data. Others are more important when travel behavior is compared across the different surveys.

General Issues

Most statistics in this chapter are sample estimates, i.e., they refer to an entire universe of units (households, persons, or trips), but are constructed from sample surveys. In constructing a sample estimate, an attempt is made to come as close as is feasible to the corresponding value that would be obtained from a complete census of the universe. Estimates based on a sample will, however, generally differ from the values from a census. As a result, sample estimates involve errors. Such sampling errors are larger with smaller samples. While this chapter does not show these errors, it provides information so that the reader can determine the sample size from which a particular distribution of mode choice is estimated.[11]

The NPTS data contain information for both local and intercity travel. Local travel consists of the comings and goings of a household's members in their daily activities. Intercity travel, on the other hand, is long distance travel on a non-repetitive basis, is mainly for recreation or work-related, and often involves overnight stays way from home and exceeds a distance of 75 miles or more to the destination. Local travel is far more important than intercity travel both in terms of magnitudes and the type of non-work purposes. In 1990, long distance travel accounted for about 31 percent of all person miles traveled and as low as one percent of all person trips.[12] The chapter focuses on local travel.

Additionally, the NPTS data contain travel information for people age five or older. Trips by children under five years old are not included. For example, consider a mother who takes her one-year-old son to a daycare center in the morning and picks him up in the afternoon. The two person trips by the mother would be included in NPTS data files, while the two trips by her son would not be included. Unless otherwise indicated, data in this chapter on both trip-making and demographics are for people age five or older.

There are a variety of measures for mobility including (1) person trips, (2) vehicle trips, (3) person miles, (4) vehicle miles, and (5) person hours.[13] While each of these measures provides a unique perspective on mobility, the number of person trips is arguably the best measure for overall mobility. Personal travel is primarily for participating in activities. What matters then is whether one can carry out an activity by completing a trip, regardless of its length in distance or duration. Only the number of person trips is used in the mode choice analysis.

Comparability Issues

The 1995 survey was a telephone survey, thus, limiting the sample framework to households with telephones. This raised concerns that it may result in an undercounting of people of color because they

[11] While sampling errors can be estimated from the surveys with specially designed software, the statistical software used in the analysis, SPSS, does not correctly calculate sampling errors because of complex sample designs used in the surveys, especially the 1995 NPTS (FHWA, 1997a, Appendix G).

[12] Hu, Patricia S., and Jennifer Young (1993), *1990 NPTS Databook*, Washington, D.C.: FHWA, p. 8-6.

[13] A person trip is a trip by one person in any mode of transportation. The number of person miles is the number of miles traveled by each person on a trip. A vehicle trip is a trip by a single privately operated vehicle regardless of the number of persons in the vehicle. One vehicle mile is the movement of one privately operated vehicle for one mile, regardless of the number of persons in the vehicle. The number of person hours is the duration traveled by each person on a trip. A trip, person trip or vehicle trip, is defined as any time a person or privately operated vehicle goes from one address to another.

are more likely to be lower income than white households and therefore are more likely to be without a telephone. Limiting the sample to households with telephones was also a concern for fear it could lead to biases in mode choice analysis because mode choice behaviors may differ systematically between households with telephones and without telephones. However, weighting procedures were used to adjust the weighted estimates so that the 1995 data should represent all U.S. households, including those without telephones. The 1995 survey allowed another household member (proxy) to report an individual's trips if the individual could not be contacted after several attempts. Allowing proxy interviews may contribute to a greater number of household trips being reported but may also increase respondent errors. The 1995 survey data were edited during the data collection process. The advantage of real-time editing is that many data inconsistencies and data quality problems can be immediately identified and corrected. The number of completed interviews was 40,935 households in 1995. The 1995 survey determined the racial and ethnic background of a sample household by the racial and ethnic background of the respondent within the household who answered questions about the household.

The 1995 survey had a number of features that differentiate it from some earlier surveys and impact response rate and data quality.

- It used a written diary to help respondents remember travel on a specific day. Trip diaries allow a more complete reporting of travel and better reporting of trip characteristics.
- It also used a household roster of trips that maintained a list of trips that household members already interviewed had been on with, or accompanied by, this respondent.
- It used a $2.00 incentive that was sent with each travel diary. This may have made the respondents feel obligated to record and report all of their travel.
- It also used an advance letter to notify potential respondents that they would be recruited for the survey.
- It confirmed responses with zero trips by asking a follow-up question: Does that mean you stayed at the same place all day?
- It defined trip purposes on a one-way basis, rather than the round-trip basis used in earlier surveys.

Because of these differences in survey methods between the 1995 survey and earlier surveys, the mode choice analysis relies almost exclusively on the 1995 survey results and makes comparisons in terms of mode shares. There is no evidence to suggest that the different survey methods had differential impacts in response rate by racial/ethnic groups or even that reporting of travel by different modes was influenced—though it had been speculated that non-motorized modes would be more accurately (and highly) reported in the 1995 survey.

MODE CHOICE FOR NON-WORK TRAVEL

This section examines how modal differences across racial and ethnic groups may vary with personal, household, geographic, and trip characteristics. Before examining modal differences as revealed by the 1995 NPTS, changes in mode choice behavior for non-work travel are briefly presented using 1983 and 1995 NPTS data.

Modal Differences at the Aggregate Level

For all racial and ethnic groups combined, privately operated vehicles have a dominant role in non-work travel (Table 6-1). Driving privately operated vehicles accounts for 57.3 percent and riding in privately operated vehicles as passengers accounts for 31.2 percent of all person trips for non-work travel. Modes other than privately operated vehicles have minimal roles in non-work travel, with walking accounting for 6.4 percent, public transit for 1.4 percent, bicycling for 1.0 percent, and other means for 2.7 percent.

Across the racial and ethnic groups, several patterns of modal difference emerge (Figure 6-1).

- The largest differences in relative modal shares between people of color and Whites occur with trips made by public transit and walking. People of color are several times as likely as Whites to use public transit for non-work travel and about twice as likely as Whites to walk for non-work travel.
- Blacks stand out among people of color in their use of public transit and other means. Blacks are over 9 times as likely as Whites to use public transit for non-work travel, while other people of color are about 2 to 4 times as likely as Whites to use public transit for non-work travel. Blacks are 1.6 times as likely as Whites to use the residual modes for non-work travel, while other people of color are about as likely as Whites to use those modes.
- While all people of color are less likely to drive for non-work travel than Whites, the extent of difference is larger for Hispanics and Blacks than for other people of color.
- While all people of color are more likely than Whites to walk for non-work travel, the extent of difference is larger for Blacks and Asians than for other people of color.
- Other people of color are about equally as likely as Whites to travel as passengers of privately operated vehicles for non-work travel, while Hispanics are more likely than Whites to travel as passengers.

Overall, Blacks differ the most from Whites in mode choice for non-work travel, followed by Hispanics, Asians, and Others (Figure 6-2). To quantify the mode choice differences between groups the absolute value of differences between mode share values from the columns in Table 4 were summed for each racial ethnic group compared to the white population. This measure produces values of 24 for Blacks, 20 for Hispanics, 15 for Asians, and 10 for Others.

Changes in Mode Choice

Non-work person trips made as drivers of privately operated vehicles increased by about 60 percent in share for people of color and by about 40 percent for Whites (Figure 6-3). Non-work person trips made by bicycles also increased in share for all groups with Hispanics having the largest increase.

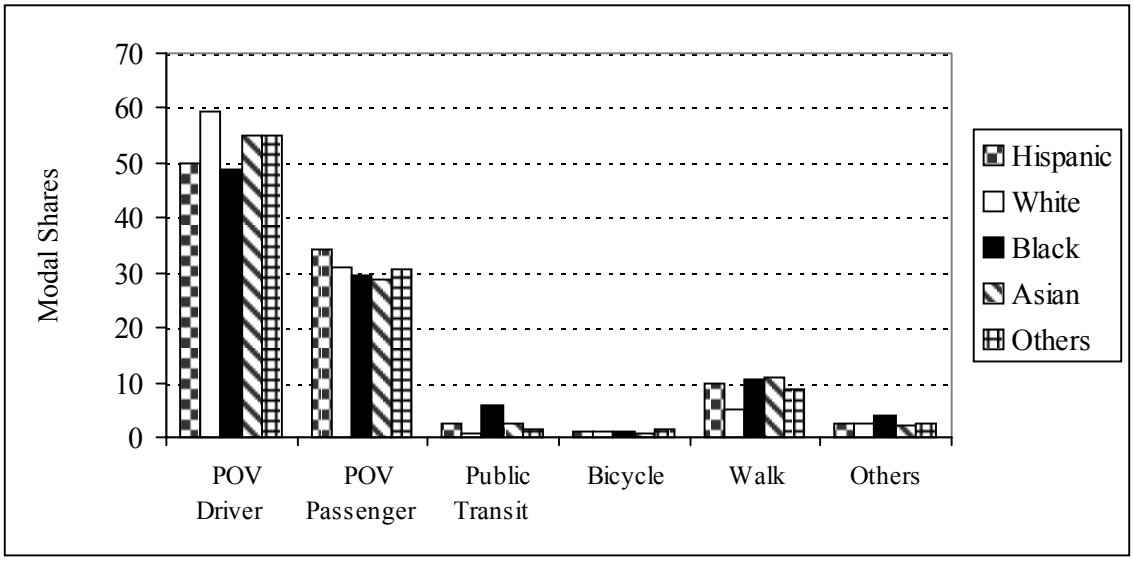
On the other hand, every racial and ethnic group experienced decreases in shares of non-work person trips made as passengers of privately operated vehicles, by transit, by walking, and by other means. Decreases in shares of non-work person trips made as passengers of privately operated vehicles and by walking are similar across the racial and ethnic groups. The decreases range from 20 to 29 percent for trips made as passengers of privately operated vehicles and from 35 to 42 percent by walking. Shares of person trips made by transit decreased almost by half for Hispanics, 32 percent for Whites, 24 percent for Blacks, and 59 percent for Others. Shares of person trips by walking, however, decreased less for Hispanics than for other groups.

Table 6-1. Modal Distribution of Person Trips for Non-Work Travel, 1995

1995						
Mode	**Hispanic**	**White**	**Black**	**Asian**	**Others**	**All**
POV Driver (%)	49.8	59.6	48.9	55	55.2	57.3
POV Passenger (%)	34.1	31.1	29.6	28.8	30.8	31.2
Public Transit (%)	2.6	0.6	5.8	2.4	1.5	1.4
Bicycle (%)	1.0	1.1	1.0	0.7	1.3	1.0
Walk (%)	9.8	5.1	10.6	10.8	8.9	6.4
Others (%)	2.7	2.5	4.1	2.2	2.4	2.7
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0
1983						
Mode	**Hispanic**	**White**	**Black**	**Asian**	**Others**	**All**
POV Driver (%)	31.4	42.7	30.5	36.6	28.8	41.0
POV Passenger (%)	45.1	42.7	37.3	44.2	42.1	42.5
Public Transit (%)	5.0	0.9	7.6	2.7	6.4	1.7
Bicycle (%)	0.5	0.9	0.8	0.9	1.5	0.9
Walk (%)	15.0	8.9	17.7	9.6	13.8	9.8
Others (%)	2.9	3.8	6.1	6.0	7.4	4.1
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0

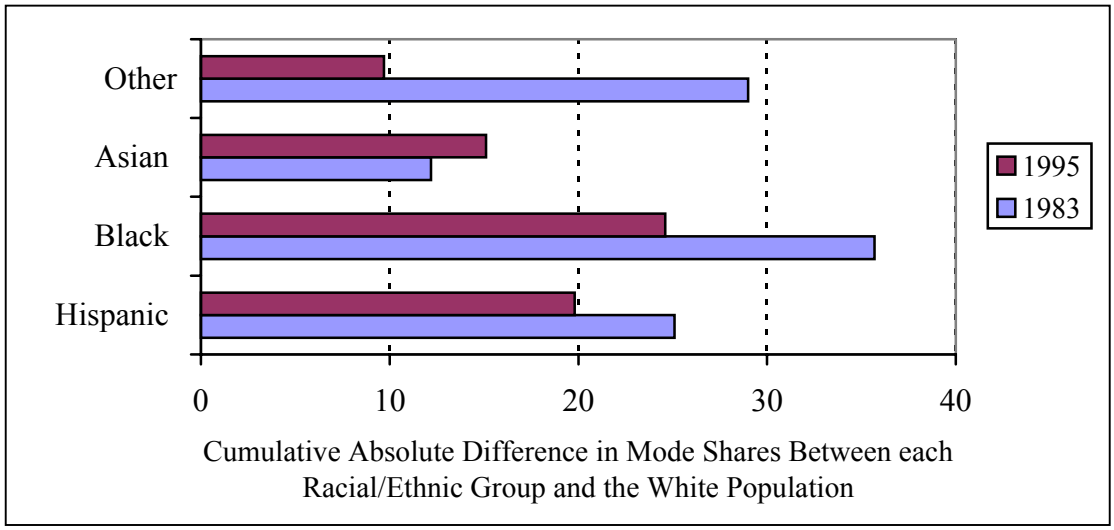
Source: Travel Day File, 1995 NPTS.

Figure 6-1. Modal Shares for People of Color and Whites, 1995



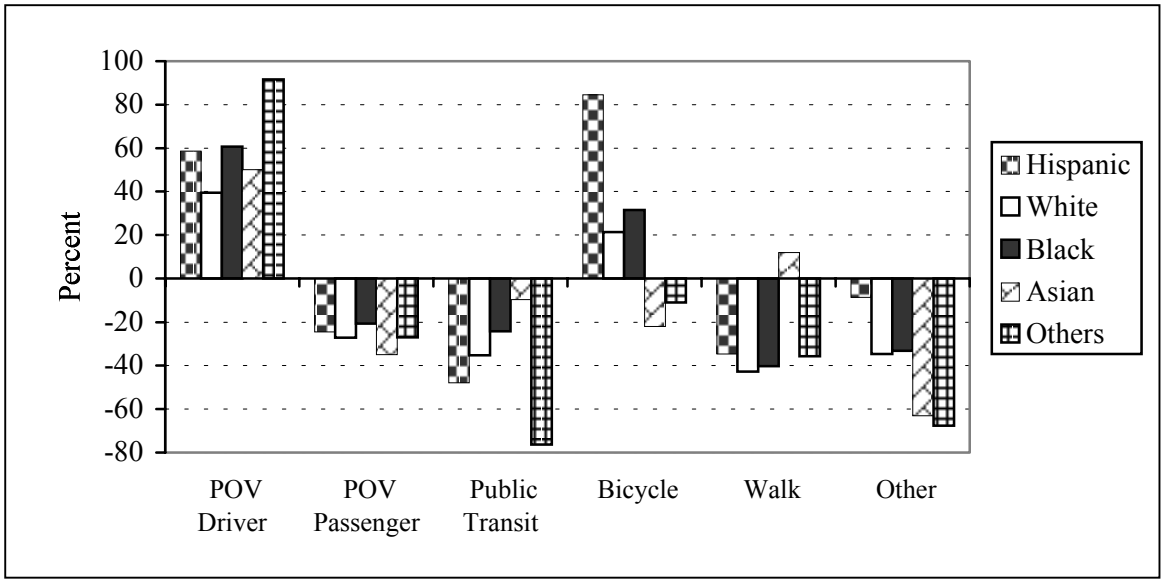
Source: Travel Day File, 1995 NPTS.

Figure 6-2. Modal Difference Between People of Color and Whites for Non-Work Travel, 1995



Source: Travel Day File, 1995 NPTS.

Figure 6-3. Changes in Shares by Mode Between 1983 and 1995 for Non-Work Travel



Source: 1983 and 1995 NPTS.

There is also evidence that differences in modal distributions among the racial and ethnic groups decreased between 1983 and 1995. This was determined by calculating an indicator that summed the absolute differences between the share of trips on each mode between whites and the respective racial/ethnic group.[14] The group index indicates how much the modal distribution of each racial and ethnic group differs from that of Whites. It decreased for Hispanics from 25 in 1983 to 20 in 1995, for Blacks from 36 in 1983 to 24 in 1995, and for Others from 16 in 1983 to 12 in 1995. The overall index indicates

[14] The group index for a given group of people of color sums up the absolute differences between its modal distribution and Whites'. The overall index for all people of color sums up their values of the group index. Appendix B details the calculation of these two indexes using an example.

sums up the group index values for each year. This overall index indicates the overall differences in mode choice among the racial and ethnic groups. In this case, the overall index decreased from 77 in 1983 to 56 in 1995. Thus, travel behavior between groups is more similar today than in the past.

Modal Differences at the Disaggregate Level—Person Age

For all racial and ethnic groups combined, public transit plays a similar role across age groups, accounting for about 1.4 to 1.7 percent of all person trips (Table 6-2). However, the three age groups defined for this analysis differ in a number of ways. Those under 16 years of age travel predominantly as passengers of privately operated vehicles (71.2 percent). Walking and other means each accounts for about 10 percent of their person trips. Bicycles account for about 3.5 percent of their person trips. On the other hand, people age 16 or older travel predominantly as drivers and, to a lesser extent as passengers, of privately operated vehicles. Bicycling, walking, and other means play smaller roles for people age 16 or older than for people under 16 years old. Among those age16 or older, people age 65 or over travel more frequently as passengers and less frequently as drivers of privately operated vehicles than do people age 16 to 64. The rows labeled segment share in Table 6-2 also indicates the share of the population in the various age and racial/ethnic categories.

Table 6-2. Modal Distribution of Person Trips for Non-Work Travel by Person Age, 1995

Person Age	Mode	Hispanic	Non-Hispanic				All
			White	Black	Asian	Others	
Under 16	POV Driver	1.3	3.6	1.1	0.5	1.1	3.0
	POV Passenger	70.7	73.5	59.4	70.2	66.7	71.2
	Public Transit	2.1	0.7	5.8	2.0	1.0	1.5
	Bicycle	2.7	3.7	3.0	3.0	5.5	3.5
	Walk	14.6	8.4	16.8	14.4	15.1	10.4
	Others	8.6	10.1	13.9	9.9	10.5	10.4
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Share	**24**	**18**	**21**	**18**	**18**	**19**
16-64	POV Driver	65.4	74.2	64.5	68.1	69.8	72.0
	POV Passenger	22.2	20.0	20.0	18.8	21.2	20.2
	Public Transit	2.9	0.5	5.4	2.1	1.7	1.4
	Bicycle	0.4	0.5	0.4	0.2	0.3	0.5
	Walk	8.4	4.2	8.6	10.3	6.5	5.3
	Others	0.7	0.6	1.1	0.5	0.5	0.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Share	**72**	**68**	**71**	**77**	**68**	**69**
65+	POV Driver	64.1	69.0	51.4	58.5	60.1	67.3
	POV Passenger	25.9	24.2	27.3	27.5	26.9	24.5
	Public Transit	0.7	1.1	9.4	8.3	1.0	1.7
	Bicycle	0.8	0.1	0.3			0.2
	Walk	5.7	5.1	10.5	5.8	11.3	5.7
	Others	2.9	0.5	1.0		0.7	0.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Share	**4**	**14**	**8**	**5**	**14**	**12**
Group Share		**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS. An empty cell in the table indicates that no trips were sampled.

The most interesting variations in modal differences across racial and ethnic groups occur among the elderly, i.e., people age 65 or older.[15] While Blacks, Asians, and Others are slightly less likely than Whites to travel as passengers of privately operated vehicles at the aggregate level, the elderly in these racial/ethnic groups are more likely to travel as passengers than elderly Whites. Elderly Hispanics and Others make a smaller share of their non-work travel by transit than elderly Whites. On the other hand, elderly Blacks and Asians are about nine times as likely as Hispanics, Whites, and Others to travel by transit for non-work travel. Elderly Hispanics and Asians make a similar share of their non-work travel by walking as elderly Whites. However, elderly Blacks and Others are twice as likely as Hispanics, Whites, and Asians to travel by walking for non-work travel.

Overall, modal differences across the groups are smaller among people age 16 to 64 than for the other age cohorts. Within individual racial and ethnic groups, modal differences from Whites are smaller among people age 16 to 64 for Blacks, Asians, and Others, but not for Hispanics.

Modal Differences at the Disaggregate Level—Gender

For all racial and ethnic groups combined, males and females differ mainly in their relative roles as drivers and passengers of privately operated vehicles (Table 6-3). Males make 62.2 percent of their non-work travel as drivers of privately operated vehicles, compared to 53.1 percent for females, while males make 25.6 percent of their non-work travel as passengers of privately operated vehicles, compared 36.0 percent for females. Other differences are slight. Males make slightly more trips for non-work activities by bicycle, walking, or other means than do females, while females make slightly more transit trips as a percent of their total non-work travel than do males.

Across racial and ethnic groups, several patterns of modal difference vary by gender. While both males and females among people of color are less likely to travel for non-work activities as drivers of privately operated vehicles than White males and females, the difference is larger among females than males for Hispanics, Asians, and Others, but smaller among females than males for Blacks. While both males and females among people of color are more likely to use public transit than White males and females, the relative modal shares between people of color and Whites are larger among females than males for Hispanics, Blacks, and Asians, but smaller among females for Others. For example, female Asians are about six times as likely to use public transit as female Whites, while male Asians are only twice as likely to use public transit as male Whites. On the other hand, female Others are about twice as likely to use public transit as female Whites, while male Others are about three times as likely to use public transit as male Whites.

Overall, modal differences across the racial and ethnic groups are slightly smaller among males than among females.

Modal Differences at the Disaggregate Level—Employment Status

For all racial and ethnic groups age 16 or older combined, workers make proportionally far more non-work trips as drivers of privately operated vehicles than non-workers (Table 6-4). Conversely, non-workers make more non-work trips as passengers of privately operated vehicles, by public transit, by bicycle, by walking, or by other means. This general pattern of difference between workers and non-workers holds for each of the racial and ethnic groups.

[15] Some of these patterns of modal difference across racial and ethnic groups were identified by comparing modal share ratios between people of color and Whites at the aggregate level and by each age cohort.

Table 6-3. Modal Distribution of Person Trips for Non-Work Travel by Gender, 1995

Gender	Mode	Hispanic	Non-Hispanic				All
			White	Black	Asian	Others	
Male	POV Driver	56.8	64.4	51.0	61.4	61.2	62.2
	POV Passenger	27.2	25.4	26.6	21.4	23.5	25.6
	Public Transit	2.0	0.6	5.0	1.2	1.8	1.2
	Bicycle	1.3	1.6	1.5	1.1	2.3	1.6
	Walk	9.8	5.3	10.9	12.1	8.8	6.5
	Others	3.0	2.7	5.0	2.8	2.5	2.9
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**48**	**47**	**41**	**55**	**48**	**46**
Female	POV Driver	43.3	55.5	47.5	47.3	49.6	53.1
	POV Passenger	40.6	36.0	31.7	37.8	37.6	36.0
	Public Transit	3.2	0.7	6.3	3.9	1.2	1.6
	Bicycle	0.6	0.6	0.7	0.3	0.3	0.6
	Walk	9.8	5.0	10.4	9.2	8.9	6.2
	Others	2.5	2.3	3.4	1.5	2.4	2.4
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**52**	**53**	**59**	**45**	**52**	**54**
Group Size		**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS.

Table 6-4. Modal Distribution of Person Trips for Non-Work Travel by Employment Status, 16 Years or Older, 1995

Employment Status	Mode	Hispanic	Non-Hispanic				All
			White	Black	Asian	Others	
Worker	POV Driver	71.8	76.0	71.0	72.8	74.7	75.0
	POV Passenger	19.1	18.5	17.9	17.8	15.9	18.4
	Public Transit	1.6	0.4	3.4	1.5	1.7	0.9
	Bicycle	0.2	0.4	0.3	0.3	0.3	0.4
	Walk	6.7	3.9	6.7	7.1	6.9	4.6
	Others	0.7	0.7	0.8	0.5	0.5	0.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**65**	**63**	**63**	**65**	**55**	**63**
Non-Worker	POV Driver	50.6	66.6	45.7	54.2	58.0	62.5
	POV Passenger	30.6	26.0	27.8	24.7	31.5	26.8
	Public Transit	5.2	0.9	9.9	4.6	1.4	2.3
	Bicycle	0.8	0.5	1.0	0.1	0.2	0.6
	Walk	11.6	5.1	13.1	15.5	8.0	6.8
	Others	1.3	0.8	2.5	0.9	0.8	1.0
	Total	100.0	100.0	100.0	100.0	100.0	100
	Segment Size	**35**	**37**	**37**	**35**	**45**	**37**
Group Size		**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS.

Across individual racial and ethnic groups, one interesting difference between workers and non-workers is that differences in modal distributions between people of color and Whites are at least as small, and in most cases much smaller, among workers than among non-workers. For example, while Hispanic workers are about four times as likely to use public transit as White workers for non-work travel, Hispanic non-workers are over five times as likely to use public transit as White non-workers. Also, while Black workers are almost as likely as White workers to travel for non-work activities as drivers of privately operated vehicles, Black non-workers are two-thirds as likely as White non-workers to travel for non-work activities as drivers of privately operated vehicles. Furthermore, while Asian workers are less than twice as likely as White workers to walk for non-work activities, Asian non-workers are three times as likely as White non-workers to do so. This is true for all most all groups of people of color and modes. Modal differences across racial and ethnic groups are much smaller among workers than among non-workers. This is true overall and for each of the racial and ethnic groups. In addition, Blacks differ the most from Whites for both workers and non-workers.

Modal Differences at the Disaggregate Level—Driver's License Status

Driver's license status makes a dramatic difference in mode choice for non-work travel among people who are at least 16 years old (Table 6-5). Licensed drivers make 75.8 percent of their trips for non-work travel as drivers of privately operated vehicles, 18.7 percent as passengers of privately operated vehicles, 4.1 percent by walking, and the remaining 1.4 percent by transit, bicycle, and other means. In contrast, non-licensed drivers make 56.9 percent of their person trips for non-work travel as passengers of privately operated vehicles, 22.5 percent by walking, 11.5 percent by public transit, and the remaining 9.1 percent as drivers, by bicycle, or by other means. This general pattern of difference between licensed and non-licensed drivers holds true across the racial and ethnic groups.

Table 6-5. Modal Distribution of Person Trips for Non-Work Travel by License Status, 16 Years or Older, 1995

License Status	Mode		Non-Hispanic				All
		Hispanic	White	Black	Asian	Others	
Licensed	POV Driver	74.4	76.2	74.8	73.2	74.1	75.8
	POV Passenger	18.4	18.9	17.2	16.2	19.2	18.7
	Public Transit	1.2	0.4	2.1	1.4	0.5	0.6
	Bicycle	0.3	0.4	0.3	0.2	0.1	0.3
	Walk	5.2	3.6	4.9	8.7	5.7	4.1
	Others	0.6	0.5	0.6	0.4	0.3	0.5
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**85**	**95**	**81**	**90**	**90**	**92**
Non-Licensed	POV Driver	4.7	3.4	2.2	2.1	1.0	3.3
	POV Passenger	51.5	66.0	41.2	57.5	58.4	56.9
	Public Transit	12.6	5.6	22.5	13.8	11.9	11.5
	Bicycle	1.0	2.0	1.8	0.8	1.5	1.7
	Walk	27.3	18.7	27.5	23.0	23.4	22.5
	Others	2.9	4.3	4.7	2.8	3.7	4.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**15**	**5**	**19**	**10**	**10**	**8**
Group Size		**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS.

Across individual racial and ethnic groups, there are several variations in patterns of modal difference by license status. Licensed drivers among people of color and Whites are surprisingly similar in their share of non-work travel as drivers of privately operated vehicles. While the share of non-work travel made as drivers of privately operated vehicles is 76.2 percent for Whites, it ranges from 73.2 percent to 74.4 percent for people of color. Differences in relative modal shares between Blacks and Whites are larger among licensed drivers than among non-licensed drivers when they travel by public transit. Black licensed drivers are over five times as likely as White licensed drivers to use public transit, while the ratio of transit modal shares is about 4 times among non-drivers. Asian licensed drivers are about two and a half times as likely to walk for non-work travel as White licensed drivers.

Overall, modal differences across the racial and ethnic groups are much greater among non-licensed drivers than among licensed drivers. This is true for each group. Among licensed drivers, Asians differ the most from Whites in modal distributions. Among non-licensed drivers, however, it is Blacks that differ the most from Whites in modal distributions.

Modal Differences at the Disaggregate Level—Household Income

For all racial and ethnic groups combined, people from different levels of household income differ little in the proportion of their non-work travel as passengers of privately operated vehicles (Table 6-6). They differ mainly in the proportion of their non-work travel as drivers, by transit, and by walking. The proportion of non-work travel as drivers of privately operated vehicles by people living in households with incomes less than $15,000 is smaller than that by people living in households with incomes at least $15,000 by about 10 percentage points. In contrast, people with the lowest household incomes make 11.6 percent and 4.6 percent of their non-work travel by walking and public transit, respectively, compared to 6.2 percent and 1.2 percent for people with medium household incomes and 5.2 percent and 0.6 percent for people with the highest household incomes.

Across individual racial and ethnic groups, there are several variations in patterns of modal difference by income level. First, for trips made as drivers of privately operated vehicles, the difference in relative modal shares between people of color and Whites tends to decrease with increases in household income. The largest decrease occurs among Blacks. Others households with incomes less than $15,000 make a much larger share of their non-work travel as passengers of privately operated vehicles than Whites in the same income range but a similar share by walking. Asians with household incomes of less than $15,000 make a much larger share of their non-work travel by public transit than do Asians with higher household incomes. Relative differences in transit modal shares between Hispanics and Blacks and Whites are much smaller among people with at least $50,000 in household incomes. For example, Hispanics with household incomes ranging between $15,000 and $49,999 are four times as likely as Whites in the same income range to use public transit for their non-work activities. Hispanics with at least $50,000 in household income, however, are only twice as likely as Whites in the same income range to use public transit. Relative differences in walking modal shares are also smaller among people in households with at least $50,000 in incomes for Hispanics and Blacks. For example, Blacks with household incomes of less than $15,000 are over twice as likely to walk for non-work travel as Whites in the same income range. Blacks in households with at least $50,000 in income, however, are just as likely as Whites in the same income range to walk for non-work travel.

Table 6-6. Modal Distribution of Person Trips for Non-Work Travel by Income, 1995

Household Income	Mode	Hispanic	Non-Hispanic				All
			White	Black	Asian	Others	
Under $15,000	POV Driver	40.0	56.2	34.4	46.9	45.5	48.7
	POV Passenger	32.6	29.7	30.5	22.7	39.0	30.6
	Public Transit	6.2	1.8	11.3	9.7	3.6	4.6
	Bicycle	2.3	1.8	1.7	0.2	0.6	1.8
	Walk	15.8	8.4	17.9	15.7	9.0	11.6
	Others	3.1	2.2	4.3	4.6	2.2	2.8
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**19**	**10**	**24**	**9**	**16**	**12**
$15,000-$49,999	POV Driver	50.0	60.7	52.2	60.1	54.7	58.4
	POV Passenger	34.7	30.5	28.8	22.6	32.5	30.6
	Public Transit	2.2	0.5	4.4	1.7	1.1	1.2
	Bicycle	0.7	0.9	1.1	0.3	1.7	1.0
	Walk	9.8	5.0	9.1	13.5	8.1	6.2
	Others	2.7	2.4	4.4	1.8	1.8	2.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**50**	**45**	**52**	**48**	**50**	**47**
$50,000+	POV Driver	53.4	58.5	55.8	52.2	55.8	57.9
	POV Passenger	34.7	32.4	32.6	34.5	28.6	32.6
	Public Transit	0.9	0.5	2.5	1.8	0.9	0.6
	Bicycle	0.4	1.1	0.3	0.8	1.2	1.0
	Walk	7.6	4.8	5.0	8.3	10.7	5.2
	Others	2.9	2.7	3.8	2.4	2.8	2.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**30**	**45**	**23**	**43**	**34**	**41**
Group Size		**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS.

Overall, modal differences across the groups decrease significantly with levels of household income. For individual groups, Blacks differ the most from Whites in modal distribution among people with household incomes of less than $15,000. Hispanics differ the most from Whites in modal distribution among people with the middle range of household income. Finally, Asians differ the most from Whites among people with at least $50,000 in household income.

Modal Differences at the Disaggregate Level—Vehicle Ownership

For all racial and ethnic groups combined, people from households with different vehicle ownership levels differ little in the proportion of their non-work travel as passengers of privately operated vehicles (Table 6-7). They do differ in the use of other means, however, especially between people in households with no vehicle vs. those with at least one vehicle. People in households with no vehicles make 33.6 percent of their non-work travel by walking, 17.4 percent by public transit, and only 10.4 percent as drivers of privately operated vehicles. In contrast, people in households with one vehicle make 8.2 percent of their non-work travel by walking, 1.7 percent by transit, and 58.4 percent as drivers. Modal differences between people in households with one vehicle and people in households with two or more are smaller, with people with at least two household vehicles making fewer trips by transit and walking.

Table 6-7. Modal Distribution of Person Trips for Non-Work Travel by Vehicle Ownership, 1995.

Vehicle Ownership	Mode	Hispanic	Non-Hispanic				All
			White	Black	Asian	Others	
None	POV Driver	8.7	12.8	9.1	2.3	6.7	10.4
	POV Passenger	19.6	37.8	27.7	18.1	23.6	31.1
	Public Transit	22.1	9.9	23.4	30.0	20.3	17.4
	Bicycle	1.5	4.0	1.7	0.5	0.2	2.5
	Walk	42.6	30.9	32.6	48.0	40.1	33.6
	Others	5.5	4.7	5.6	1.2	9.2	5.1
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**8**	**3**	**15**	**6**	**4**	**5**
One	POV Driver	46.1	62.9	51.3	57.7	54.4	58.4
	POV Passenger	36.3	26.8	29.2	21.4	32.7	28.5
	Public Transit	2.3	0.9	4.6	1.9	1.4	1.7
	Bicycle	1.4	0.8	1.2	1.2	0.3	0.9
	Walk	11.6	6.7	9.9	16.1	9.5	8.2
	Others	2.3	1.9	3.8	1.7	1.8	2.3
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**30**	**21**	**38**	**24**	**30**	**24**
Two +	POV Driver	56.5	60.2	59.3	58.1	58.1	59.8
	POV Passenger	34.8	32.0	30.5	32.2	30.3	32.1
	Public Transit	0.4	0.3	1.3	0.5	0.5	0.4
	Bicycle	0.7	1.0	0.7	0.6	1.8	1.0
	Walk	5.0	3.9	4.3	6.1	6.9	4.1
	Others	2.6	2.6	3.8	2.5	2.4	2.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**62**	**77**	**47**	**70**	**66**	**72**
Group Size		**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS.

Across individual racial and ethnic groups, there are several variations in patterns of modal difference by vehicle ownership. First, while Asians with at least one household vehicle are almost as likely as Whites with at least one household vehicle to drive for non-work activities, Asians without vehicles are only one-fifth as likely as their White counterparts to drive for non-work activities. Second, while people of color with at least one vehicle are as likely as their White counterparts to travel as passengers of privately operated vehicles, people of color without vehicles are much less likely to travel as passengers than their White counterparts. Third, while Blacks make the largest share of their non-work travel by public transit among people in households with at least one vehicle, it is Asians who make the largest share of their non-work travel by public transit among people in households without any vehicle. Fourth, Blacks in households with at least two vehicles are only slightly more likely to walk for non-work travel than are Whites in households with at least two vehicles. Other people of color with at least two household vehicles are far more likely to walk for non-work travel than Whites with at least two household vehicles.

Overall, modal differences are minimal among people in households with at least two vehicles but are large among people living in households with fewer vehicles, particularly without any vehicle.

Modal Differences at the Disaggregate Level—Household Lifecycle

For all racial and ethnic groups combined, people in households with a single adult are more likely to travel for non-work purposes as drivers of privately operated vehicles, by public transit, and by walking than people in households with more than one adult (Table 6-8). People in households with more than one adult, on the other hand, are far more likely to travel as passengers of privately operated vehicles for non-work travel than people in households with only one adult. These two population segments are similar in using bicycles and other means for non-work travel.

Table 6-8. Modal Distribution of Person Trips for Non-Work Travel by Lifecycle, 1995

Lifecycle	Mode	Hispanic	Non-Hispanic				All
			White	Black	Asian	Others	
Single-Adult	POV Driver	45.5	66.8	45.5	66.1	61.6	61.2
	POV Passenger	29.8	20.9	25.5	10.9	23.3	22.4
	Public Transit	5.7	1.5	8.3	4.1	1.6	3.1
	Bicycle	1.5	1.2	1.4		0.1	1.2
	Walk	12.0	7.7	15.3	18.8	11.2	9.6
	Others	5.4	1.9	4.0	0.1	2.3	2.5
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	14	15	26	13	17	16
Multi-Adult	POV Driver	50.5	58.3	50.1	53.3	53.8	56.6
	POV Passenger	34.8	32.9	31.1	31.5	32.4	32.9
	Public Transit	2.1	0.5	4.9	2.2	1.5	1.1
	Bicycle	0.9	1.0	0.9	0.8	1.5	1.0
	Walk	9.4	4.7	9.0	9.6	8.4	5.8
	Others	2.3	2.6	4.1	2.6	2.5	2.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	86	85	74	87	83	84
Group Size		10	75	11	2	2	100

Source: Travel Day File, 1995 NPTS. An empty cell indicates no sampled trips.

Across individual racial and ethnic groups, there are several variations in patterns of modal difference by household lifecycle. First, while both Hispanics and Blacks in multi-adult households are less likely to drive for non-work activities than their White counterparts, Hispanics and Blacks in single-adult households are far less likely to drive than do their White counterparts. Second, except for Asians, Hispanics, Blacks, and Others in a single-adult household are more likely to travel as passengers of privately operated vehicles than their White counterparts. Third, the differences in transit share between people of color and Whites are larger among those living in multi-adult households than among those living in single-adult households.

Overall, modal differences across the racial and ethnic groups are much smaller among people living in households without at least two adults than among people living in households with only one adult.

Modal Differences at the Disaggregate Level—Area Size

For all racial and ethnic groups combined, modal distributions differ little across different metropolitan area size under 3,000,000 people (Table 6-9). About 59 percent of person trips for non-work travel are made as drivers of privately operated vehicles, 32 percent as passengers of privately operated vehicles, 0.3-0.8 percent by public transit, 0.7 to 1.5 percent by bicycles, 4.0 to 5.1 percent by walking, and 2.5 to

Table 6-9. Modal Distribution of Person Trips for Non-Work Travel by Metropolitan Area Size, 1995

Area Size	Mode	Hispanic	Non-Hispanic				All
			White	Black	Asian	Others	
Outside MSA	POV Driver	55.2	60.2	52.0	53.9	60.6	59.3
	POV Passenger	39.1	31.7	35.9	34.6	29.7	32.4
	Public Transit	0.5	0.3	0.1	0.1	0.0	0.3
	Bicycle	1.5	1.2	1.2	2.0	2.0	1.2
	Walk	1.8	4.0	5.8	3.6	4.7	4.0
	Others	2.0	2.7	4.9	5.7	3.0	2.8
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**13**	**23**	**15**	**5**	**24**	**21**
Under 500,000	POV Driver	52.8	60.4	56.4	57.2	53.3	59.3
	POV Passenger	37.8	31.5	30.4	26.4	35.6	31.9
	Public Transit	0.8	0.3	1.9	1.3	0.4	0.5
	Bicycle	1.4	1.5	1.6	0.6	1.8	1.5
	Walk	4.0	4.0	6.7	12.4	6.4	4.3
	Others	3.3	2.4	3.0	2.2	2.5	2.5
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**13**	**17**	**11**	**8**	**13**	**15**
500,000-999,999	POV Driver	44.0	61.8	54.9	60.8	55.1	59.2
	POV Passenger	47.4	30.9	32.0	22.2	39.7	32.6
	Public Transit	0.4	0.4	2.2	6.1	1.6	0.7
	Bicycle	0.6	0.8	0.6	0.9	0.3	0.7
	Walk	5.5	3.7	6.4	9.0	2.1	4.2
	Others	2.0	2.4	3.9	1.1	1.1	2.5
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**8**	**9**	**8**	**9**	**7**	**9**
1,000,000-	POV Driver	57.0	59.9	51.8	55.4	54.0	58.6
	POV Passenger	33.0	31.6	32.4	26.5	33.3	31.8
	Public Transit	0.6	0.5	4.1	0.3	0.2	0.8
	Bicycle	0.9	1.0	1.1	1.8	1.5	1.0
	Walk	5.5	4.7	6.2	14.0	7.4	5.1
	Others	3.0	2.4	4.4	2.0	3.6	2.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**14**	**18**	**16**	**18**	**13**	**17**
3,000,000+	POV Driver	46.7	58.1	44.3	53.7	52.9	54.4
	POV Passenger	30.1	30.2	26.3	30.4	27.6	29.5
	Public Transit	4.5	1.2	9.5	2.8	3.1	2.9
	Bicycle	0.8	0.9	0.9	0.3	0.7	0.9
	Walk	15.0	7.1	15.0	10.5	13.7	9.6
	Others	2.8	2.4	4.0	2.2	2.0	2.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**52**	**34**	**50**	**60**	**42**	**38**
Group Size		**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS.

2.8 percent by other means. The modal distribution in metropolitan areas with at least 3,000,000 in population differs somewhat with other areas, however. Fewer trips are made by privately operated vehicles, while more trips are made by public transit and walking.

Some differences in modal distribution among the racial and ethnic groups by metropolitan area size differ from the general patterns observed from all groups combined. Outside metropolitan areas, Hispanics seem to have an unusually low share of walking trips compared to all other groups (1.8 percent vs. 3.6 to 4.8 percent). In metropolitan areas with less than 500,000 people, Asians have a relatively high share of walking trips (12.4 percent vs. 4.0 to 6.7 percent). In metropolitan areas with 500,000 to 1,000,000 people, Hispanics make relatively low shares of their non-work trips as drivers of privately operated vehicles or by public transit and a high share of their non-work trips as passengers of privately operated vehicles. Asians make a relatively low share of their non-work trips as passengers of privately operated vehicles but a relatively high share of their non-work trips by public transit (6.1 percent vs. 0.4 to 2.2 percent). In metropolitan areas with 1,000,000 to 3,000,000 people, Asians make a particularly high share of their non-work trips by walking (14.0 percent vs. 4.7 to 7.4 percent).

Metropolitan area size does not seem to have systematic effects on overall modal differences across racial and ethnic groups or which group differs the most from Whites in modal distribution.

Modal Differences at the Disaggregate Level—Area Density

For all racial and ethnic groups combined, modal distributions do not differ much across different levels of urbanization outside urban areas (Table 6-10). About 58-60 percent of non-work trips are made as drivers of privately operated vehicles, 31-34 percent as passengers of privately operated vehicles, 0.2 to 1.0 percent by public transit, 0.8 to 1.2 percent by bicycles, 3.6 to 6.4 percent by walking, and 2.1 to 3.7 percent by other means. Urban areas differ dramatically from other areas in the use of public transit, walking, and privately operated vehicles. About 47.8 percent and 25.9 percent of non-work trips in urban areas are made as drivers and passengers of privately operated vehicles, respectively, while 6.6 percent and 16.7 percent of non-work trips in urban areas are by public transit and walking, respectively.

However, area density seems to have some effect on the modal distribution of non-work travel by Asians. In towns, for example, Asians have the highest shares of their non-work trips made by public transit and bicycles among the racial and ethnic groups. In second cities, Asians have the highest shares of their non-work trips made by public transit and by walking among the racial and ethnic groups. In urban areas, on the other hand, Asians have the lowest share of their non-work trips made by walking.

Similar to the case with metropolitan area size, area density does not seem to have systematic effects on overall modal differences across racial and ethnic groups or on which group differs the most from Whites in modal distribution.

Modal Differences at the Disaggregate Level—Trip Purpose

Modal distributions vary with trip purposes (Table 6-11). For travel to school and religious activities, the largest share is made as passengers of privately operated vehicles, followed by drivers of privately operated vehicles, other means (including school buses), walking, public transit, and bicycle. A much larger share of trips for personal and family business is made as a driver of privately operated vehicles than for social and recreational activities, while larger shares of trips are made as passengers of privately operated vehicles, by public transit, by bicycles, by walking, or by other means for social and recreational activities than for personal and family business. The most notable difference from the pattern of modal differences across racial and ethnic groups from all non-work purposes is that Asians make a significantly higher share of their school and religious trips by walking than any other group.

Table 6-10. Modal Distribution of Person Trips for Non-Work Travel by Density, 1995

Urbanization Classification	Mode	Hispanic	Non-Hispanic				All
			White	Black	Asian	Others	
Rural	POV Driver	50.6	58.9	52.2	53.0	52.8	57.8
	POV Passenger	41.9	33.2	34.4	38.9	36.4	33.9
	Public Transit	0.6	0.2			0.0	0.2
	Bicycle	2.1	1.0	1.0		2.2	1.1
	Walk	2.3	3.5	4.9	2.1	5.3	3.6
	Others	2.5	3.2	7.6	5.9	3.4	3.4
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**13**	**22**	**10**	**3**	**23**	**20**
Town	POV Driver	57.6	60.2	54.6	56.5	56.8	59.6
	POV Passenger	34.1	31.9	33.9	29.3	31.4	32.1
	Public Transit	0.2	0.2	0.6	1.2	0.1	0.3
	Bicycle	0.8	1.2	1.8	4.9	1.4	1.2
	Walk	2.9	3.6	4.9	4.0	5.7	3.7
	Others	4.4	2.9	4.1	4.0	4.6	3.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**15**	**25**	**12**	**10**	**18**	**22**
Suburb	POV Driver	51.6	60.8	57.1	59.8	57.9	59.7
	POV Passenger	36.3	31.1	28.4	30.8	29.9	31.2
	Public Transit	0.6	0.6	3.4	0.5	0.9	0.8
	Bicycle	0.7	0.8	0.4	0.2	1.0	0.8
	Walk	7.7	4.6	5.5	6.5	8.6	5.1
	Others	3.2	2.1	5.2	2.1	1.8	2.5
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**23**	**26**	**19**	**36**	**23**	**25**
Second City	POV Driver	49.8	61.2	52.6	46.5	62.9	58.5
	POV Passenger	36.9	29.5	33.6	26.9	28.7	30.9
	Public Transit	1.3	0.6	2.6	3.4	0.5	1.0
	Bicycle	0.8	1.3	0.7	0.4	0.8	1.1
	Walk	9.0	5.5	7.3	20.9	5.8	6.4
	Others	2.2	1.9	3.1	1.9	1.4	2.1
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**19**	**18**	**24**	**18**	**17**	**19**
Urban	POV Driver	44.0	54.1	38.5	53.9	45.6	47.8
	POV Passenger	26.4	26.3	24.4	26.5	27.5	25.9
	Public Transit	7.3	3.0	13.1	4.7	6.0	6.6
	Bicycle	0.9	1.0	1.4	0.3	0.6	1.1
	Walk	19.3	14.1	19.7	13.0	18.9	16.7
	Others	2.0	1.5	3.0	1.7	1.3	2.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**30**	**9**	**35**	**33**	**20**	**15**
Group Size		**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS. Empty cells indicate no sampled trips.

Table 6-11. Modal Distribution of Person Trips for Non-Work Travel by Purpose, 1995

Purpose	Mode	Hispanic	Non-Hispanic				All
			White	Black	Asian	Others	
Personal/Family	POV Driver	61.0	70.6	58.4	66.8	66.6	68.1
	POV Passenger	27.0	24.0	25.0	22.6	24.9	24.5
	Public Transit	2.2	0.5	5.2	2.2	1.0	1.2
	Bicycle	0.3	0.4	0.6	0.2	0.3	0.4
	Walk	8.8	4.0	9.6	7.8	7.0	5.2
	Others	0.7	0.5	1.2	0.4	0.3	0.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**57**	**57**	**59**	**55**	**57**	**58**
School/Religious	POV Driver	22.9	32.3	26.9	27.0	30.4	30.2
	POV Passenger	44.6	39.5	36.3	32.4	40.5	39.4
	Public Transit	4.2	1.3	6.7	4.5	2.6	2.6
	Bicycle	0.4	1.2	0.2	0.8	0.3	0.9
	Walk	12.6	7.5	11.1	22.5	9.4	9.1
	Others	15.4	18.2	18.7	12.8	16.8	17.8
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**13**	**10**	**15**	**15**	**12**	**11**
Social/Recreational	POV Driver	40.4	48.6	40.2	47.0	43.5	47.0
	POV Passenger	43.1	41.0	36.4	38.6	38.4	40.7
	Public Transit	2.7	0.7	6.7	1.7	2.0	1.5
	Bicycle	2.5	2.1	2.4	1.6	3.4	2.2
	Walk	10.4	6.5	12.6	10.6	11.7	7.6
	Others	0.9	1.0	1.6	0.4	1.0	1.1
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**30**	**32**	**26**	**31**	**31**	**31**
Group Size		**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS.

Overall, modal differences across the racial and ethnic groups are smaller for personal/family business and for social/recreational activities than for school/religious activities. Blacks differ the most in modal distributions from Whites for personal/family business and for social and recreational activities, while Asians differ the most from Whites for school and religious activities.

Modal Differences at the Disaggregate Level—Trip Distance

Trip distance significantly affects the means people use for their non-work travel (Table 6-12). For all racial and ethnic groups combined, walking is the dominant mode for trips under a quarter mile, accounting for 48.6 percent of all non-work person trips under a quarter mile. Bicycles account for 4.8 percent. Public transit has a minimal role for these short trips. What is surprising is that privately operated vehicles account for over 45 percent of these short trips, with 15.2 percent as passengers and 30.4 percent as drivers. Beyond a quarter mile of length, mode distribution changes dramatically. The share of trips made as passengers of privately operated vehicles increases to 46.1 percent for trips longer than 30 miles. The share of trips by public transit increases to 1.6 percent for trips between 1 to 5 miles and remains approximately at that level for longer trips. Bicycling and walking quickly lose their appeal for trips longer than one mile.

Table 6-12. Modal Distribution of Person Trips for Non-Work Travel by Trip Distance, 1995

Trip Distance in Miles	Mode	Hispanic	Non-Hispanic				All
			White	Black	Asian	Others	
0-0.25	POV Driver	28.6	32.9	22.4	26.8	24.5	30.4
	POV Passenger	18.5	15.1	14.1	10.0	10.3	15.2
	Public Transit	0.1	0.1	0.9		0.1	0.2
	Bicycle	3.4	5.2	3.5	3.4	6.9	4.8
	Walk	49.2	46.0	57.0	59.9	56.9	48.6
	Others	0.2	0.7	2.1		1.4	0.8
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**10**	**7**	**10**	**10**	**10**	**8**
0.25-1	POV Driver	46.4	59.5	45.3	43.5	52.8	56.0
	POV Passenger	28.8	26.5	26.7	28.3	28.1	26.8
	Public Transit	1.9	0.3	2.9	1.2	0.3	0.8
	Bicycle	1.8	2.3	2.4	0.5	1.9	2.2
	Walk	19.4	9.9	20.5	24.8	15.9	12.5
	Others	1.8	1.6	2.2	1.7	1.1	1.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**27**	**23**	**24**	**23**	**23**	**24**
1-5	POV Driver	55.3	63.9	53.5	61.8	59.7	61.9
	POV Passenger	36.0	30.8	31.3	29.5	32.8	31.3
	Public Transit	2.5	0.7	6.9	3.9	1.9	1.6
	Bicycle	0.5	0.6	0.4	0.8	0.6	0.6
	Walk	2.1	1.1	3.1	1.5	1.7	1.4
	Others	3.6	2.9	5.0	2.5	3.3	3.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**34**	**38**	**36**	**37**	**34**	**37**
5-10	POV Driver	54.6	61.9	57.9	64.6	61.9	60.9
	POV Passenger	37.1	34.0	31.9	30.0	33.9	34.0
	Public Transit	3.1	0.7	5.7	1.1	1.0	1.4
	Bicycle	0.3	0.2		0.3	0.0	0.2
	Walk	0.1	0.1	0.2		0.2	0.1
	Others	4.9	3.1	4.3	4.0	3.0	3.4
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**14**	**15**	**15**	**14**	**15**	**15**
10-20	POV Driver	59.0	60.5	56.8	58.9	60.6	60.0
	POV Passenger	37.3	36.7	31.8	37.1	36.0	36.2
	Public Transit	2.7	0.5	6.1	1.9	1.8	1.3
	Bicycle		0.0	0.3		0.4	0.1
	Others	1.0	2.4	5.0	2.2	1.2	2.5
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**8**	**10**	**9**	**11**	**9**	**10**
20+	POV Driver	48.9	60.2	52.4	71.3	54.2	58.5
	POV Passenger	48.0	37.8	36.7	25.4	43.8	38.5
	Public Transit	1.3	0.6	9.0	2.8	0.4	1.4
	Bicycle		0.0				0.0
	Others	1.9	1.4	1.9	0.5	1.7	1.5
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**7**	**7**	**5**	**5**	**8**	**7**
Group Size		**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS. No walking trips were sampled beyond 10 miles. Empty cells indicate no sampled trips.

Across individual racial and ethnic groups, there are several variations in patterns of modal difference by trip distance. First, changes in the share of non-work trips made as drivers of privately operated vehicles between the very short trips and trips 5 to 10 miles long are larger for Blacks and Others than those for Whites. For example, the Black share increases from 22.4 percent for trips under a quarter mile long to 57.9 percent for trips 5 to 10 miles long, compared to an increase from 32.9 percent to 61.9 percent for Whites. Second, Asians and Others make a particularly low share of the non-work trips as passengers of privately operated vehicles for trips under a quarter mile long (10 percent vs. 14 to 19 percent). Third, the decline in the role of walking for longer trips is larger for Whites than for people of color. For example, the Asian share of walking trips for non-work travel drops from 59.9 percent for trips under a quarter mile to 24.8 percent for trips a quarter to one mile long, compared to a drop from 46.0 percent to 9.9 percent for Whites between these same distances.

The patterns of modal differences across racial and ethnic groups for each of the trip distance ranges differ little qualitatively from the general pattern observed from trips of all lengths. However, modal differences across racial and ethnic groups do vary with trip distance. Data seem to indicate that modal distributions differ less among the racial and ethnic groups for trips between 1 to 20 miles than trips outside this range.

Modal Differences at the Disaggregate Level—Time of Day

For all racial and ethnic groups combined, driving privately operated vehicles accounts for 59.7 percent of non-work trips during the midday and 55.0 percent during the peak hours or at night (Table 6-13). The share of non-work trips made as passengers of privately operated vehicles is highest at 37.6 percent at night and lowest at 27.9 percent during the midday. Public transit accounts for 1.6 percent of non-work trips during the midday, 1.4 percent during the peak hours, and 0.9 percent at night. Walking accounts for 7.1 percent of non-work travel during the midday, 6.4 percent during the peak hours, and 4.5 percent at night.

Across individual racial and ethnic groups, there are several variations in patterns of modal difference by household lifecycle. The comparative differences in shares of non-work travel as a driver of a privately operated vehicles between people of color and Whites is smallest during night hours. Asians make a larger share of their non-work travel as drivers of privately operated vehicles at night than do Whites. The pattern of the relative likelihood of using public transit for non-work travel between people of color and Whites varies across individual groups of people of color. The relative likelihood is similar for peak hours and midday for Hispanics, lower during the peak hours than during the midday for Blacks, and higher during the peak hours than the midday for Asians and Others. People of color are more likely to walk for non-work travel than Whites, the difference is highest during the peak hours and smallest at night.

Overall, modal differences across the racial and ethnic groups are smaller at night than during other times of the day. Modal differences between Asians and Whites, however, are smaller for the peak hours than other times of the day. Furthermore, Blacks differ the most from Whites for both peak hours and midday hours, while Asians differ the most from Whites at night.

Table 6-13. Modal Distribution of Person Trips for Non-Work Travel by Time of Day, 1995

Time of Day	Mode	Hispanic	Non-Hispanic				All
			White	Black	Asian	Others	
Peak: 7-9 AM, 4-7 PM	POV Driver	48.2	57.4	46.3	53.0	52.6	55.0
	POV Passenger	34.2	32.6	31.0	29.6	29.3	32.4
	Public Transit	2.5	0.6	5.0	2.9	1.7	1.4
	Bicycle	1.2	1.3	1.0	0.7	1.4	1.2
	Walk	10.7	4.9	11.3	10.1	11.3	6.4
	Others	3.2	3.2	5.4	3.7	3.7	3.5
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**33**	**31**	**34**	**31**	**30**	**32**
Midday: 9AM - 4 PM	POV Driver	51.1	62.2	50.3	53.3	57.0	59.7
	POV Passenger	31.4	27.8	25.4	29.1	29.0	27.9
	Public Transit	2.9	0.7	7.3	2.4	1.6	1.6
	Bicycle	0.9	1.0	1.1	0.7	1.2	1.0
	Walk	10.5	5.8	12.0	12.5	8.9	7.1
	Others	3.1	2.5	3.9	2.0	2.3	2.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**30**	**34**	**29**	**33**	**34**	**33**
Night: Other Hours	POV Driver	49.6	56.3	49.8	62.4	54.3	54.9
	POV Passenger	40.2	37.5	37.2	26.8	37.6	37.6
	Public Transit	2.0	0.4	3.7	1.7	0.8	0.9
	Bicycle	0.7	0.8	0.9	1.0	1.3	0.8
	Walk	6.5	3.9	6.2	7.5	5.2	4.5
	Others	1.0	1.2	2.3	0.5	0.8	1.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Segment Size	**37**	**34**	**37**	**36**	**36**	**35**
Group Size		**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS.

ROLE OF AGE, LICENSE STATUS, AND VEHICLE OWNERSHIP

Modal differences across racial and ethnic groups are minimal among several segments of the population, including people with at least two household vehicles, licensed drivers, workers, and people households with high incomes. Among these characteristics, being a licensed driver seems to play the largest role in modal differences across the racial and ethnic groups. For licensed drivers, modal differences are small for a variety of characteristics besides vehicle ownership, employment status, and household income. The one exception to this result seems to be among people who live in households without any vehicle. Modal differences are significant for non-licensed drivers among people living in households with at least two vehicles, workers, or people living in households with an annual income at least $50,000.

The above evidence supports the hypothesis that modal distributions differ across racial and ethnic groups mainly because of modal differences among non-licensed drivers and people without household vehicles. To see the size of the population segment of non-licensed drivers and people without household vehicles, Table 6-14 shows population distribution by license status and vehicle ownership for each of the racial and ethnic groups and for two population universes. For all racial and ethnic groups combined, non-licensed drivers and people without any household vehicles account for 13 percent of the population age

Table 6-14. Population Distribution by License Status and Vehicle Ownership, 1995

Racial and Ethnic Groups	Population Age 16 or Older		Population Age 5 or Older	
	Drivers in Households with Vehicles	Non-Drivers or Drivers in Households without Vehicles	Drivers in Households with Vehicles	Non-Drivers or Drivers in Households without Vehicles
Hispanic	77	23	59	41
White	91	9	76	24
Black	68	32	54	46
Asian	83	17	70	30
Others	85	15	70	30
All	87	13	72	28

Source: Person File, 1995 NPTS.

16 or older and for 28 percent of the population age 5 or older. These shares differ among the racial and ethnic groups. On one extreme, this population segment accounts for 9 percent of people age 16 or older and for 24 percent of people age 5 or older among Whites. On the other extreme, this population segment accounts for 32 percent of people age 16 or older and for 46 percent of people age 5 or older among Blacks.

Table 6-15 shows modal distributions for each racial and ethnic group by person age, driver's license status, and vehicle ownership. Public transit and walking play a significant role in meeting the non-work travel needs of non-licensed drivers or people without household vehicles, accounting for 11.7 percent and 23.5 percent, respectively. In contrast, these two modes account for 0.4 percent and 3.6 percent for drivers with vehicles. However, privately operated vehicles still account for more than half of the non-work travel for non-licensed drivers or people without household vehicles.

Among drivers with household vehicles, modal distributions are remarkably similar. The two notable differences are that Blacks still proportionally make more trips by public transit (1.3 percent vs. 0.3 to 0.6 percent) and that Asians walk proportionally more for their non-work travel (7.6 percent vs. 3.4 to 5.4 percent).

Among non-licensed drivers or people without household vehicles, the differences in modal distributions are large. However, most differences are qualitatively similar the general pattern of difference observed at the aggregate level. One notable exception is that Asians and Others, not Hispanics and Blacks, travel proportionally less frequently than other groups as drivers of privately operated vehicles. Also, it is Whites, not Hispanics, that have the highest share of non-work trips made as passengers of privately operated vehicles.

Table 6-15. Modal Distribution of Person Trips for Non-Work Travel by Person Age, License Status, and Vehicle Ownership, 1995

Age	License Status and Vehicle Ownership	Mode	Hispanic	Non-Hispanic				Total
				White	Black	Asian	Others	
16 or Older	Drivers in Households with Vehicles	POV Driver	75.9	76.7	77.7	75.2	74.7	76.6
		POV Passenger	18.5	18.9	16.8	16.1	19.1	18.6
		Public Transit	0.5	0.3	1.3	0.6	0.4	0.4
		Bicycle	0.3	0.3	0.1	0.1	0.1	0.3
		Walk	4.3	3.4	3.6	7.6	5.4	3.6
		Others	0.5	0.5	0.5	0.3	0.3	0.5
		Total	100.0	100.0	100.0	100.0	100.0	100.0
		Segment Size	**63**	**77**	**60**	**72**	**73**	**73**
	Non-Drivers or Drivers in Households without Vehicles	POV Driver	8.5	8.7	8.2	2.8	3.6	8.2
		POV Passenger	45.5	58.5	37.6	49.7	55.6	50.7
		Public Transit	14.1	6.0	20.8	16.4	11.6	11.7
		Bicycle	0.9	2.6	1.9	0.9	1.4	2.0
		Walk	28.1	20.2	27.1	27.6	24.2	23.5
		Others	2.8	4.0	4.4	2.5	3.6	3.8
		Total	100.0	100.0	100.0	100.0	100.0	100.0
		Segment Size	**13**	**5**	**19**	**10**	**9**	**8**
Under 16		POV Driver	1.3	3.6	1.1	0.5	1.1	3.0
		POV Passenger	70.7	73.5	59.4	70.2	66.7	71.2
		Public Transit	2.1	0.7	5.8	2.0	1.0	1.5
		Bicycle	2.7	3.7	3.0	3.0	5.5	3.5
		Walk	14.6	8.4	16.8	14.4	15.1	10.4
		Others	8.6	10.1	13.9	9.9	10.5	10.4
		Total	100.0	100.0	100.0	100.0	100.0	100.0
		Segment Size	**24**	**18**	**21**	**18**	**18**	**19**
Group Size			**10**	**75**	**11**	**2**	**2**	**100**

Source: Travel Day File, 1995 NPTS.

ROLE OF RACIAL AND ETHNIC BACKGROUND IN TRANSIT USE

To further explore the question of whether or not context variables can fully explain the differences in mode choice across racial/ethnic groups, this analysis turned to the application of additional statistical tools. One powerful tool to delineate the role of racial and ethnic background on mode choice is regression analysis. Regression analysis allows one to measure the effects of racial and ethnic background on mode choice, while controlling many other variables that may also affect mode choice. Logistic regression, a particular method of regression analysis, was used to examine the role of racial and ethnic background on whether public transit was used by respondents on their travel day. Logistic regression is used because the variable to be explained, i.e., whether public transit was used, takes only two values, 1 if a respondent used public transit on the travel day and zero otherwise. A detailed review of the hypothesis tests and results are provided in Appendix C.

Three sets of hypotheses are tested. They relate to whether each group of people of color differs from Whites in using public transit for non-work travel among three population segments: the mobile population, the immobile population, and the young population. The mobile population includes all people who are at least 16 years old, licensed to drive, and live in households with at least one vehicle. The immobile population includes all people who are at least 16 years old and are not licensed to drive or people who are at least 16 years old and live in households without vehicles. The young population includes all people who are under 16 years old. The role of racial and ethnic background in the use of public transit for non-work travel is separately tested for these population segments because the analysis earlier suggests that modal differences between people of color and Whites differ across these population segments. For a given population segment, four hypotheses are tested, one for each group of people of color.

Four sets of additional variables are used to control effects of factors other than racial and ethnic background on transit use for non-work travel. The set including age, driver's license status, and vehicle ownership has three dummy variables: Mobile, Immobile, and Young. These three variables are used to determine which of the three sets of hypotheses is being tested. If a model includes Immobile and Young as two variables and interacts Mobile with the racial and ethnic variables, it will be used to test the hypotheses related to the Mobile population.

When people of color are tested against Whites regarding transit use for non-work travel, the other three sets of variables are used to control how similar they are in factors other than race and ethnicity. The geographic characteristics include area scale, area density, proximity to transit stops, and whether one lives in the New York area. The personal and household characteristics other than age, license status, or vehicle ownership includes education attainment, employment status, household life cycle, and household income. The travel day characteristics include whether the travel day was on a weekend and whether the travel day was in December, January, or February.

For the mobile population, both Hispanics and Blacks are statistically different from Whites in whether they use public transit for non-work travel when they can be different in their geographical characteristics. However, only Blacks are statistically different from Whites when they are identical in geographic characteristics.

The results for the immobile population are the same as those for the mobile population when the racial and ethnic groups are controlled to be identical in geographical characteristics. That is, only Blacks are statistically different from Whites. When the racial and ethnic groups can be different in geographical characteristics, however, the results for the immobile population differ from those for the mobile population. If the personal and household characteristics are controlled to be identical between people of color and Whites, all four groups of people of color are different from Whites in whether they use public transit for non-work travel. If the personal and household characteristics can be different as well, all but Asians are different from Whites.

The overall results for the young population are identical to those for the mobile population. That is, both Hispanics and Blacks are statistically different from Whites in whether they use public transit for non-work travel when they can be different in their geographical. However, only Blacks are statistically different from Whites when they are identical in geographic characteristics.

Thus, when characteristics other than racial and ethnic background are appropriately controlled, only Blacks differ from Whites in whether public transit is used for non-work travel and that difference is far less than one would anticipate from reviewing aggregate mode choice differences across groups.

A COMPARISON OF WORK AND NON-WORK TRAVEL MODE CHOICE

One might reasonably question whether or not observations about mode choice for non-work travel for different racial and ethnic groups carry over to behaviors for work travel. While this study does not explore that issue in detail, this section provides a brief overview of work vs. non-work travel.

Table 6-16 shows modal distributions of person trips for each of the racial and ethnic groups and all groups combined by trip purpose (work vs. non-work) and by year (1983 vs. 1995). Only people age 16 or older are included in the tabulation for meaningful comparisons.[16] Modal distributions in Table 6-16 are compared in a number of ways. First, driving and public transit play a larger role in work travel than in non-work travel, while the other modes play a larger role in non-work travel than in work travel (Figure 64). These modal differences between work and non-work travel declined from 1983 to 1995 for trips made as drivers of privately operated vehicles, as passengers of privately operated vehicles, by public transit, and by walking, but increased for trips by bicycle and by other means.

The role of driving increased for both work and non-work travel from 1983 to 1995, while the roles of riding in privately operated vehicles as passengers, public transit, and walking decreased for both work and non-work travel during the same period (Figure 6-4). The increase in the role of driving is larger for non-work travel than for work travel, while the decreases in the roles of riding privately operated vehicles as passengers, public transit, and walking are smaller for non-work travel than for work travel.

Modal differences between work and non-work travel vary across racial and ethnic groups for several modes. While driving plays a larger role in work travel than in non-work travel for all racial and ethnic groups, that role is relatively smaller for Blacks than for the other groups. In addition, the differences for public transit are largest among Whites and smallest among Hispanics. Whites are almost four times as likely to use public transit for work travel as for non-work travel, while Hispanics are about twice as likely to use public transit for work travel as for non-work travel. Also, walking plays a relatively larger role in work travel for Whites than any group of people of color.

Changes in modal shares from 1983 to 1995 generally are in the same direction for work and non-work travel for each of the racial and ethnic groups (Figure 6-5). The magnitude of changes, however, differs somewhat between work and non-work travel. For the modes whose share increased during the period, including driving only, the increase is larger for non-work travel than for work travel for all groups. For the modes whose share decreased during the period, including riding privately operated vehicles as passengers, public transit, and walking, the decrease is typically smaller for non-work travel than for work travel.

Differences in modal shares between people of color and Whites vary between work and non-work travel for all of the major modes except driving privately operated vehicles. For example, while riding privately operated vehicles as passengers plays a larger role in work travel for people of color than for Whites, it plays almost an identical role in non-work travel for all groups. In addition, while public transit plays a larger role in both work and non-work travel for people of color than for Whites, the relative role of public transit between people of color and Whites is even bigger in non-work travel than in work travel.

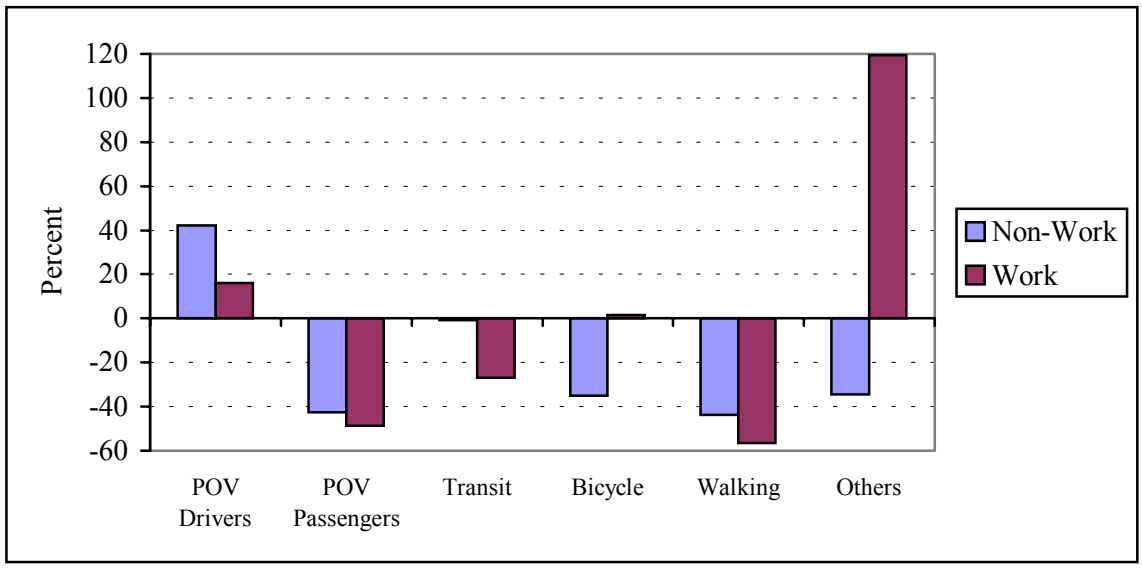
[16] A better universe for the comparisons would be people who are in the labor force. The different surveys unfortunately do not have a uniformly defined variable measuring labor force participation. They do have a uniformly defined variable measuring whether a respondent was working in the week before the interview. However, this variable is too restrictive to have reasonably large samples for analysis.

Table 6-16. Mode Choice by People Age 16 or Older by Purpose, 1983 and 1995

Purpose	Mode	1983					1995				
		Hispanic	White	Black	Others	All	Hispanic	White	Black	Others	All
Non-Work	POV Drivers	41.2	51.1	38.5	44.6	49.5	64.4	72.6	61.7	66.8	70.4
	POV Passengers	38.7	37.5	34.2	37.7	37.5	23.1	21.3	21.6	21.7	21.5
	Transit	4.3	0.8	6.8	3.9	1.4	2.8	0.6	5.8	2.0	1.4
	Bicycle	0.6	0.7	0.4	1.3	0.7	0.4	0.4	0.5	0.2	0.4
	Walking	14.4	8.7	18.1	12.3	9.6	8.4	4.4	9.0	8.6	5.4
	Others	0.8	1.2	2.0	0.2	1.2	0.9	0.7	1.4	0.6	0.8
	Total	100	100	100	100	100	100	100	100	100	100
Work	POV Drivers	60.5	75.2	51.5	64.8	72.5	77.4	86.8	72.5	79.5	84.1
	POV Passengers	24.7	15.8	21.5	19.7	16.9	10.9	7.9	11.4	10.9	8.7
	Transit	8.3	2.8	17.9	11.1	4.5	5.5	1.8	11.6	5.2	3.3
	Bicycle	0.4	0.4	0.2	0.0	0.4	0.3	0.4	0.2	0.7	0.4
	Walking	5.7	5.1	7.6	4.4	5.2	3.8	1.9	3.0	3.2	2.3
	Others	0.4	0.6	1.3	0.0	0.6	2.1	1.3	1.5	0.5	1.3
	Total	100	100	100	100	100	100	100	100	100	100

Source: 1983 and 1995 NPTS.

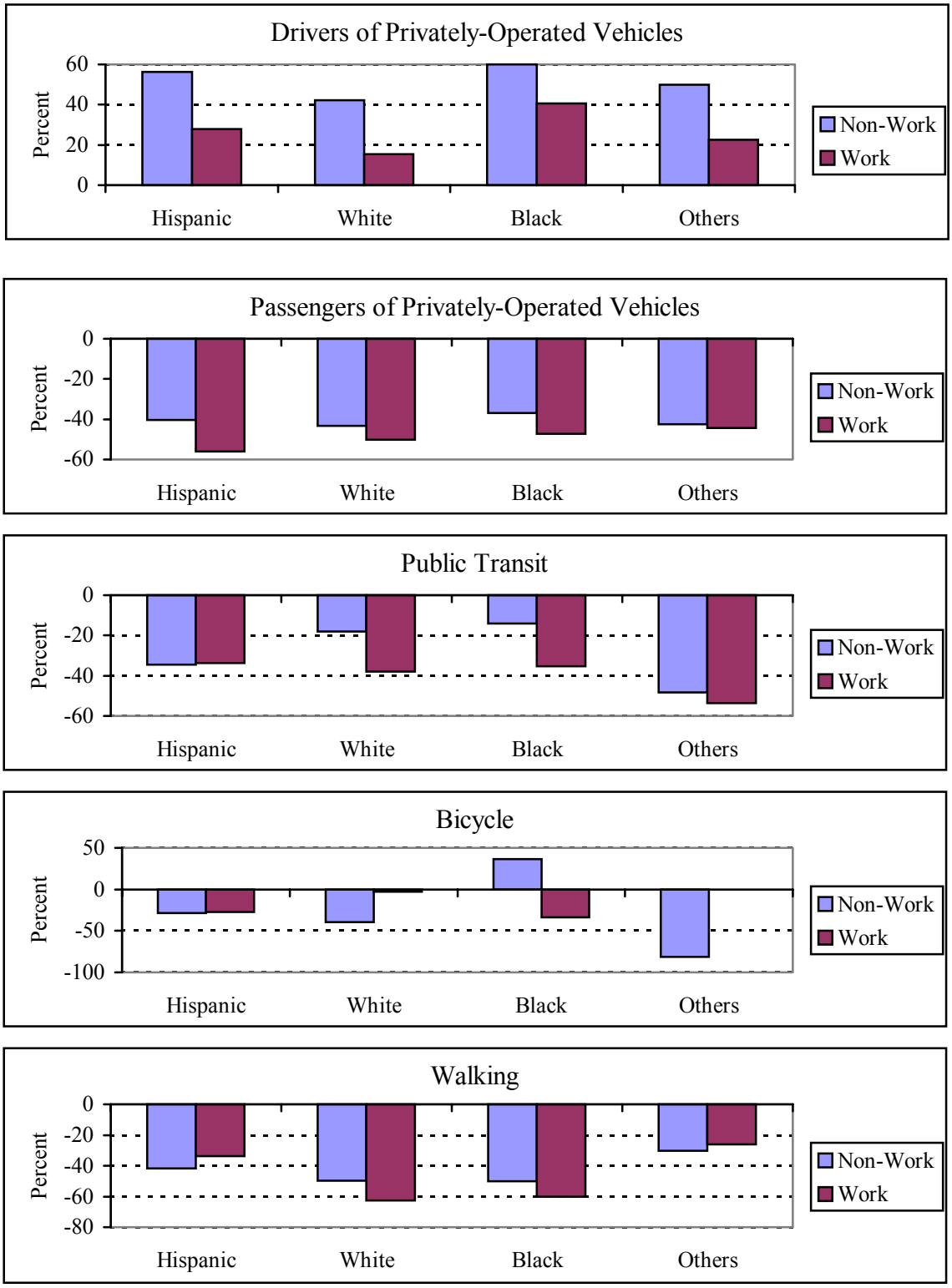
Figure 6-4. Change in Modal Shares Between 1983 and 1995 by Purpose



Source: 1983 and 1995 NPTS.

Finally, the overall differences in modal distributions between people of color and Whites are smaller for non-work trips than for work trips. In addition, overall modal differences between people of color and Whites declined from 1983 to 1995 for both work and non-work travel. Also, overall modal differences are largest between Blacks and Whites and smallest between Others and Whites.

Figure 6-5. Comparing Changes in Modal Shares From 1983 to 1995



Source: Travel Day File, 1995 NPTS.

SUMMARY

Context and Objectives

The transportation planning community is best prepared to help in meeting the needs of travelers when they have a strong knowledge base on travel behavior. Transportation investments in facilities and services can be most wisely planned and issues such as future transportation demand, impacts, and equity, best addressed in the context of a rich understanding of the public's travel behavior. This report endeavors to contribute to the body of knowledge on travel behavior through a comprehensive look at mode choice behavior. Specifically, mode choice for non-work travel is investigated in detail to identify differences between racial/ethnic groups including White, Black, Hispanic, Asian and Other.

A broad understanding of travel behavior involves knowledge of many aspects, including why, when, and how people travel, how frequently, far, and fast people travel; and how these aspects vary with time, geography, and the demographic characteristics of the population. The Nationwide Personal Transportation Survey (NPTS) provides a valuable data source for exploring these issues. The analysis reported on in this paper presents a focused review of a particularly interesting component of travel behavior.

Travel by people of color is of strong policy interest because it is a growing and changing share of the total travel market and is expected to continue to grow much faster than overall travel well into the next century. This growth has been driven both by the growth in minority population and by the significant increases in travel rates by minority individuals. The mode choice of this population segment is also changing rapidly.

Another reason for the high interest in travel behavior of minority populations is the fact that mobility is essential to the quality of life and economic well being of all people and minority populations historically have not had the same high level of mobility enjoyed by Whites in this country. Thus, understanding travel behavior for minorities also enables policy makers to explore the role that transportation may be playing in influencing the economic opportunity and quality of life of the minority population.

Understanding non-work travel is becoming increasingly important due to its growing influence on people's lives and the transportation system. Non-work travel includes travel for personal and family business, school activities, religious activities, health care, social and recreational activities, and any other activities not related to commuting or work. From 1969 to 1995, work travel's share continued its declined from more than 26 percent to about 20 percent of all local travel.[17] Although work travel was growing substantially during this period, non-work travel was growing even more dramatically. Even during traditional commuting rush periods, non-work travel comprises more than 70 percent of all trips. The large share and fast growth of non-work travel have important implications to transportation planning. The resultant changes in both temporal and spatial distributions of travel in our metropolitan areas influence the types of investments, services, and policies that can be used to address travel needs.

Mode choice determines how people travel and is an important part of travel behavior. The NPTS data base enables consideration of six mode choice options: driving privately operated vehicles, riding in privately operated vehicles as passengers, public transit, bicycle, walking, and others.[18] This analysis

[17] The 1969 number is derived from Hu, Patricia S., and Jennifer Young (1993), *1990 NPTS Databook*, Washington, D.C.: FHWA, while that for 1995 is computed from the 1995 NPTS by the authors.

[18] Privately operated vehicles mean motor vehicles that are privately owned and operated, including automobiles, vans, sports utility vehicles, pickup trucks, other trucks, recreational vehicles, motorcycles, and others. Public transit includes bus, commuter train, streetcar/trolley, and subway/elevated rail. School bus is included in the "others."

compares modal differences across groups by examining how patterns of difference in mode choice vary with personal, household, geographic, and trip characteristics. For each age cohort selected, for example, the analysis examines whether the pattern of modal differences among these racial and ethnic groups differs, both qualitatively and quantitatively, from the general pattern observed at the aggregate level. The analysis also explores which of these characteristics may be largely responsible for the modal differences observed at the aggregate level across racial and ethnic groups. Finally, the paper reports on an investigation of the role of racial and ethnic background in whether public transit is used for non-work travel by simultaneously controlling for many of the personal, household, geographic, and trip characteristics examined earlier.

For people of color, historically, many of their characteristics limited them from having the high level of mobility provided by the automobile. Larger proportions of people of color live in households with low levels of income. Hispanic and Black household incomes are only 74 and 70 percent of the national average in 1995, respectively. Reasons for such income disparities include people of color being younger on average, having lower levels of education attainment, and being more likely to live in single-adult households with children. People of color spend fewer dollars but larger shares of their income on transportation. Fewer people of color age 16 or older are licensed drivers. Finally, people of color live in households with fewer vehicles; for example, about 20 percent of Blacks live in households without vehicles while only 3 percent of Whites live in zero-vehicle households.

People with lower mobility by the automobile tend to use transit and non-motorized modes to help compensate. When people perceive one means of transportation to be too costly or unavailable for them, they may use other means even if the performance is poorer. As a result some people may spend more time to achieve a given level of mobility at lower levels of comfort, reliability, security, and safety than the rest of the population. While such substitution may occur anywhere, transit substitution is made easier in large metropolitan areas or areas with high densities, where people of color are more likely to live than the rest of the population. Transit services are better in terms of frequency, and spatial and temporal coverage in larger areas and in areas with higher densities.

To set the context for this analysis of mode choice for non-work travel, this research initiative reviewed the growth and composition of the population of people of color and their mobility levels. The review of mobility levels looked at differences among racial and ethnic groups in the level of mobility for non-work activities from 1983 to 1995. The purpose was to examine the extent of disparities in mobility across racial and ethnic groups and how disparities may have changed during the period. This review, documented in a separate report, also looked at major determinants of mobility and characteristics of people of color that may limit them from achieving high levels of mobility.

Principal Findings

Mode Choice at the Aggregate Level

There are several distinctive patterns of difference in mode choice among the racial and ethnic groups. First, the largest differences in relative modal shares between people of color and Whites occur for trips by public transit and walking. People of color are several times as likely as Whites to use public transit for non-work travel and about twice as likely as Whites to walk for non-work travel. Blacks stand out among people of color in their use of public transit. Blacks are over 9 times as likely as Whites to use public transit for non-work travel, while other people of color are about 2 to 4 times as likely as Whites to use public transit for non-work travel.

While all people of color are less likely to drive for non-work travel than Whites, the extent of difference is larger for Hispanics and Blacks than for other people of color. While all people of color are more

likely than Whites to walk for non-work travel, the extent of difference is larger for Blacks and Asians than other people of color. Other people of color are about equally as likely as Whites to travel as passengers of privately operated vehicles for non-work travel; Hispanics are more likely than Whites to travel as passengers.

Modal Differences by Market Segments

Differences in mode choice across the racial and ethnic groups vary little with certain market segments but dramatically with others:

- Metropolitan area size, area density, or trip purpose do not seem to have systematic effects on modal differences across the racial and ethnic groups.
- Modal differences across the groups are slightly smaller among people age 16 to 64 than for other age cohorts, among males than for females, among people living in households with at least two adults than for people living in one-adult households, among trips 1 to 20 miles long than for other trips, and among night trips than for other trips.
- Modal differences across the racial and ethnic groups are much smaller among people with at least two household vehicles than for people with fewer vehicles, among workers than for non-workers, among people with high incomes than for people with lower incomes, and among people who are licensed to drive than for people not licensed to drive.
- Mode choice across the racial and ethnic groups is remarkably similar among people who are licensed to drive and live in households with vehicles. Modal differences are large, on the other hand, among people who are not licensed to drive or live in households without vehicles, especially those who are 16 years old or older.

Modal differences across racial and ethnic groups may vary with personal, household, geographic, and trip characteristics. For all racial and ethnic groups combined, privately operated vehicles have a dominant role in non-work travel. Driving privately operated vehicles accounts for 57.3 percent and riding in privately operated vehicles as passengers accounts for 31.2 percent of all person trips for non-work travel. Modes other than privately operated vehicles have modest roles in non-work travel, with walking accounting for 6.4 percent, public transit for 1.4 percent, bicycling for 1.0 percent, and other means for 2.7 percent.

License Status and Vehicle Ownership

Modal differences across racial and ethnic groups are minimal among several segments of the population, including people with at least two household vehicles, licensed drivers, workers, and people living in households with high incomes. For licensed drivers, modal differences are small for a variety of characteristics besides vehicle ownership, employment status, and household income. The one exception to this result seems to be among people who live in households without any vehicle. Regardless of license status, the modal difference among people without household vehicles is high, indicating significant differences in modal distributions across the racial and ethnic groups. On the other hand, modal differences are significant for non-licensed drivers among people living in households with at least two vehicles, workers, or people living in households with an annual income at least $50,000. This evidence supports the hypothesis that modal distributions differ across racial and ethnic groups mainly because of modal differences among non-licensed drivers and people without household vehicles. To see the size of the population segment of non-licensed drivers and people without household vehicles, Table 3 shows population distribution by license status and vehicle ownership for each of the racial and ethnic groups and for two population universes. For all racial and ethnic groups combined, non-licensed drivers and

people without any household vehicles account for 13 percent of the population age 16 or older and for 28 percent of the population age 5 or older. These shares differ among the racial and ethnic groups. On one extreme, this population segment accounts for 9 percent of people age 16 or older and for 24 percent of people age 5 or older among Whites. On the other extreme, this population segment accounts for 32 percent of people age 16 or older and for 46 percent of people age 5 or older among Blacks.

Public transit and walking play a significant role in meeting the non-work travel needs of non-licensed drivers or people without household vehicles, accounting for 11.7 percent and 23.5 percent of trips, respectively. In contrast, these two modes account for 0.4 percent and 3.6 percent of trips for drivers with vehicles. However, privately operated vehicles still account for more than half of the non-work travel for non-licensed drivers or people without household vehicles.

Among drivers with household vehicles, modal distributions are remarkably similar. The two notable differences are that Blacks still make more trips proportionally by public transit (1.3 percent vs. 0.3 to 0.6 percent) and that Asians walk proportionally more for their non-work travel (7.6 percent vs. 3.4 to 5.4 percent).

Among non-licensed drivers or people without household vehicles, the differences in modal distributions are large. However, most differences are qualitatively similar to the general pattern of difference observed at the aggregate level. One notable exception is that Asians and Others, not Hispanics and Blacks, travel proportionally less frequently than other groups as drivers of privately operated vehicles. Also, it is Whites, not Hispanics, that have the highest share of non-work trips made as passengers of privately operated vehicles.

Role of Racial and Ethnic Background in Transit Use

Racial and ethnic background appears to play a role in whether public transit is used on a typical day for non-work travel. When the racial and ethnic groups are controlled to be identical in a number of personal, household, geographic, and trip characteristics, only Blacks are found to be different from Whites in whether public transit was used for non-work travel on the travel day. This is true among people who are licensed to drive and live in households with vehicles, among people 16 years or older who are not licensed to drive or live in households without vehicles, and among people under 16 years old.

Three sets of hypotheses were tested with logistic regression. They explore whether each group of people of color differs from Whites in using public transit for non-work travel among three population segments: the mobile population, the immobile population, and the young population. The mobile population includes all people who are at least 16 years old, licensed to drive, and live in households with at least one vehicle. The immobile population includes all people who are at least 16 years old and are not licensed to drive or people who are at least 16 years old and live in households without vehicles. The young population includes all people who are under 16 years old.

For the mobile population, both Hispanics and Blacks are statistically different from Whites in whether they use public transit for non-work travel when they can be different in their geographical characteristics. However, only Blacks are statistically different from Whites when they are identical in geographic characteristics.

The results for the immobile population are the same as those for the mobile population when the racial and ethnic groups are controlled to be identical in geographical characteristics. That is, only Blacks are statistically different from Whites. When the racial and ethnic groups can be different in geographical characteristics, however, the results for the immobile population differ from those for the mobile population. If the personal and household characteristics are controlled to be identical between people of color

and Whites, all four groups of people of color are different from Whites in whether using public transit for non-work travel. If the personal and household characteristics can be different as well, all but Asians are different from Whites.

The overall results for the young population are identical to those for the mobile population. That is, both Hispanics and Blacks are statistically different from Whites in whether they use public transit for non-work travel when they can be different in their geographical characteristics. However, only Blacks are statistically different from Whites when they are identical in geographic characteristics. Excluding the New York MSA does not change the results.

Thus, when characteristics other than racial and ethnic background are appropriately controlled, only Blacks differ from Whites in whether public transit is used for non-work travel and these differences are far less than one would surmise from looking at aggregate data.

Implications

The data indicate that, to the extent that the economic and household characteristics of racial/ethnic group populations are similar to those of the White population so too is travel behavior similar to that of the White population. Racial/ethnic group traits critical to influencing travel behavior are moving quite rapidly to match those of the White population. Perhaps with the exception of some cultural characteristics such as an apparent greater willingness to use transit by Blacks, there is overwhelming evidence of a trend toward more comparable mobility levels across population segments.

While there remain some differences in behavior that are not explained by looking at other available variables, it is not clear that even these differences will be retained over the long term. Most obviously, the willingness of Blacks to use public transportation even when other characteristics of the population are held constant may be explained by Blacks having a greater awareness of transit options, generally living in areas with better transit service availability, and/or there being less of a stigma associated with transit use in the Black population—conditions that may or may not remain stable over time.

Auto-mobility has clearly spread to all segments of the population. The young, the old, the unemployed, the low income, and various minority racial/ethnic groups are all evidencing greater availability of auto travel options and lessened dependency on transit and other modes. As single occupant vehicle options have become available there is greater auto use.

The differences in mode choice behavior between racial/ethnic groups is subtle enough that one has to use sophisticated analytical tools to determine which behaviors can be explained by household characteristics before concluding which might have some cultural or other race/ethnicity based causal factor. The variety of variables in the NPTS data set enables one to go a long way toward this goal, however, other data items might also be helpful in fully understanding travel behavior differences. Specifically, better measures of transit service availability (frequency, span of service and coverage) could further explains some differences as might factors such as the time since immigration for new immigrants who may not have yet have adopted typical American travel behaviors.

A positive implication of this observation is that it argues in support of behavioral modeling that differentiates households or individuals on a variety of demographic traits but need not specifically include race/ethnicity variables. The collective results suggest that other factors appear to explain mode choice behaviors quite well. While mode choice by Blacks was significantly different, this may be partially explained by service levels available to Blacks or may be accommodated in the model calibration process. Additional analysis of the significance of this behavior difference and how it might be dealt with in travel modeling would merit further review.

The relatively strong economy in 1995 and subsequently may represent an unprecedented period of economic growth and opportunity that is influencing travel behavior more than would be the case in a more normal cyclical business environment. One can only speculate on how mode choice behaviors will be influenced going forward. Indeed, the 2000 NPTS should provide an important update of our understanding of travel behavior differences and trends. Strong TEA-21 funding for transit and numerous local initiatives to expand transit services and aggressive consideration and implementation of rail systems may begin to influence mode choice decisions in the future. The extent to which the overall growth in urban travel demand is outpacing capacity may also change the competitive position of roadway and alternative modes, perhaps influencing mode choice over time. Similarly, changes in the overall economy may differentially influence mode choice behavior of the various racial/ethnic groups. The extent to which findings from the 1995 data are sustained or the trends continued may have important policy implications to transportation planners.

This analysis looked most closely at mode split. Trip generation, and trip distribution (trip length) may also vary across racial/ethnic groups and the data on overall mobility suggest that, for example, Asian travel patterns may be different in the areas of trip generation and distribution. While beyond the scope of this analysis, this aspect of travel behavioral differences across groups may merit additional analysis.

Finally, the findings also suggest that the often reported American love affair with the automobile is not unique to only some segments of the population but rather quite inherent in the full population, or at least rapidly cultivated once someone resides in America. Thus, the fundamental nature of the population's values relative to mode choice decisions is quite constant given similar situations. At a minimum, this reinforces the stability of the fundamental values that drive mode choice decisions and reinforces the value of developing as rich an understanding of this behavior as possible in order to better serve the traveling public.

Chapter 6 Appendix A
Person- and Household-Based Identification of Race and Ethnicity

This note shows the percent of persons age five or older in the 1983 NPTS whose racial and ethnic background differs between household- and person-based identification.

A new race variable and a new ethnicity variable were created that identify household race and household ethnicity, respectively. These new variables were compared with the original variables. Furthermore, two variables were created to jointly define racial and ethnic groups, with one based on the original variables and the other based on the new variables. These two joint variables were also compared.

The results are shown in the Table 6A-1. The first column lists the joint racial and ethnic groups that are defined by household-based race and ethnicity. Columns (2) through (4) show differences in joint definitions of race and ethnicity, differences in race alone, and differences in ethnicity alone.

Several patterns emerge from the table. First, differences in race identification are minimal for Hispanics, Whites, and Blacks but significant for Asians and other races. Second, differences in ethnicity identification are significant for all but Blacks. Third, differences in race identification are much larger than differences in ethnicity identification. Fourth, differences in joint race and ethnicity identification are small for Whites and Blacks but large for Hispanics, Asians, and others.

Table 6A-1. Percent of Persons Five or Older Whose Race and/or Ethnicity Differ between Person-Based and Household-Based Identification, 1983

Joint Racial and Ethnic Groups	Differences in Race	Differences in Ethnicity
Hispanic	0.6	14.5
White	0.4	17.2
Black	0.9	1.5
Asian	6.9	5.4
Others	16.6	10.9
Invalid	1.0	9.2
All	0.7	14.9

Source: 1983 NPTS

Chapter 6 Appendix B
Indexes of Modal Difference

This appendix details how the indexes of modal differences are calculated for an example set of modal distributions for the racial and ethnic groups. Table 6B-1 shows the example and Table 6B-2 shows how the two indexes would be calculated with this set of modal distributions. To calculate the group index for Black, for example, one would first calculate the absolute difference in modal share between Blacks and Whites for each of the six modes. The results are 7.0 for trips made as drivers of privately-operated vehicles, 1.6 for trips made as passengers of privately-operated vehicles, 4.0 for public transit, 0.0 for bicycles, 3.7 for walking, and 1.0 for other means. One would then sum these differences up to get 17 in this case as the group index value for Blacks. The group index values can be similarly calculated for other groups. These group index values are shown at the bottom row of Table 6B-2. To calculate the overall index for all people of color, one would simply sum the group index values for all people of color to get 59 in this case. This overall index value is shown at the bottom of the right column.

Table 6B-1. Example Set of Modal Distributions

Mode	Hispanic	White	Black	Asian	Others
POV Driver	71.0	74.5	67.5	68.0	68.1
POV Passenger	17.9	18.0	16.3	18.3	27.4
Transit	3.0	0.6	4.6	2.5	0.7
Bicycle	0.5	1.0	0.9	0.3	0.6
Walking	6.7	5.7	9.4	8.2	3.0
Others	0.9	0.2	1.2	2.6	0.2
Total	100.0	100.0	100.0	100.0	100.0

Source: 1983 NPTS

Table 6B-2. Calculation of Group and Overall Indexes of Modal Difference between People of color and Whites

Mode	Hispanic	Black	Asian	Others	Overall
POV Driver	3.5	7.0	6.5	6.5	
POV Passenger	0.1	1.6	0.4	9.5	
Transit	2.4	4.0	1.9	0.1	
Bicycle	0.5	0.0	0.6	0.4	
Walking	1.0	3.7	2.5	2.7	
Others	0.7	1.0	2.4	0.1	
Group Index	**8**	**17**	**14**	**19**	**59**

Source: 1983 NPTS

Chapter 6 Appendix C
Logistic Regression Analysis of Role of Racial and Ethnic Background in Transit Use

HYPOTHESES AND VARIABLES

Three sets of hypotheses are tested. They relate to whether each group of people of color differs from Whites in using public transit for non-work travel among three population segments: the mobile population, the immobile population, and the young population. The mobile population includes all people who are at least 16 years old, licensed to drive, and live in households with at least one vehicle. The immobile population includes all people who are at least 16 years old and are not licensed to drive or people who are at least 16 years old and live in households without vehicles. The young population includes all people who are under 16 years old. The role of racial and ethnic background in the use of public transit for non-work travel is separately tested for these population segments because the analysis earlier suggests that modal differences between people of color and Whites differ across these population segments. For a given population segment, four hypotheses are tested, one for each group of people of color.

Four sets of additional variables are used to control effects of factors other than racial and ethnic background on transit use for non-work travel (Table 6C-1). The set including age, driver's license status, and vehicle ownership has three dummy variables: Mobile, Immobile, and Young. These three variables are used to determine which of the three sets of hypotheses is being tested. If a model includes Immobile and Young as two variables and interacts Mobile with the racial and ethnic variables, it will be used to test the hypotheses related to the Mobile population. Models for the other two population segments can be similarly constructed.

When people of color are tested against Whites regarding transit use for non-work travel, the other three sets of variables are used to control how similar they are in factors other than race and ethnicity. The geographic characteristics include area scale, area density, proximity to transit stops, and whether one lives in the New York area. The personal and household characteristics other than age, license status, or vehicle ownership includes education attainment, employment status, household life cycle, and household income. The travel day characteristics include whether the travel day was on a weekend and whether the travel day was in December, January, or February.

SAMPLES AND MODELS

The regression analysis uses a sample of persons from the 1995 NPTS who satisfy three conditions: 1) they made at least one person trip on their travel day; 2) they indicated that public transit was available in the city or town in which they resided; and 3) they had valid values for all variables included in the analysis.

Table 6C-1. Variables Used in Logistic Regressions

Category	Name	Definition
Dependent	Transit	1 for people who used transit at least once on travel day for non-work purpose; 0 otherwise
Racial and ethnic background	Hispanic	1 for Hispanics; 0 otherwise
	White	1 for non-Hispanic Whites; 0 otherwise
	Black	1 for non-Hispanic Blacks; 0 otherwise
	Asian	1 for non-Hispanic Asians; 0 otherwise
	Others	1 for non-Hispanic Others; 0 otherwise
Age, Driver's License, and Vehicle Ownership	Mobile	1 for people 16 years or older who are licensed drivers and live in households with vehicles; 0 otherwise
	Immobile	1 for people 16 years or older who are not licensed drivers or without vehicles; 0 otherwise
	Young	1 for people under 16 years old; 0 otherwise
Geographic	Large MSA	1 for people living in MSAs with at least 3 million; 0
	Urban	1 for people living in urban areas; 0 otherwise
	0.25 Miles to Stop	1 for people living within 0.25 miles of a transit stop; 0
	New York MSA	1 for people living in New York MSA; 0 otherwise
Personal and Household Features	College +	1 for people with college education or more; 0 otherwise
	Non-Worker	1 for non-workers; 0 otherwise
	Single-Adult Households	1 for people living in single-adult households; 0 otherwise
	Low Income	1 for people with household income under $15,000; 0
Travel Day Features	Weekday	1 if travel day was a weekday; 0 otherwise
	Winter	1 if travel day was in December, January, or February; 0

For each set of the hypotheses tested, a set of nine models was estimated to examine the robustness of the results. To test the hypotheses for the Mobile population, for example, all nine models include Young, Immobile, and four dummies for Hispanics, Blacks, Asians, and Others. The dummy for Whites is excluded because Whites are the benchmark group. Each of the included racial and ethnic dummies is interacted with Mobile. The coefficients on these common variables are to be interpreted relative to Whites who are licensed to drive and live in households with at least one vehicle. Our main interest is on the four racial and ethnic dummy variables for people of color. A coefficient that is not different from zero in terms of statistical significance for the Hispanic dummy, for example, would indicate that the Mobile population among Hispanics is no different from the Mobile population among Whites in the use of public transit for non-work travel.

The nine models differ in what sets of control variables as shown in Table 6C-2 are also included in them. Model 1 includes none of the control variables. Models 2-4 include one of the three sets of control variables. Models 5-7 include two of the three sets of control variables. Model 8 includes all three sets of control variables. Model 9 includes all three sets but excludes the dummy for the New York metropolitan area. All of the control variables are dummy variables. Consequently, each should be interpreted relative to the omitted categories related to it. Non-Worker, for example, should be interpreted relative to workers.

RESULTS

Tables 6C-2 through 6C-4 show the three sets of estimated models, with Table 6C-2 for the Mobile population, Table 6C-3 for the Immobile population, and Table 6C-4 for the Young population. In addition to the estimated coefficients, the tables also show estimated odds ratios. For example, the estimated odds ratio for the Immobile population in Model 1, Table 6C-2, is almost 34, indicating that the persons age 16 or older who are not licensed to drive or live in households without vehicles, regardless of racial and ethnic background, are 34 times as likely as White drivers with vehicles to use public transit for non-work travel. The odds ratio reduces to about 13 in Model 8, indicating that persons in the Immobile population are still 13 times as likely as White drivers with vehicles to use public transit for non-work travel even when they are identical in the geographic, personal, household, and travel day characteristics controlled in the model.

For the mobile population, both Hispanics and Blacks are statistically different from Whites in whether they use public transit for non-work travel when they can be different in their geographical characteristics shown in Table 6C-1 (Models 1, 3, 4, and 7 in Table 6C-2). However, only Blacks are statistically different from Whites when they are identical in geographic characteristics (Models 2, 5, 6, and 8). Excluding the dummy for New York MSA does not change the results (Model 9).

The results for the immobile population are the same as those for the mobile population when the racial and ethnic groups are controlled to be identical in geographical characteristics. That is, only Blacks are statistically different from Whites (Models 2, 5, 6, and 8 in Table 6C-3). Excluding the dummy for New York MSA does not change the results (Model 9 in Table 6C-3). When the racial and ethnic groups can be different in geographical characteristics, however, the results for the immobile population differ from those for the mobile population. If the personal and household characteristics are controlled to be identical between people of color and Whites, all four groups of people of color are different from Whites in whether using public transit for non-work travel. If the personal and household characteristics can be different as well, all but Asians are different from Whites.

The overall results for the young population are identical to those for the mobile population. That is, both Hispanics and Blacks are statistically different from Whites in whether they use public transit for non-work travel when they can be different in their geographical characteristics shown in Table 6C-1 (Models 1, 3, 4, and 7 in Table 6C-4). However, only Blacks are statistically different from Whites when they are identical in geographic characteristics (Models 2, 5, 6, and 8). Excluding the dummy for New York MSA does not change the results (Model 9).

Thus, when characteristics other than racial and ethnic background are appropriately controlled, only Blacks differ from Whites in whether public transit is used for non-work travel.

Table 6C-2. Logistic Models on the Role of Racial and Ethnic Background in the Use of Transit among Licensed Drivers with Vehicles, 1995

Independent Variables	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio
Hispanic · Mobile	0.35	1.43	-0.05*	0.95	0.43	1.54	0.37	1.44	-0.01*	0.99	-0.03*	0.97	0.44	1.56	0.00*	1.00	-0.01*	0.99
Black · Mobile	1.54	4.67	1.10	2.99	1.69	5.41	1.54	4.68	1.25	3.50	1.10	3.00	1.69	5.39	1.26	3.51	1.20	3.32
Asian · Mobile	0.54*	1.72	0.23*	1.26	0.26*	1.30	0.55*	1.73	-0.02*	0.98	0.24*	1.27	0.26*	1.30	-0.01*	0.99	-0.10*	0.91
Others · Mobile	0.08*	1.08	-0.26*	0.77	0.16*	1.17	0.09*	1.09	-0.18*	0.84	-0.26*	0.77	0.17*	1.18	-0.17*	0.84	-0.11*	0.89
Immobile	3.53	33.96	2.79	16.31	3.38	29.30	3.53	34.01	2.53	12.55	2.79	16.34	3.38	29.34	2.53	12.58	2.72	15.22
Under 16	1.70	5.47	1.51	4.54	1.72	5.57	1.70	5.47	1.26	3.54	1.52	4.55	1.72	5.57	1.27	3.55	1.41	4.10
Large MSA			0.42	1.52					0.45	1.57	0.43	1.53			0.46	1.59	0.63	1.87
Urban			0.84	2.32					0.81	2.24	0.84	2.32			0.81	2.24	1.02	2.76
0.25 Miles from Stop			0.64	1.90					0.57	1.77	0.64	1.90			0.58	1.79	0.60	1.82
New York MSA			0.85	2.35					1.04	2.83	0.86	2.36			1.05	2.86	2.72	
College or Graduate					0.41	1.50			0.26	1.29			0.41	1.50	0.25	1.29	0.30	1.35
Non-Worker					0.40	1.50			0.58	1.79			0.40	1.50	0.58	1.79	0.49	1.63
Single-Adult Households					0.38	1.47			0.29	1.34			0.39	1.48	0.30	1.35	0.28	1.33
Low Income					0.71	2.03			0.73	2.08			0.70	2.01	0.73	2.07	0.67	1.95
Weekday							0.15	1.16			0.16	1.17	0.17	1.19	0.19	1.21	0.19	1.21
Winter							-0.17	0.85			-0.23	0.80	-0.16	0.85	-0.26	0.77	-0.23	0.80
Constant		-4.74		-5.53		-5.38		-4.81		-6.10		-5.60		-5.47		-6.20		-6.31
Observations		52,837		52562		44222		52837		43996		52562		44222		43996		43996
-2 Log Likelihood																		
Initial		16054		15945		13255		16054		13151		15945		13244		13151		13151
Final		12679		11501		10109		12664		9128		11480		10096		9105		9281

Source: SPSS Logistic Regression procedure, using the 1995 NPTS. Coefficients with * are not significant at the 5 percent level.

Table 6C-3. Logistic Models on the Role of Racial and Ethnic Background in the Use of Transit among Non-Licensed Drivers or People without Vehicles, 1995

Independent Variables	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio
Hispanic · Immobile	0.50	1.65	-0.10*	0.91	0.59	1.81	0.51	1.66	-0.10*	0.91	-0.09*	0.91	0.60	1.82	-0.08*	0.92	0.07*	1.07
Black · Immobile	1.14	3.14	0.78	2.18	1.12	3.05	1.15	3.16	0.71	2.04	0.79	2.20	1.13	3.08	0.73	2.07	0.68	1.98
Asian · Immobile	0.34*	1.40	0.03*	1.03	0.49	1.63	0.34*	1.40	0.28*	1.33	0.03*	1.03	0.50	1.65	0.31*	1.37	0.40*	1.50
Others · Immobile	0.55	1.73	0.03*	1.03	0.64	1.90	0.55	1.74	0.14*	1.15	0.04*	1.04	0.67	1.96	0.17*	1.19	0.33*	1.39
Mobile	-2.60	0.07	-2.26	0.10	-2.40	0.09	-2.59	0.07	-1.97	0.14	-2.25	0.11	-2.40	0.09	-1.96	0.14	-2.15	0.12
Under 16	-1.27	0.28	-0.99	0.37	-1.11	0.33	-1.27	0.28	-0.99	0.37	-0.98	0.37	-1.10	0.33	-0.98	0.37	-1.01	0.36
Large MSA			0.42	1.53					0.45	1.57	0.43	1.53			0.46	1.58	0.62	1.86
Urban			0.83	2.30					0.81	2.25	0.83	2.30			0.81	2.24	1.02	2.77
0.25 Miles from Stop			0.63	1.88					0.59	1.80	0.64	1.89			0.60	1.81	0.61	1.85
New York MSA			0.92	2.50					1.08	2.94	0.92	2.52			1.09	2.96		
College or Graduate					0.40	1.50			0.23	1.26			0.40	1.50	0.23	1.26	0.28	1.32
Non-Worker					0.40	0.49			0.55	1.73			0.40	1.49	0.55	1.73	0.47	1.60
Single-Adult Households					0.41	1.51			0.29	1.34			0.42	1.52	0.30	1.35	0.29	1.34
Low Income					0.67	1.95			0.72	2.05			0.65	1.92	0.71	2.03	0.65	1.91
Weekday							0.16	1.17			0.17	1.18	0.19	1.21	0.21	1.24	0.21	1.24
Winter							-0.18	0.84			-0.23	0.80	-0.17	0.84	-0.25	0.78	-0.22	0.81
Constant		-1.77		-3.03		-2.55		-1.84		-3.82		-3.11		-2.66		-3.95		-3.88
Observations		53094		52817		44375		53094		44149		52817		44375		44149		44149
-2 Log Likelihood																		
Initial		16034		15924		13201		16034		13132		15924		13226		13132		13132
Final		12623		11467		10091		12606		9149		11446		10103		9126		9309

Source: SPSS Logistic Regression procedure, using the 1995 NPTS. Coefficients with * are not significant at the 5 percent level.

Table 6C-4. Logistic Models on the Role of Racial and Ethnic Background in the Use of Transit among People Under 16 Years Old, 1995

Independent Variables	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio	Coeff.	Odds Ratio
Hispanic · Young	0.62	1.86	0.09*	1.09	0.40	1.49	0.63	1.88	-0.23*	0.79	0.10*	1.10	0.41	1.51	-0.23*	0.80	-0.11*	0.89
Black · Young	1.74	5.70	1.15	3.15	1.42	4.14	1.74	5.71	0.82	2.27	1.14	3.13	1.42	4.15	0.81	2.26	0.83	2.29
Asian · Young	0.52*	1.69	0.11*	1.11	0.68*	1.98	0.51*	1.67	0.28*	1.32	0.11*	1.11	0.67*	1.95	0.28*	1.32	0.30*	1.35
Others · Young	0.72*	2.06	0.25*	1.28	0.56*	1.75	0.72*	2.05	0.09*	1.10	0.25*	1.29	0.57*	1.78	0.11*	1.12	0.24*	1.28
Immobile	2.48	11.88	1.69	5.45	2.22	9.16	2.48	11.91	1.52	4.58	1.69	5.44	2.22	9.20	1.52	4.58	1.60	4.97
Mobile	-0.67	0.51	-0.86	0.42	-0.74	0.48	-0.67	0.51	-0.72	0.49	-0.86	0.42	-0.74	0.48	-0.72	0.49	-0.84	0.43
Large MSA			0.42	1.52					0.46	1.58	0.43	1.53			0.47	1.60	0.63	1.88
Urban			0.83	2.29					0.81	2.25	0.83	2.29			0.81	2.25	1.01	2.74
0.25 Miles from Stop			0.63	1.87					0.59	1.80	0.63	1.87			0.59	1.81	0.61	1.84
New York MSA			0.83	2.30					1.01	2.76	0.84	2.31			1.02	2.79		
College or Graduate					0.36	1.44			0.22	1.25			0.36	1.44	0.22	1.24	0.26	1.30
Non-Worker					0.38	1.47			0.56	1.74			0.38	1.47	0.56	1.74	0.47	1.61
Single-Adult Households					0.35	1.42			0.28	1.33			0.36	1.43	0.29	1.33	0.27	1.31
Low Income					0.67	1.96			0.72	2.06			0.66	1.94	0.71	2.04	0.65	1.92
Weekday							0.14	1.15			0.14	1.16	0.18	1.19	0.19	1.21	0.19	1.21
Winter							-0.17	0.85			-0.21	0.81	-0.15	0.86	-0.23	0.79	-0.20	0.82
Constant		-3.69		-4.40		-4.17		-3.76		-5.06		-4.47		-4.26		-5.16		-5.16
Observations		53,086		52809		44362		53086		44136		52809		44362		44136		44136
-2 Log Likelihood																		
Initial		16069		15959		13242		16069		13149		15959		13242		13149		13149
Final		12655		11518		10157		12641		9183		11500		10144		9163		9330

Source: SPSS Logistic Regression procedure, using the 1995 NPTS. Coefficients with * are not significant at the 5 percent level.

Chapter 7
Variation in Metropolitan Travel Behavior by Sex and Ethnicity

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INTRODUCTION

Researchers have long observed that travel behavior varies systematically by sex and by ethnicity. However, the underlying causes of these differences and their policy implications have been subject to ongoing debate. In particular, there is an extensive literature comparing and contrasting the travel patterns of men and women, though relatively few studies have explicitly examined the combined influence of sex and ethnicity on travel behavior—the focus of this study.[1]

This research uses recently published data from the Nationwide Personal Transportation Survey (NPTS) to examine patterns of metropolitan travel by sex and ethnicity along three dimensions: (1) the choice of travel mode, (2) commuting to and from work, and (3) the purpose of travel. We use both cross-tabulations of data and multi-variate analyses (using both weighted and unweighted data) to explore ethnic and sex variations in travel behavior for metropolitan trips under 75 miles in length and 180 minutes in duration. In a nutshell, we find that race/ethnicity appears to be a more important influence than sex on mode choice and commuting behavior, although sex differences persist, especially by household type. Our analysis of non-work travel, however, reveals sharp distinctions between men and women across ethnic groups. Despite significant increases in paid labor force participation by women over the last third of the twentieth century, these data suggest that women continue to shoulder far more responsibility than men for maintaining households (and for household-serving travel). As a consequence, we find that women, regardless of race/ethnicity, are more likely than men to chain trips together into tours. This has important implications for urban transportation planning and policy. For example, the relative inflexibility of fixed-route transit service is often poorly suited to chaining multiple trips together across a metropolitan area. Public transit systems may need to develop new, more flexible forms to better adapt to the needs of trip-chaining travelers.

In recent years, researchers have argued that observed sex differences in travel behavior apply more to whites, who have higher incomes, own more automobiles, and are more likely to reside in metropolitan suburbs, than to persons of color. Several recent studies have explored the travel behavior of women of color, and compared trip time, length, and mode both with men of the same ethnicity and with white men and women (e.g. Johnston-Anumonwo 1995; McLafferty and Preston 1997; Spain 1997). To the extent that these studies have aimed to address a particular aspect of the commute-based spatial mismatch theory, they have not described the overall patterns of travel by sex and ethnicity. For example, in comparing black and white women's commute durations, while controlling for location of both residence and job, McLafferty and Preston (1997) allude to the fact that, in American cities, patterns of home location, job location, household structure, income, and mode of travel vary systematically by ethnicity. While it

[1] This research was conducted with funding from the U.S. Federal Highway Administration, through a sub-contract with Battelle and the authors are grateful for this support. The authors thank Aaron Clark and Norman Wong for their research assistance on this project. Any errors or omissions are the responsibility of the authors, and not of the University of California, Battelle, or the U.S. Federal Highway Administration.

might be possible to explain the ethnic and sex differences in travel by way of other characteristics (e.g., by simultaneously controlling for commute mode, wages, occupation, education, marriage, parenthood, and residence), the fact that these characteristics are not randomly distributed across sex-ethnicity groups is still important; transportation policy which favors one group of urban travelers over another may inadvertently discriminate on the basis of sex, ethnicity, or income level. In addition, most studies focusing on a specific metropolitan area have compared white women only with black and/or Latina women; here, we make comparisons which include both those of Asian descent and "others," which include Native Americans.

MODE CHOICE

- Women hold drivers' licenses at nearly the rate of men, particularly in younger cohorts, and have nearly as many vehicles-per-driver as men do.
- Ethnicity and income are better predictors (than sex) of licensing and automobile availability, and thus mode choice and number of trips taken.
- Men are more likely than women to drive alone, and women are more likely to carpool and to ride transit—mostly buses—particularly at lower income levels and in urban centers.
- Women now make more daily trips, on average, than men do—excepting Asians.

The use of different transportation modes—driving, walking, transit, et cetera—is closely connected with the number of trips taken, the speed, and the distance of trips (Giuliano 1979; Spain 1997). Historically, men have, on average, taken more trips and traveled more miles than women (Wachs 1991; Lave 1992; Pisarski 1996). However, there has been some disagreement about whether men's travel has become "saturated" and thus cannot continue to grow at a high rate (Lave 1992; Rey, et al. 1994) or whether women's travel is converging with that of men (Pisarski 1996). Rey, et al. (1994), using 1990 NPTS data, showed that average person-trips, vehicle-trips, vehicle-miles, and person-miles were still increasing for both men and women, but that average daily person-trips was the only category in which the growth in women's travel had overtaken that of men. Since the 1983 NPTS, travel behavior data have shown that women have taken more daily trips per person than men; however, due to sex differences in mode choice, women have historically taken fewer trips in vehicles than men have. To explore how the use of transportation modes varies across demographic groups, we explore here sex and ethnic differences in automobile use, vehicle availability, and public transit use.

Automobility

Access to an automobile historically has been one of the most important predictors of the means of travel—or "mode choice"—and sex differences in automobile availability have been noted by many scholars as a partial explanation for women's higher likelihood to use non-automobile modes such as public transit or walking (e.g. Blumen 1994; Rosenbloom 1995; Stete 1995; McLafferty and Preston 1997; Spain 1997). While the notion that one will only use a car if one has a car may seem obvious, the preponderance of automobile use by those with access to them suggests that motor vehicles are (or would be) the preferred mode for most travelers, for most trips, in most places in the U.S. Thus, "automobility" is a useful indicator of transportation access, and can be measured in several ways—by driver's licensing rates, by the presence of at least one vehicle within the household, or by allocation of automobiles in households containing more drivers than vehicles (Spain 1997). Nonetheless, many members of households with fewer than one car per driver take trips in vehicles of other households—those of neighbors, friends, or relatives. Here, we analyze the influence of licensing and auto availability on average number of trips, mode choice, and speed, and show that while women and men's travel patterns have converged

somewhat, there are still slight sex differences in each ethnic group. Specifically, women tend to have lower levels of automobile access, but this does not appear to limit their mobility per se, as women on average take more daily person-trips than do men.

Licensing

Wachs (1991), Pisarski (1996), Lave (1992), and Spain (1997) have noted that both drivers licensing rates and automobile access have been increasing for women, at the same time they have been entering the workforce in record numbers. Figure 7-1 shows the 1995 proportion of women and men with driver's licenses and in the workforce, by age group. In the past, women were less likely to be licensed than men (often because there was one automobile per household and the husband was the driver). The data show quite clearly that high driver's licensing rates among younger cohorts of women put them far closer to the licensing rates of similar men, in contrast to the lower licensing rates among their mothers and grandmothers in the older age cohorts. Thus, with the passage of time, we should see a continuing shrinkage of the historic sex differences in licensing rates (Spain 1997). Furthermore, licensing rates have become a less important/accurate predictor of mode choice than other factors. Since such high numbers of both men and women now have a license, licensing itself may now be less important in determining travel mode than in the past, except in elderly cohorts (Rosenbloom 1993; Spain 1997).

On the other hand, the number of trips and miles traveled per day are affected significantly by possession of a driver's license. Spain (1997) found that men with licenses take 60 percent more trips per day than those without licenses, and that women with licenses take nearly twice as many trips as those without, mostly due to the high proportion of older women without licenses. Exploring by ethnicity, she further found that white males and females take 13.1 and 13.8 percent more trips than black males and females, respectively. When looking at licensing by sex and ethnicity simultaneously, we find that, in each ethnic group, a man is more likely to hold a driver's license than is a woman—the widest gap is among Latinos, where the men are 13.3 percent more likely to hold a license than the women (Figure 7-2). Among whites, who have the highest licensing rates, there is only a 2.7 percent gap between men and women's licensing rates. Ethnic differences in licensing rates, however, are substantial; white men are more than 23 percent more likely than black men to be licensed, and white women are more than 29 percent more likely to hold a license than their black counterparts. Thus, the difference in licensing rates is more significant between ethnic groups than between men and women in the same ethnic group. These distinctions reflect income differences among ethnic groups, as also shown in Figure 7-2. Lack of a driver's license is also an important predictor of transit use, suggesting that where incomes constrain vehicle availability (and thus the need for a license), other modes will be used. We will explore the importance of income influences on transit use below, and suggest that sex and ethnicity may serve as proxies for income to some degree.

Automobile Availability

Having an automobile available in the household may be a more relevant measure of mobility than licensing, as fewer individuals have cars than have licenses. Table 7-1 shows that women are more likely than men to be in households with no car, or with less than one car per two drivers. That is, women are slightly more likely to be found among the group with the least automobile access. This phenomenon is in part due to an aging cohort of women who live alone and never held drivers licenses, but this is less true for younger cohorts (Spain 1997).

Figure 7-1. Convergence of Licensing and Workforce Participation Among Younger Men and Women

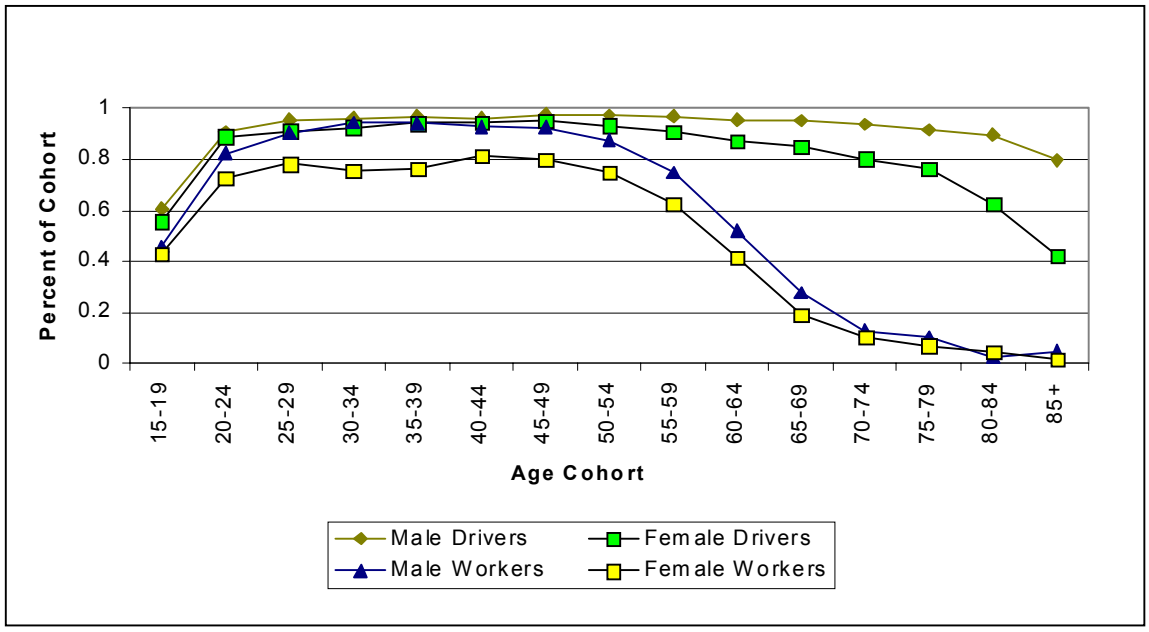


Figure 7-2. Licensing and Income Vary Systematically by Ethnicity More Than by Sex

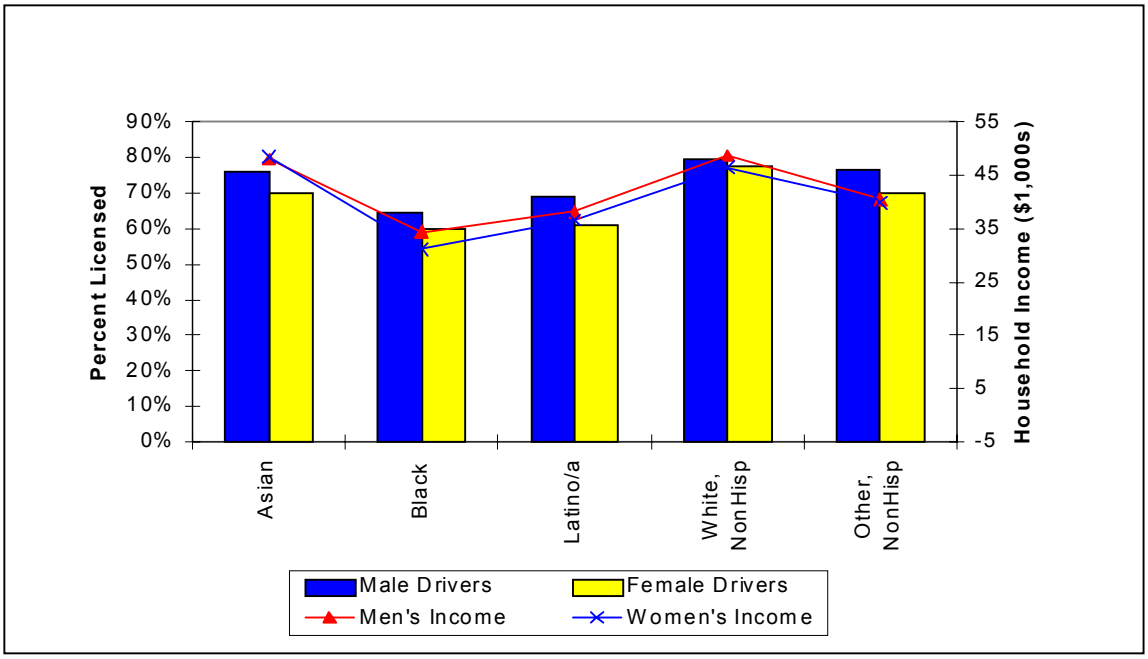


Table 7-1. Women Comprise Large Proportion of Low-Vehicle Households

	No Vehicle	0.01-0.49	0.50-0.99	1 exactly	1.01-1.49	1.50-1.99	2+	Overall
Men	38	46.9	51.5	49.2	55.9	51.8	58.9	49.8
Women	62	53.1	48.5	50.8	44.1	48.2	41.1	50.2
Total	100%	100%	100%	100%	100%	100%	100%	100%

Collectively, what factors are most closely associated with driving? We regressed the percentage of trips made as a driver against a variety of demographic, economic, location, and travel variables and found that being (1) employed, (2) male, (3) in possession of an automobile, and (4) older (except among women) most increased the likelihood of driving on a given trip (Table 7-2).[2] On the other hand, those living in urban centers—particularly Asians, blacks, and Latinos—are less likely to drive than whites, others, and suburbanites.[3]

Holzer, *et al.* (1994) found that whites were more likely to commute in their own car than were blacks, and that women and men had similar rates of automobile commuting across ethnic groups. When disaggregating by ethnicity, we found that in the 1995 NPTS, men in every ethnic group retain a slight advantage in auto availability over women, but also that the differences among ethnic groups were larger than the differences between men and women (Figure 7-3). For example, black men had 15.1 percent more vehicles per driver in their households than black women, while white women had 33.7 percent more than black women. Thus, it appears that ethnicity (or other factors which vary systematically by ethnicity, such as income or residential location) is a stronger predictor of automobile access than is sex. Tripmaking patterns mirror ethnic differences in household income, suggesting that income is an especially important predictor of non-automobile trips, and that both sex and ethnicity act as proxies for income.

The number of daily person-trips follows a similar pattern to those of both income and automobile availability, with some significant exceptions (Figure 7-4). First, although women have less automobile access than men in each ethnic group, they take more daily trips than men, except for Asians and Pacific Islanders. That is, women's travel does not seem to be restricted by a lower level of automobile availability; instead, lack of a car may make women's increased travel more difficult for them. The finding that Asian women travel less than Asian men is consistent with Mauch and Taylor's (1998) findings from the San Francisco Bay Area that Asian women travel more similarly to their male counterparts than do women of other ethnic groups. Ethnic differences are more important here as well; white women, who average more than five person-trips per day, take 23 percent more person-trips daily than Asian women, who travel the least. In comparison, Asian men take 5.7 percent more trips than Asian women on average, while white men take 3.6 percent fewer trips than white women daily. Regressing trip-making against the set of demographic, economic, location, and travel variables shows important sex differences in trip-making. Asian and Latino men make more trips per day than similar women, while black, white, and other women make more trips than men (Table 7-3). For each ethnic group, holding a drivers license is the most important influence on number of trips taken in day, followed by labor force participation and having children at home; parenthood is a particularly strong influence for blacks. In the Commuting section, we explore distinctions by travel purpose, and show that while women's paid labor force participation may be becoming more similar to men's, women's trips for household responsibilities differ by ethnicity and also suggest the persistence of a sex-based division of household labor.

[2] See Appendix 7A for definitions of all of the variables presented in this report.
[3] All of the models presented in this report were run separately using both weighted and unweighted data. Given the consistent similarity of the results, only the unweighted model results are presented here.

Table 7-2. Percent of Trips Taken as Driver

ALL			Men		Women		Asian	Black	Latino	Others	White
Variable	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables					
MALEFL	0.146 ***	0.146 ***					0.233 ***	0.098 ***	0.221 ***	0.187 ***	0.141 ***
ASIANFL	-0.013		0.010		-0.033 ***						
BLACKFL	-0.078 ***		-0.071 ***		-0.088 ***						
LATINFL	-0.061 ***		-0.017		-0.099 ***						
OTHERFL	-0.023 ***		-0.011		-0.033 ***						
PARENTFL	0.048 ***	0.038 ***	0.033 ***	0.026 **	0.049 ***	0.034 ***	0.054	-0.002	0.009	-0.054	0.078 ***
PRTNERFL	-0.028 ***	-0.026 ***	0.028 **	0.031 **	-0.086 ***	-0.084 ***	-0.028	0.015	-0.021	-0.022	-0.050 ***
NONWTRPS	0.012	0.013	-0.008	-0.007	0.028 **	0.030 **	0.094 *	0.041	0.081 **	0.134 ***	-0.024 ***
WORKERFL	0.231 ***	0.237 ***	0.240 ***	0.245 ***	0.224 ***	0.232 ***	0.254 ***	0.286 ***	0.240 ***	0.340 ***	0.199 ***
INCOMEPT	0.034 ***	0.050 ***	0.029 **	0.039 ***	0.038 ***	0.058 ***	0.026	0.060 **	0.044	0.090 *	0.030 ***
URBANFL	-0.080 ***	-0.094 ***	-0.094 ***	-0.102 ***	-0.070 ***	-0.089 ***	-0.145 ***	-0.103 ***	-0.079 **	-0.093 **	-0.067 ***
VPERDRVR	0.145 ***	0.151 ***	0.136 ***	0.139 ***	0.167 ***	0.177 ***	0.087 *	0.232 ***	0.174 ***	0.085 *	0.117 ***
WRKCOUNT	-0.035 ***	-0.040 ***	-0.022	-0.025	-0.036 **	-0.045 **	0.011	-0.035	-0.039	-0.157 **	-0.031 **
R_AGE	0.117 ***	0.127 ***	0.221 ***	0.225 ***	0.034 **	0.051 ***	0.061	0.090 ***	0.112 ***	0.018	0.118 ***
(Constant)	***	30.109 ***	***	32.567 ***	***	38.650 ***	**	***		***	***
N	13434	13540	6924	6991	6510	6549	342	1107	731	407	10826
Adjusted R^2	0.137	0.130	0.125	0.121	0.116	0.103	0.161	0.193	0.188	0.154	0.090
Sig.F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standardized (beta) coefficients shown. Probability of >T is shown as *** at the 0.01 level, ** at the 0.05 level, and * at the 0.1 level.

Figure 7-3. Vehicle Access Varies More by Ethnicity Than by Sex, and Also Mirrors Income, Except for Asians

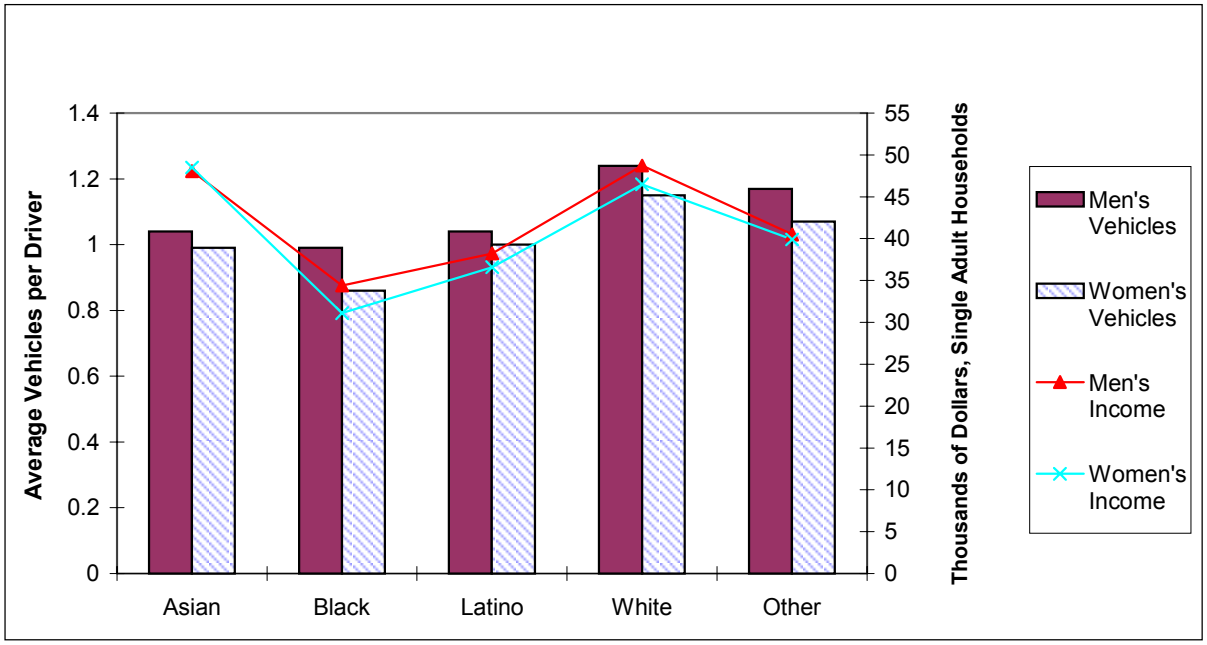


Figure 7-4. Number of Person-Trips Also Varies More by Ethnicity Than by Sex

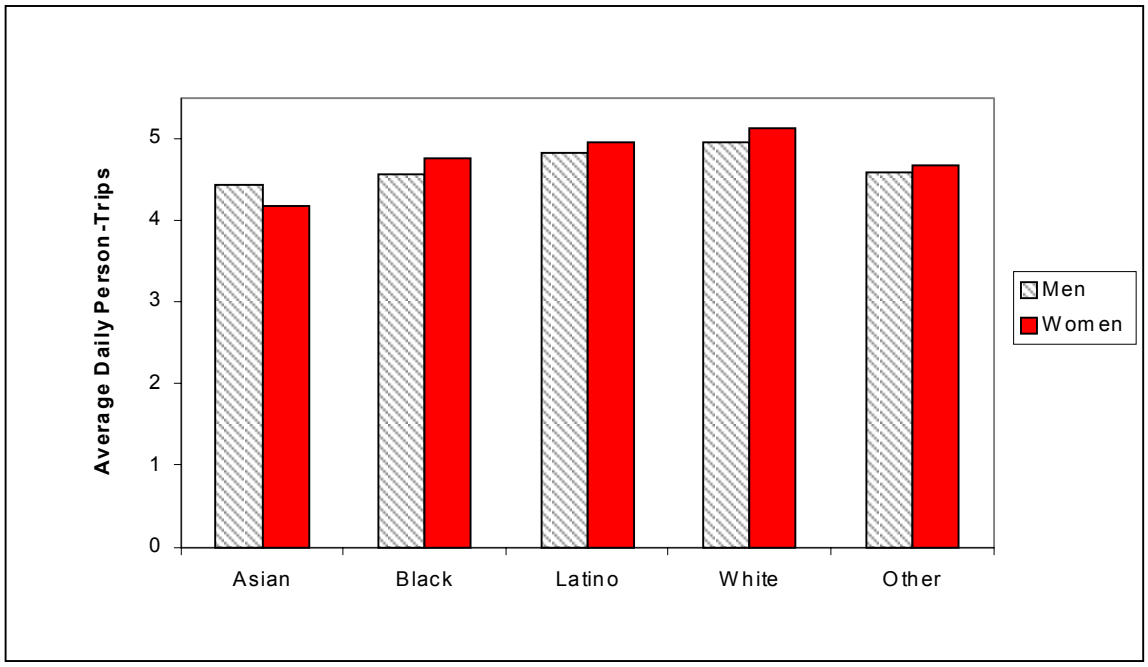


Table 7-3. Number of Daily Trips

ALL			Men		Women		Asian	Black	Latino	Others	White
Variable	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables					
MALEFL	-0.114 ***	-0.113 ***					-0.130 **	-0.132 ***	-0.137 ***	-0.149 ***	-0.107 ***
ASIANFL	0.007		0.003		0.011						
BLACKFL	-0.066 ***		-0.065 ***		-0.066 ***						
LATINFL	0.007		0.009		0.005						
OTHERFL	-0.003		-0.009		0.003						
PARENTFL	0.148 ***	0.143 ***	0.130 ***	0.125 ***	0.163 ***	0.158 ***	0.152 ***	0.172 ***	0.103 ***	0.090 *	0.150 ***
PRTNERFL	0.179 ***	0.182 ***	0.175 ***	0.180 ***	0.186 ***	0.189 ***	0.150 **	0.100 ***	0.131 ***	0.224 ***	0.204 ***
NONWTRPS	0.181 ***	0.179 ***	0.174 ***	0.174 ***	0.189 ***	0.185 ***	0.100 *	0.179 ***	0.053	0.207 ***	0.207 ***
WORKERFL	-0.088 ***	-0.089 ***	-0.076 ***	-0.072 ***	-0.090 ***	-0.095 ***	-0.037	-0.105 ***	-0.070	-0.187 ***	-0.077 ***
LICDUMMY	-0.057 ***	-0.049 ***	-0.036 ***	-0.030 **	-0.070 ***	-0.061 ***	-0.065	0.068 **	-0.003	-0.032	-0.117 ***
INCOMEPT	-0.001	0.005	0.010	0.016	-0.012	-0.005	-0.041	0.006	-0.039	-0.037	0.009
URBANFL	-0.033 ***	-0.039 ***	-0.022 *	-0.027 **	-0.041 ***	-0.049 ***	-0.020	-0.023	-0.087 **	-0.032	-0.026 ***
VPERDRVR	0.017 **	0.020 **	0.013	0.016	0.023 *	0.028 **	0.055	0.050 *	0.127 ***	0.064	-0.013
WRKCOUNT	-0.015	-0.015	-0.019	-0.022	-0.013	-0.012	-0.048	0.031	0.025	-0.012	-0.048 ***
R_AGE	0.007	0.001	-0.026 *	-0.026 *	0.024 *	0.026 *	-0.010	0.050	-0.052	0.014	-0.010
(Constant)	***	27.065 ***	***	18.217 ***	***	25.189 ***	***	**	***	**	***
N	13434	13540	6924	6991	6510	6549	342	1107	731	407	10826
Adjusted R^2	0.128	0.124	0.096	0.093	0.128	0.124	0.069	0.110	0.075	0.173	0.155
Sig.F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standardized (beta) coefficients shown. Probability of >T is shown as *** at the 0.01 level, ** at the 0.05 level, and * at the 0.1 level.

Carpooling

Women are more likely to carpool than men in each ethnic group (Figure 7-5). The NPTS also shows that women in four different household types (adopted from Preston and McLafferty (1993)—accounting for single- or multiple-adult households, and presence of children under 16 years of age—take more of their trips by car than do men in the same category (Figure 7-6). In addition, Figure 7-6 shows that women are more likely to be in a carpool than men, even in single-person households; the difference is slight only for single parents—although the relatively few men in this category are notably less likely to drive alone as well. Thus, it may be that women have found ways to access an automobile when their household responsibilities and personal security demand it—even where single fathers have not done so. Earlier studies also showed that women are more likely to be passengers (and thus dependent on another person to drive) than are men, indicating a restriction of mobility that would not appear in the mode split data (Giuliano 1979; Cichocki 1980; Hanson and Johnston 1985; Grieco, et al 1989; Pickup 1989). We found in the 1995 NPTS data that women as a group took eleven percent more of their automobile trips as passengers than did men (Figure 7-7). However, it is worth noting that the absolute number of trips as driver are the same between women and men. Thus, as a group women take driving responsibility as often as men, but since they also take many more trips than men, a larger proportion of these are as passengers. The finding that men take a higher proportion of their trips as drivers, and that conversely, women take a higher proportion as passengers, holds across ethnic groups. Models for percent of trips made in carpools show that women are more likely to carpool than men in each ethnic group (Table 7-4). Also, regardless of ethnicity, having a child or another adult in the household increases the likelihood of taking automobile trips with more than one person. Rather than carpooling, this might be considered "fampooling"—sharing a trip with other family members. Interestingly, a high vehicles-per-driver count is also associated with more carpooling, except for whites. Thus, it may be that non-white households with multiple vehicles are likely to take trips together in one automobile, leaving one or more other cars at home.

Transit Use

While in her groundbreaking piece Giuliano (1979) argued that single mothers' lower incomes often relegate them to transit, another interesting phenomenon has been noted more recently by Rosenbloom and Burns (1995). They found that despite income differences, lower-income women—particularly mothers—are likely to seek automobile access in whatever ways they can, because the requirements of juggling paid employment and household responsibilities demand the flexibility, security, and speed of an automobile. Thus, while income is often considered one of the most powerful (inverse) predictors of transit use, Rosenbloom and Burns suggest that income is a far weaker predictor of transit use among women with small children. Both sides of this tension in the literature are borne out in the 1995 NPTS data, which show that females in lower-income households are three times more likely to ride transit than those in the second quartile (Figure 7-8), but that women at each income level are also more likely to travel by car than similarly situated men. Thus, while public transit is clearly most important for households in the lowest income quartile, on average the automobile is by far the most important mode, even for the income group which is ostensibly most transit-dependent. Lower-income women take 18 times as many trips in private vehicles as on transit. Regression models of transit use, in fact, show that sex, ceteris paribus, is not a significant predictor of transit use (Table 7-5). Blacks, however, are much more likely to ride transit for many of their trips, even controlling for urban location. As expected, having a driver's license, a high vehicles-to-drivers ratio, or other drivers in the household (particularly for blacks and Latinos) are each associated with lower levels of transit use. Notably, taking non-work-related trips during the day is also associated with lower levels of transit riding. This suggests that those who ride transit do not make extra (non-work) trips, or that those who need to make multiple trips do not ride transit.

Figure 7-5. Women Carpool More Than Men in Each Ethnic Group

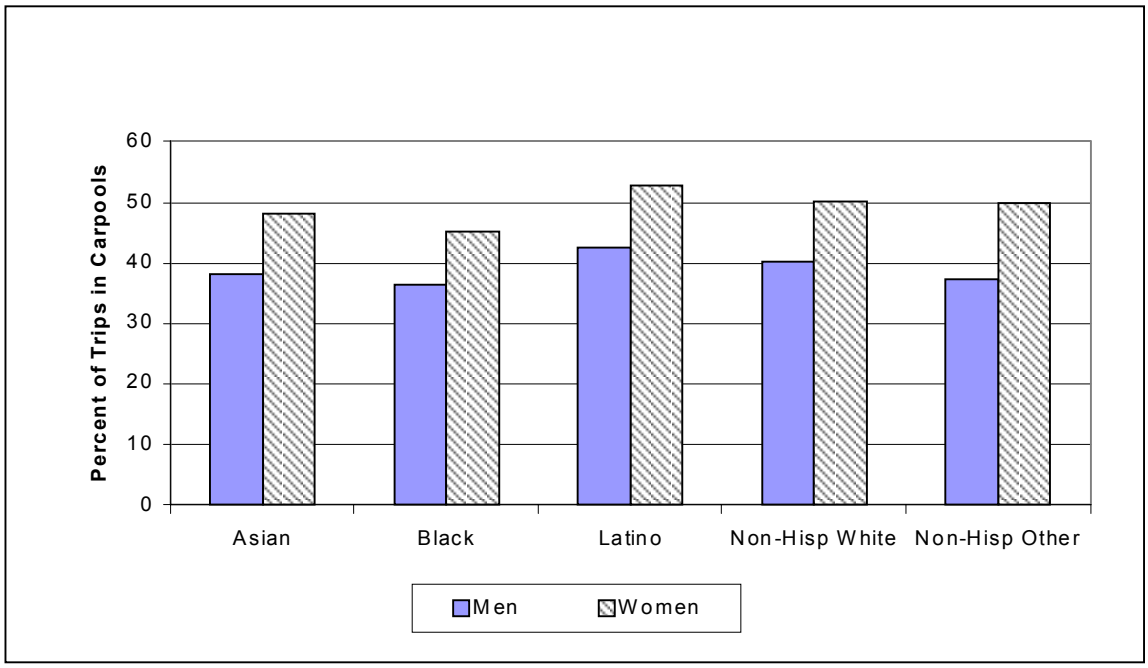


Figure 7-6. Parents Most Likely in Carpools, Married Mothers in Particular

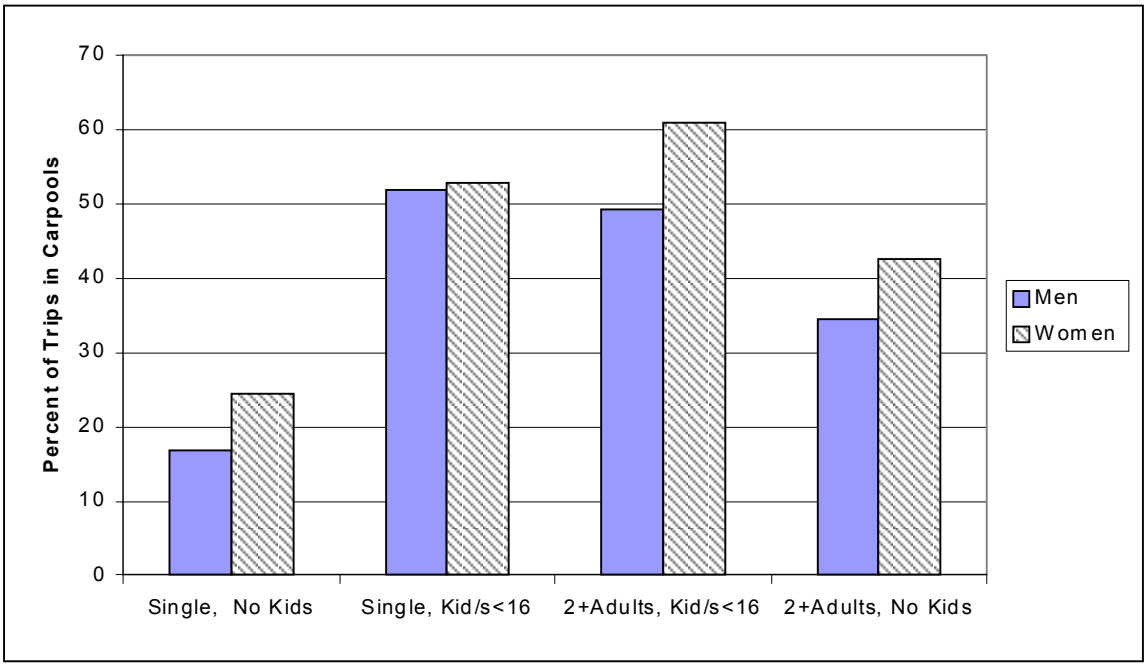


Figure 7-7. Women Are More Often Passengers Than Men, Across Ethnicity

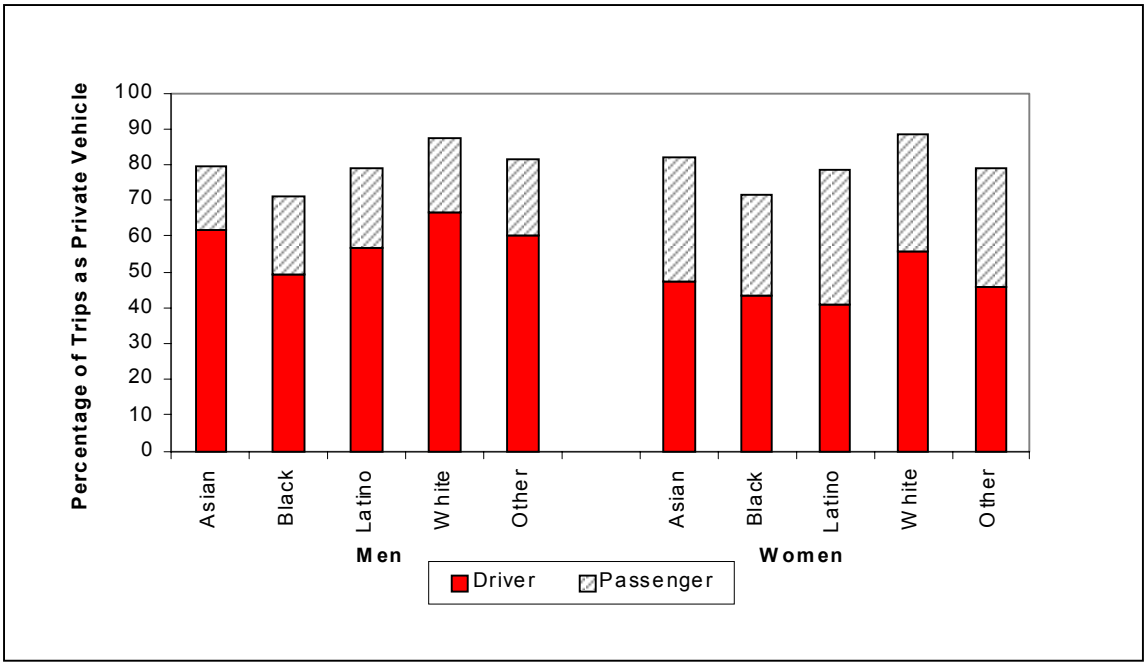


Figure 7-8. Women Ride Transit More, Especially in the Poorest Income Quartile

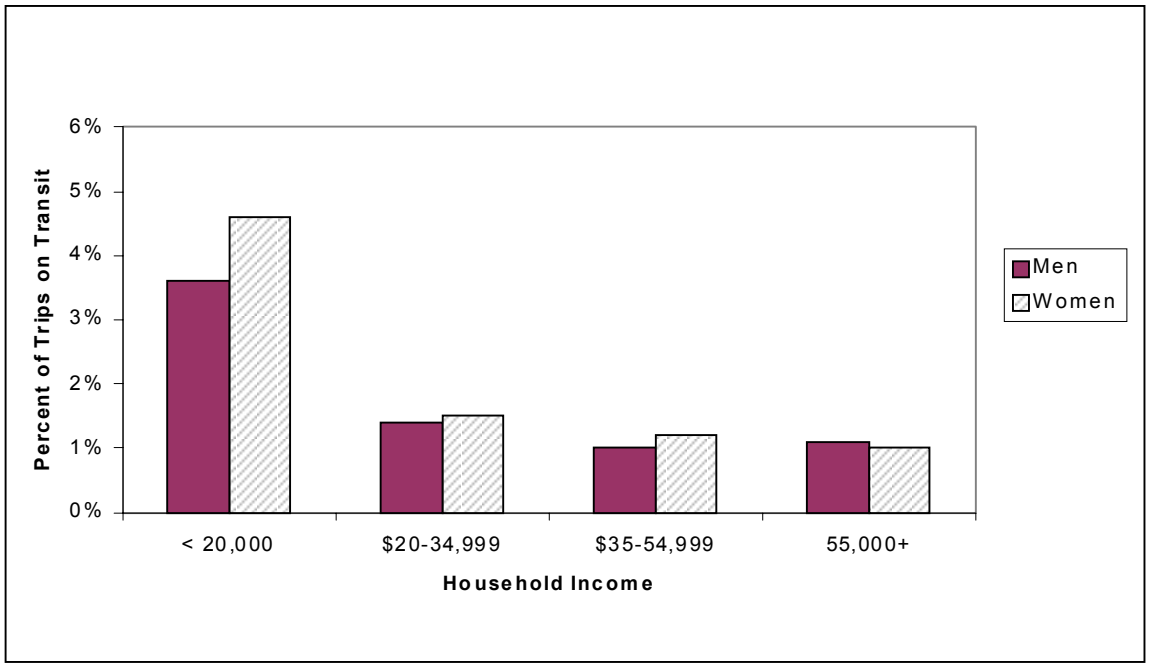


Table 7-4. Percent of Trips Taken in Carpools

ALL			Men		Women		Asian	Black	Latino	Others	White
Variable	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables					
MALEFL	0.009	0.006					-0.052	0.006	0.021	-0.007	0.011
ASIANFL	0.012		0.003		0.021 *						
BLACKFL	0.140 ***		0.118 ***		0.155 ***						
LATINFL	0.031 ***		0.035 ***		0.030 **						
OTHERFL	0.013 *		0.011		0.016						
NONWTRPS	-0.072 ***	-0.068 ***	-0.048 ***	-0.047 ***	-0.098 ***	-0.091 ***	-0.099 *	-0.125 ***	-0.076 **	-0.084 *	-0.047 ***
WORKERFL	0.020 **	0.025 ***	0.013	0.012	0.021 *	0.032 ***	0.024	0.023	-0.001	0.094 *	0.025 **
LICDUMMY	-0.312 ***	-0.340 ***	-0.329 ***	-0.348 ***	-0.293 ***	-0.328 ***	-0.259 ***	-0.413 ***	-0.287 ***	-0.367 ***	-0.231 ***
OTHRDRVR	-0.096 ***	-0.105 ***	-0.094 ***	-0.101 ***	-0.095 ***	-0.105 ***	-0.081	-0.109 ***	-0.171 ***	-0.071	-0.076 ***
VPERDRVR	-0.134 ***	-0.147 ***	-0.117 ***	-0.126 ***	-0.152 ***	-0.168 ***	-0.183 ***	-0.168 ***	-0.224 ***	-0.169 ***	-0.096 ***
(Constant)	***	23.354 ***	***	23.819 ***	***	23.898 ***	***	***	***	***	***
N	13307	13307	6916	6916	6391	6391	342	1019	696	393	10730
Adjusted R^2	0.167	0.149	0.156	0.143	0.178	0.157	0.100	0.237	0.147	0.157	0.066
Sig.F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standardized (beta) coefficients shown. Probability of >T is shown as *** at the 0.01 level, ** at the 0.05 level, and * at the 0.1 level.

Table 7-5. Percent of Trips Taken on Transit

ALL			Men		Women		Asian	Black	Latino	Others	White
Variable	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables					
MALEFL	-0.013 **	-0.014 ***					0.057 *	-0.024	***76:	-0.006	-0.012 *
ASIANFL	-0.035 ***		-0.026 ***		-0.044 ***						
BLACKFL	-0.006		-0.014		-0.003						
LATINFL	-0.009		0.005		-0.021 ***						
OTHERFL	-0.013 **		-0.014 *		-0.012 *						
PARENTFL	0.076 ***	0.076 ***	0.049 ***	0.049 ***	0.097 ***	0.097 ***	0.035	0.112 ***	0.014	0.025	0.081 ***
PRTNERFL	-0.019 ***	-0.019 ***	-0.028 ***	-0.027 ***	-0.011	-0.012	-0.097 **	0.005	0.020	0.028	-0.035 ***
WORKERFL	0.058 ***	0.060 ***	0.061 ***	0.064 ***	0.065 ***	0.067 ***	0.081 *	0.140 ***	0.097 ***	-0.050	0.030 ***
LICDUMMY	0.111 ***	0.113 ***	0.085 ***	0.086 ***	0.121 ***	0.124 ***	0.155 ***	0.109 ***	0.162 ***	0.171 ***	0.090 ***
INCOMEPT	0.036 ***	0.038 ***	0.041 ***	0.042 ***	0.031 ***	0.034 ***	0.011	0.038 *	0.040	-0.001	0.038 ***
TRDEPEND	-0.031 ***	-0.031 ***	-0.023 ***	-0.024 ***	-0.038 ***	-0.039 ***	-0.029	-0.051 **	-0.008	-0.034	-0.024 ***
URBANFL	0.027 ***	0.025 ***	0.036 ***	0.035 ***	0.019 **	0.017 **	0.086 **	0.039 **	0.033	0.020	0.022 ***
VPERDRVR	0.021 ***	0.022 ***	0.025 ***	0.026 ***	0.013 *	0.013 *	0.101 ***	0.017	0.045 *	0.105 ***	0.017 ***
WRKCOUNT	-0.002	-0.004	0.013	0.011	-0.017	-0.020 *	0.014	-0.046 *	-0.076 **	0.039	0.021 **
EDUCFL	0.014 **	0.011 **	0.003	0.001	0.021 ***	0.019 **	0.039	0.016	- ***3(	0.013	0.014 **
R_AGE	-0.043 ***	-0.039 ***	-0.010	-0.008	-0.062 ***	-0.057 ***	0.024	-0.032	-0.032	0.020	-0.049 ***
(Constant)	***	4.229 ***	***	4.054 ***	***	4.343 ***	***	***	***	***	***
N	33263	33487	15115	15239	18148	18248	826	2864	1798	1045	26637
Adjusted R^2	0.040	0.039	0.027	0.026	0.053	0.051	0.076	0.068	0.044	0.036	0.033
Sig.F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standardized (beta) coefficients shown. Probability of >T is shown as *** at the 0.01 level, ** at the 0.05 level, and * at the 0.1 level.

There remains, however, a small group of "transit dependents"—about three percent of travelers--who take 25 percent or more of their trips on public transportation. The sharp difference in mode choice between this group and the population is demonstrated in Figures 7-9 through 7-14. These transit dependents take less than 25 percent of their person-trips in private vehicles—even in carpools—compared with over 75 percent for the whole population. In fact, walking is as important a mode for transit dependents as private vehicles, which suggests that the carless may be more likely to reside in higher density environments which support both transit use and walking. Thus, some of these "transit dependents" may truly rely on transit due to low incomes, while others may choose to use transit, particularly in areas where the level of service and convenience is high (such as in New York City).

Since Giuliano (1979) first noted the disproportionate importance of transit to women, others have found that women ride public transportation two to three times as often as men (Giuliano 1979; Fox 1983; Hanson and Johnston 1985; Michelson 1988; Blumen 1994; Burns 1996). However, women's use of transit seems to be converging with that of men—primarily because women's transit use has been decreasing at a faster rate. For example, of all transit trips in the 1995 NPTS, women and men on rail (including subway, elevated, commuter, streetcar, and trolley) represent 15 percent and 17 percent of transit trips respectively, while the remainder on buses is split 41 percent to 27 percent in favor of women (Figure 7-15). Thus, women and men ride rail in comparable proportions, but women make half-again as many bus trips. This means that in total, women make 57 percent of all transit trips. The 1995 NPTS data show not only that women use transit at a ratio of 4:3 to that of men in the whole population, but also that this ratio is significantly different by location within the metropolitan area (Figure 7-16). Transit mode split in the suburbs was below 7 percent of all trips for each group, but ranged from 5 percent to more than 21 percent in the central city. In both places, blacks—particularly women in the city center—are by far the largest share of transit riders, even where they are not considered "transit dependent."

Speed

The comparative speeds of various modes are important as well. Use of transit, for example, is the most important factor in predicting commute duration (Taylor and Ong 1995). McLafferty and Preston (1997) found that living in the central city was a stronger predictor of transit use than "producer services" employment (white collar jobs concentrated in downtown), automobile ownership, or even income. They also point out that the importance of mode also varies by location; in the suburbs, the time advantage of the automobile over transit is more pronounced, except where rapid rail transit is available.

Differences in travel speed explain some of the gap between much shorter-than-average commute distances of women and blacks, and average commute trip times which are relatively close to those of white men (Giuliano 1979; Cichocki 1980; Hanson and Johnston 1985; White 1986; Pickup 1989; Rosenbloom 1993; Holzer, et al. 1994; Taylor and Ong 1995; McLafferty and Preston 1997). That is, blacks' and women's higher use of modes other than driving alone may reduce their average speed, which could explain why shorter trips can take nearly as long to complete. Figure 7-17 shows that women's average trip speeds are slightly lower than men's in private vehicles and on buses, but higher on rail. While this last fact would appear to be positive for women, it is mitigated by the fact that they take more bus trips than men do.

As we will discuss in the next section, many researchers have noted that women's commute distances are shorter than those of men, even where their times are comparable. For the many women who must juggle workplace and substantial household responsibilities, the time available for commuting may be especially constrained. To make the bulk of trips in service of the household (such as grocery shopping) and to travel to and from work, women may be more inclined than similarly situated men to (1) secure paid employment close to home and (2) to seek the use of an automobile (Holzer, et al. 1994; McDonald

Figure 7-9. Blacks, Latinos, and Asian Women Ride Transit More (Mostly Buses)

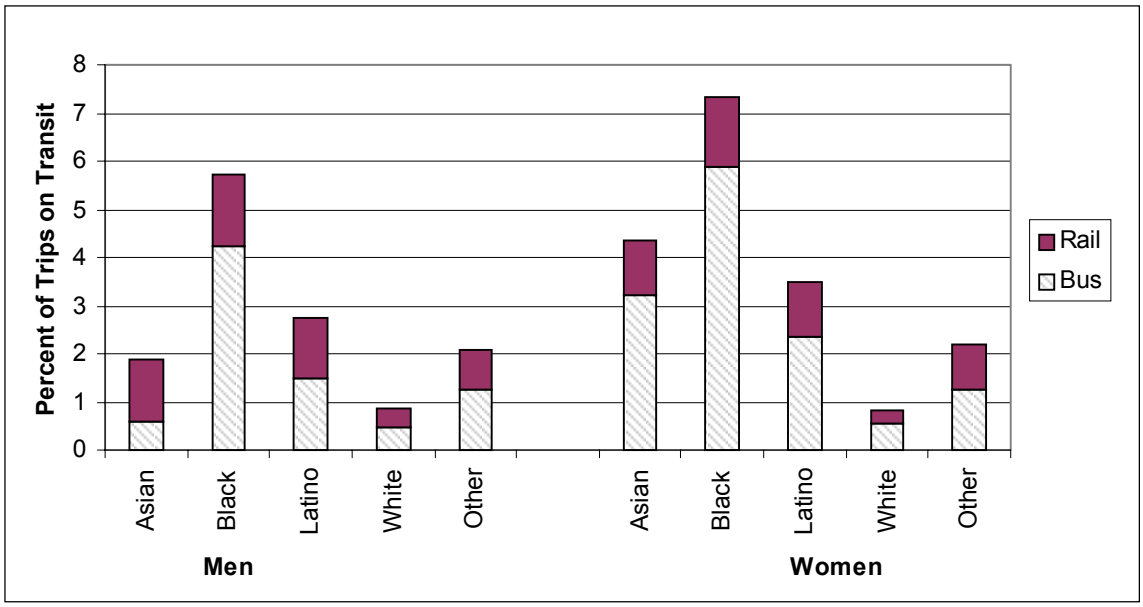


Figure 7-10. "Transit Dependents" Do Indeed Depend on Transit

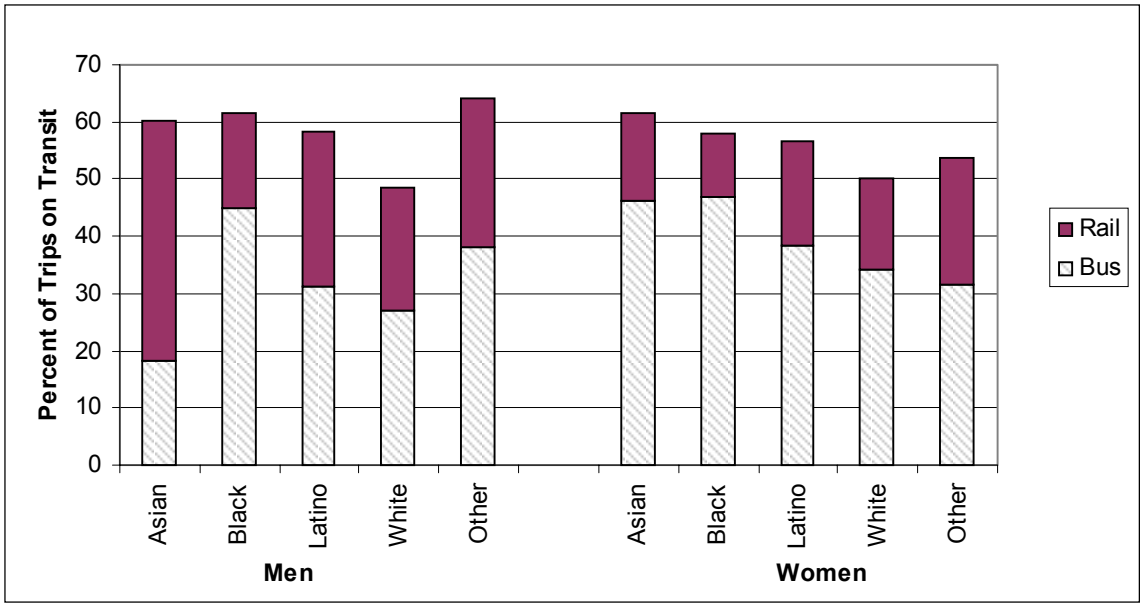


Figure 7-11. Women Drive as Often as Men, Across Ethnicity, But Carpool More

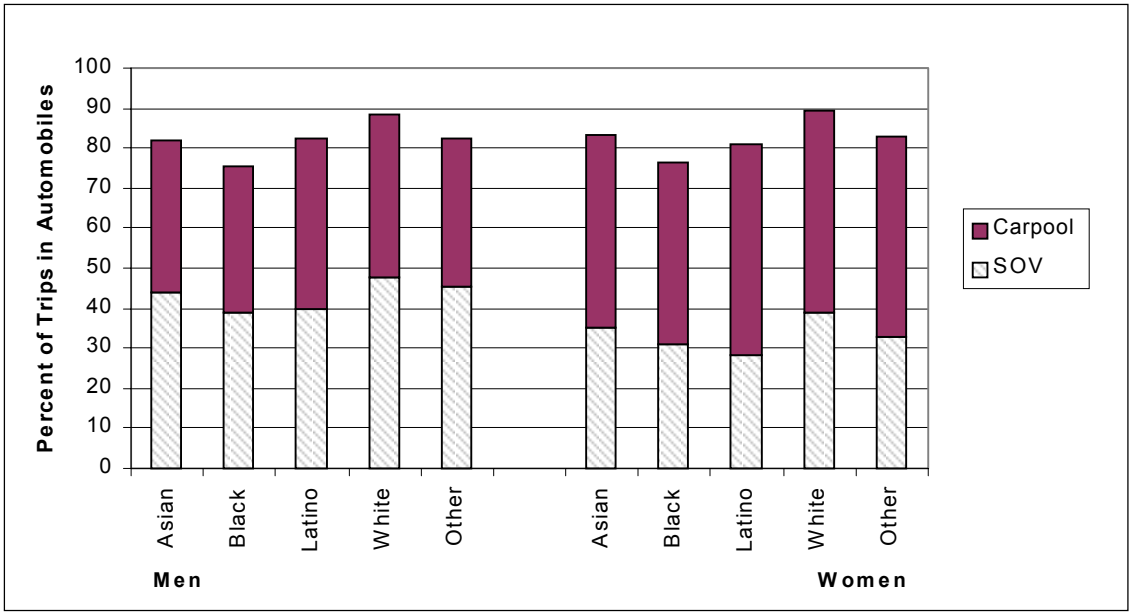


Figure 7-12. Transit Dependents Rarely Use Cars, With the Exception of Whites and "Other Women"

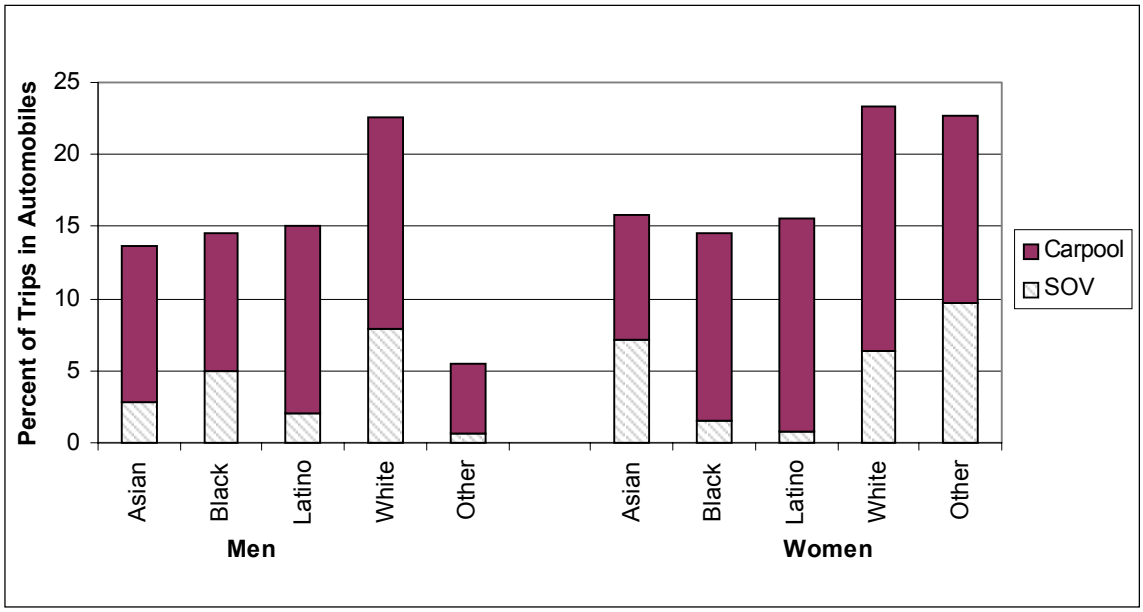


Figure 7-13. Walking is an Important Mode, Particularly for Persons of Color

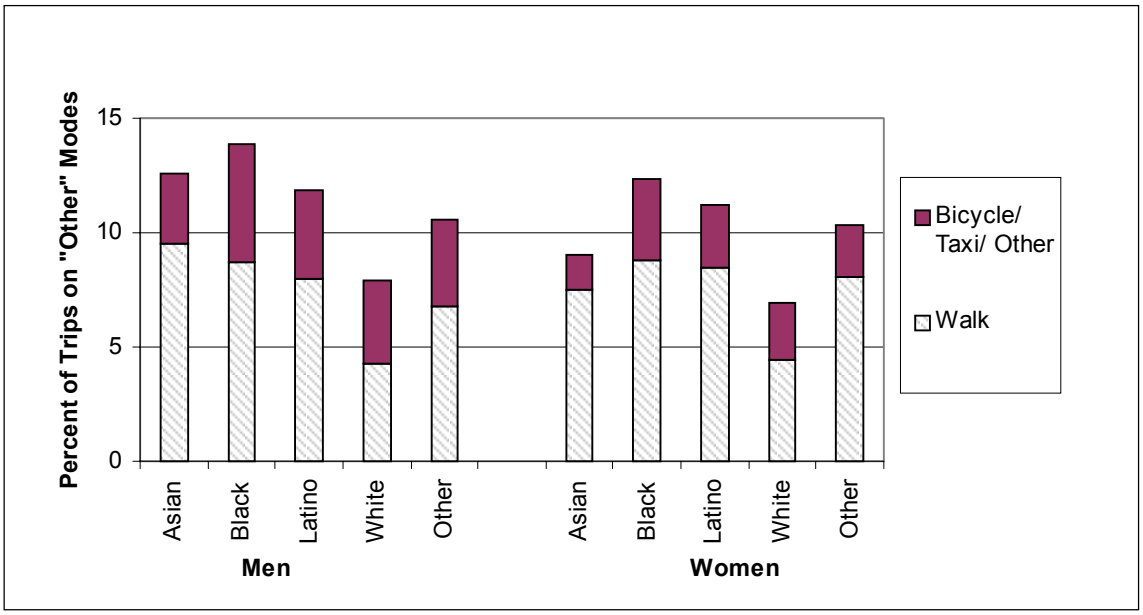


Figure 7-14. Walking is More Important to Transit Dependents Than Automobile Use

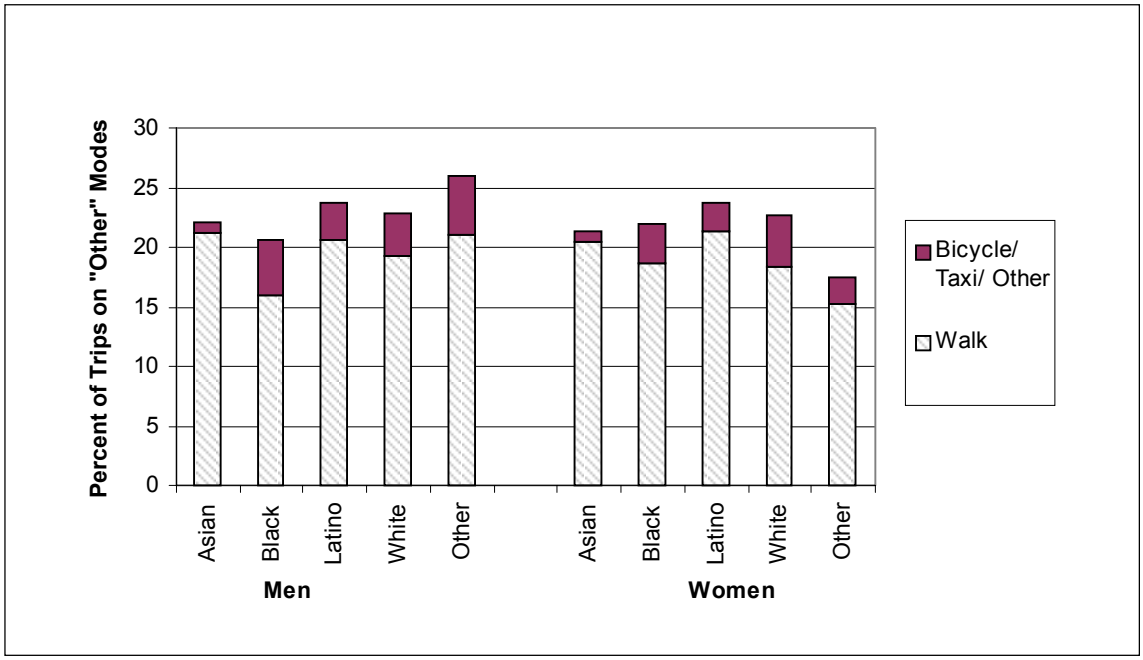


Figure 7-15. Women on Buses Comprise More Than Two-Fifths of All Transit Riders

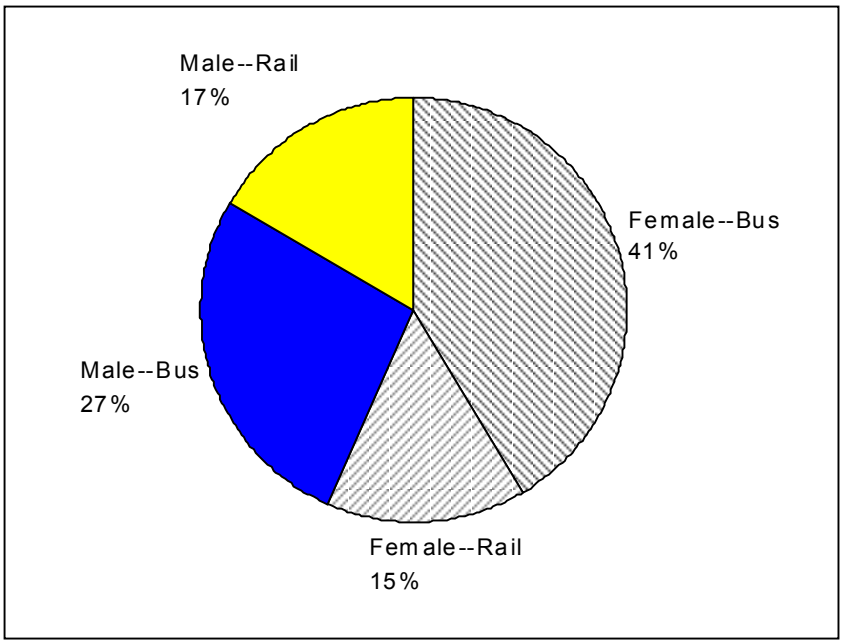


Figure 7-16. Transit Use is Much Higher in Urban Centers, Particularly for Blacks; Women Ride More Than Men Across Ethnicity

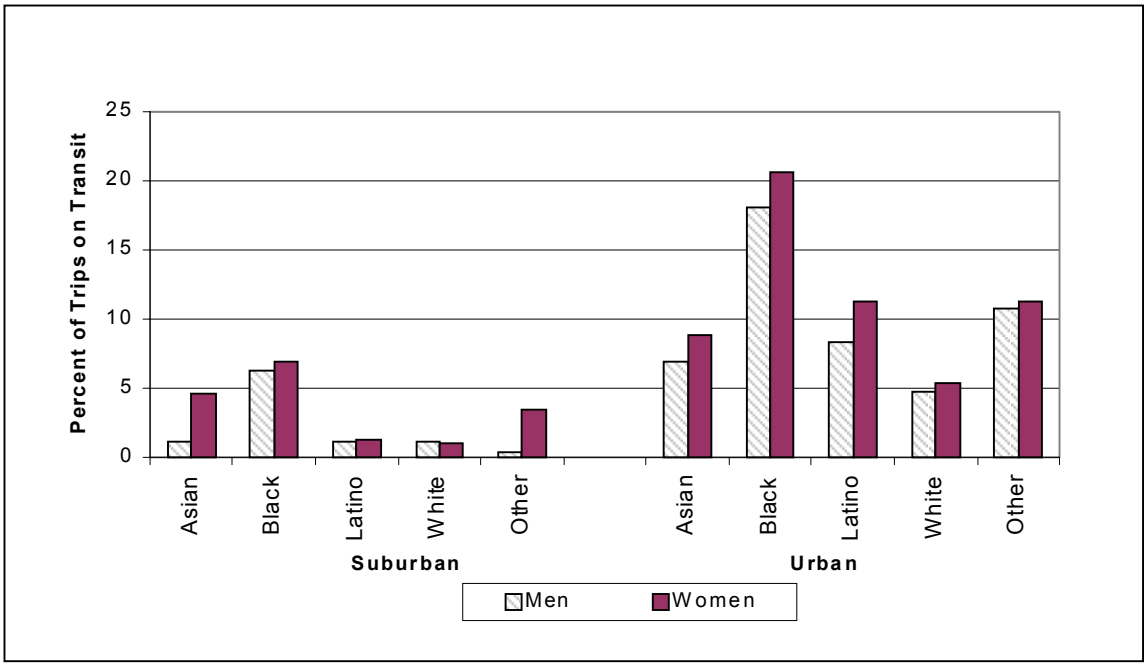
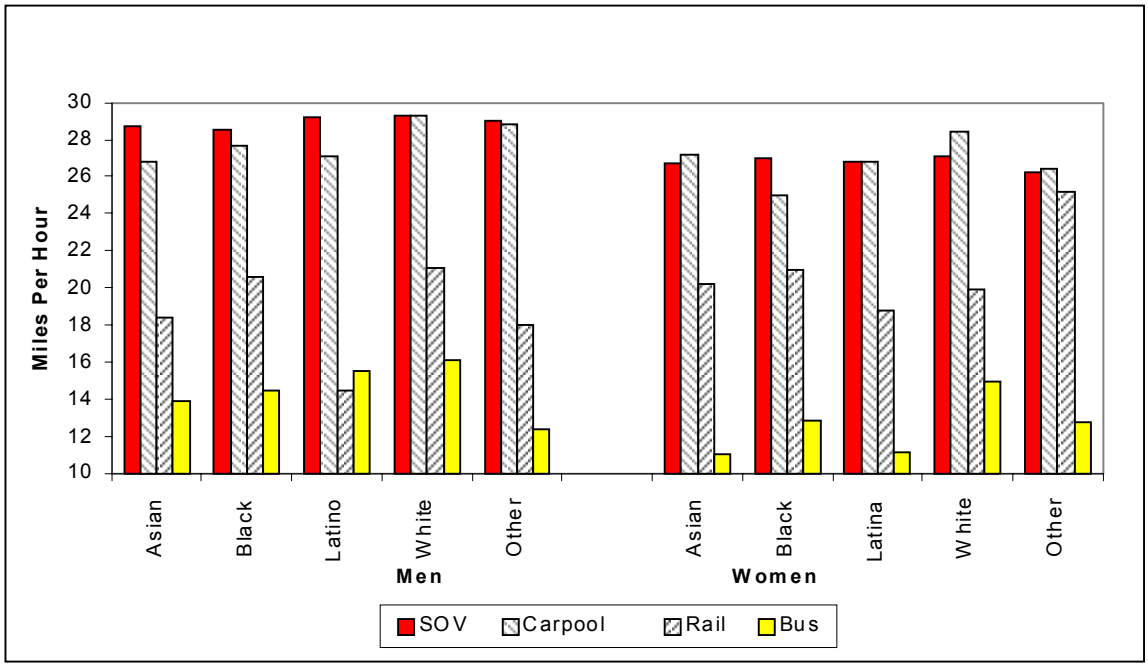


Figure 7-17. Travel in Automobiles—Even Carpools—is Generally Twice as Fast as Transit



1999). Thus, both the disproportionate (though declining) use of slower transportation modes (such as public transit) and the need to balance both household and paid work responsibilities may in concert explain women's shorter trips. Over time, however, women are increasing automobile use, and thus increasing their average travel speeds.

- Sex and household type are closely related to commute times; commute times vary systematically with ethnicity and, specifically, black women have the longest commute times of any group.
- White women in couples are likely to have shorter commute times than similar men, particularly in the suburbs.
- Women of color, especially those living in the center city, have disproportionately longer commute times which largely can be explained by a combination of low income, non-SOV mode choice, responsibility for household members such as children, and lower levels of education (which translates into limited prospects for higher-paying, more distant jobs).
- Non-whites tend to reside in central cities, have lower incomes, and higher levels of transit use, all of which are associated with longer commute times.
- A multi-variate analysis of commute time controlling for an array of demographic, economic, and location factors (sex, ethnicity, presence of children, presence of other adults, location in suburbs or urban centers, travel mode, household income, education level, and age) shows that increased commute time is most closely associated with transit use, being black, being female, and not trip-chaining non-work trips into the commute.

COMMUTING

Given both (1) the sharp increase in women's participation in the paid workforce over the last third of the 20th century and (2) an emphasis in transportation policy on the journey-to-work and peak-hour traffic congestion, research on sex-differences in travel behavior has tended to most closely examine men's and women's commute patterns. This literature has found that women generally have shorter commute distances and times than men, and at least six major explanations have arisen to explain or refute this. With respect to shorter commutes by women, these include (1) women's lower wages as a result of their disproportionate representation in the secondary labor market (i.e. lower skill, lower wage, less stable jobs), (2) women's higher

levels of "household responsibility" as a constraint on the time available for commuting, (3) segregation of women into occupations that are more spatially ubiquitous (such as those in retail employment) than male-dominated occupations, and (4) the localization of women's labor markets (e.g. employers locating strategically to be near secondary labor market workers) (MacDonald 1999). Two other theories, (5) the spatial mismatch between the locations of workers' homes and jobs, and (6) travel mode differences between men and women, have been used to explain why some women's commute times are in fact longer than men's (Taylor and Ong 1995; Taylor and Mauch 1998; MacDonald 1999). In this section, we observe the sex differences in commute patterns by ethnicity, and explore further the explanations for the causes of these differences.

As of April 1999, the male civilian labor force participation rate (for all men age 16+) was 74.6 percent, and the female rate was 60.2 percent, making women 44 percent of the paid labor force (Bureau of Labor Statistics 1999). In younger cohorts, women are employed at nearly the same rates as men (again, see Figure 7-1). Despite this historically high proportion of women in the paid work force, on average men make more work-related trips, even controlling for employment status (Wachs 1991; Pisarski 1996). While men and women both use private vehicles for more than 90 percent of their commute trips, men are more likely than women to drive alone, while women are more likely than men to carpool or ride the bus (Figure 7-18). However, these sex differences vary significantly by ethnicity, and this may be explained by a number of household factors (Figure 7-19). Men make more work-related trips, on average, on every mode, reflecting their higher propensity to be in the paid work force (Figure 7-20).

Many researchers have argued that women's work trips are constrained—both in terms of trip frequency and distance—by the requirement to make household-serving and child-serving trips (Ericksen 1977; White 1986; Johnston-Anumonwo 1995; Rosenbloom and Burns 1995). That is, because women must add the time for errands to their commute travel times, they tend to economize on commute time more than men do, causing them both to increasingly utilize automobiles and to work closer to home. However, this latter effect may be mitigated by other factors. For instance, the need for income security, coupled with a desire for less expensive housing, might result in longer commute times for income-constrained single mothers living in urban centers than for childless single women. We found that among single adults (eliminating the influence of a spouse), the presence of one or more children under 16 years old is associated with longer commute times for Asian, black, and Latino single fathers, but only for Black single mothers (Table 7-6). That is, commute times were lower in households with children for single women in each ethnic group except for blacks, ostensibly because single mothers need to be close to home. However, since black women are more likely to be single parents than any other ethnicity, the fact that their commute times increase may indicate constraints for single black mothers in obtaining satisfactory employment near home.

White (1986) and McLafferty and Preston (1997) found that the presence of a spouse and the number of children can lengthen the commute time and distance of male household heads significantly, but not that of a female householder, who is more likely also to run errands for the household or to chauffeur children. To the extent that household type varies by ethnicity, some women of color may be particularly burdened by household responsibilities coupled with low incomes. In the Purpose of Trip section, we will further analyze this phenomenon to examine the effects of different purposes of stops—particularly those chained into commutes—on trip frequency and length. In this section, we find that women of color, especially those living in the center city, have disproportionately longer commute times which largely can be explained by a combination of non-SOV mode choice, responsibility for household members such as children, and lower levels of education and income (which translate into limited job prospects).

Figure 7-18. Women Have Slightly Different Commute Mode-Splits From Men

Figure 7-19. Sex Differences in Commute Mode-Splits Vary by Ethnicity

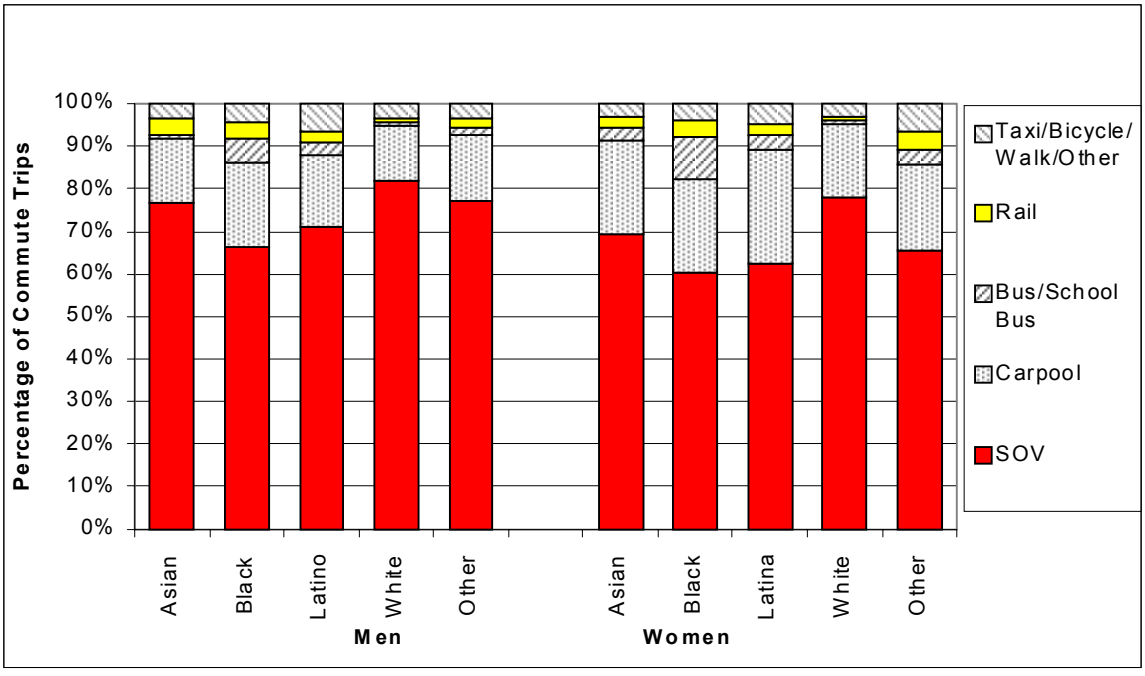
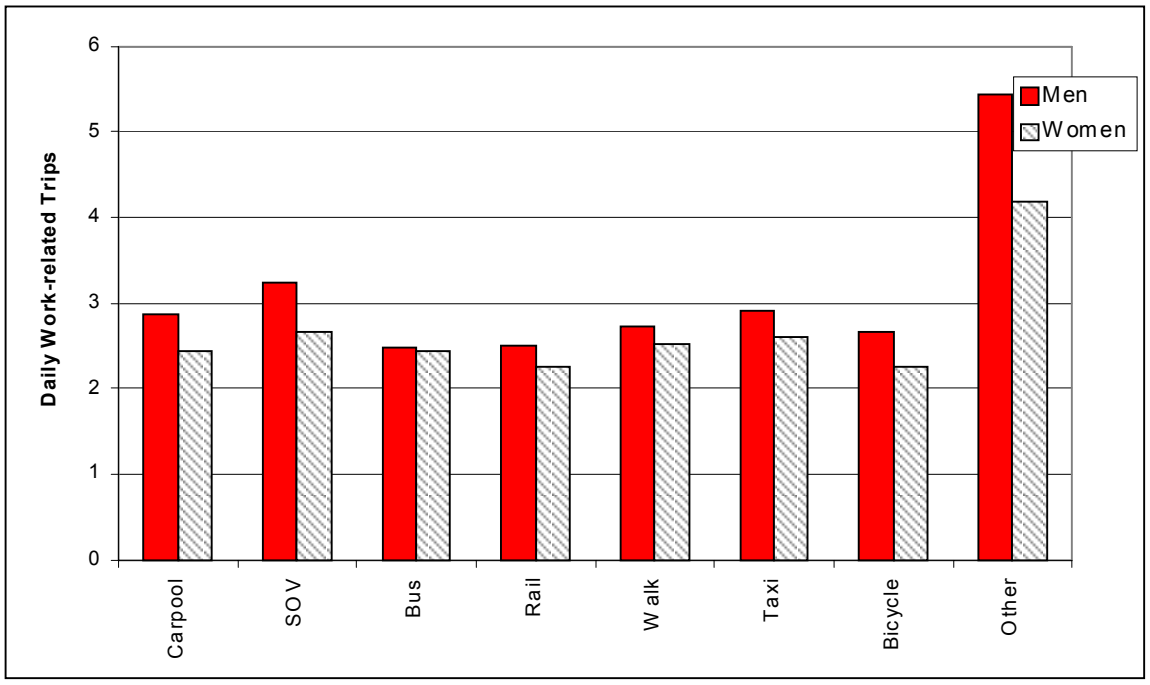


Figure 7-20. Men Make More Work-Related Trips Daily, Even Controlling for Mode



Distance/Spatial Mismatch Theory

As discussed in other sections of this report, the literature on ethnic differences in commute distance and time is closely intertwined with the spatial mismatch debate. This theory, first proposed by Kain in 1968, suggests that increasing suburbanization of jobs leads to higher unemployment rates among persons of color—who (due to persistent housing segregation) are disproportionately concentrated in inner-city core areas—because they are forced to commute unreasonably far and/or may have less access to jobs or the information networks through which jobs are often obtained (Holzer 1991; Kain 1992; Ihlanfeldt and Sjoquist 1998). Many studies since have explored not only the other factors which may help predict high unemployment rates—such as discrimination or lower educational attainment—but also the explanatory effects on commute length of such specific geographical phenomena as desired commute range (Thomas 1998), firm location (Fernandez 1994), concentrations of poverty and low-income labor markets (Cooke and Shumway 1991). In each study, the separation between residence and actual or potential jobs is observed for particular populations. However, researchers have often been unclear on whether the appropriate measure of mismatch is distance (which tends to be favored by labor market scholars) or travel time (which tends to be favored by transportation scholars).

The manner in which job/housing separation or commute "length" is measured is important, because the influence of transportation factors, such as mode choice and congestion levels, can significantly influence employment access. For example, Taylor and Ong (1995) found that, when controlling for commute mode, the distance of whites' commutes were both longer than those of blacks and Latinos, and more likely to increase over time; they also found that, in 1985, whites had commute times on each mode at least as long as those of blacks and Hispanics, but that the higher proportion of blacks commuting on public transit accounted for their higher group-average commute times. Holzer, et al. (1994) concluded

Table 7-6. Children Influence Single Parents' Average Commute Times (min.)

	Asian	Black	Latino	White	Other
Men					
No Children < 16 Years Old	15.4	18.0	19.6	19.6	23.3
1 or more < 16 Years Old	20.6	19.7	22.6	16.8	8.0
Child Adds (%):	34.2%	9.5%	15.6%	-14.2%	-65.7%
Women					
No Children < 16 Years Old	17.0	17.2	20.2	17.4	22.5
1 or more < 16 Years Old	12.8	21.8	15.9	16.5	18.6
Child Adds (%):	-24.4%	26.9%	-21.2%	-5.0%	-17.5%
Men's as % of Women's					
No Children < 16 Years Old	91%	105%	97%	113%	104%
1 or more < 16 Years Old	161%	91%	143%	102%	43%

that job decentralization, coupled with a higher probability of inner-city residents using slower, non-automobile modes, caused time costs to exceed the value of wages to be gained from expanding either search area or commute length for these residents. Gordon, et al. (1989b), argued that considering either time or distance, there is no systematic disparity in commute times between whites and nonwhites, controlling for mode, urban location (inner-city/suburb), and size of urban area. However, as Johnston-Anumonwo (1995) notes, if jobs continue to suburbanize at a faster rate than the residences of persons of color, even those central city residents who have automobile access will be forced to increase commute times if they are unable to relocate their residences. While much of the recent research has used trip time, or duration, as the best measure of the commute (e.g., McLafferty and Preston 1997), most spatial mismatch studies have not specifically considered mode but have indirectly controlled for mode by emphasizing only automobile users (e.g., Ihlandfeldt and Sjoquist 1991; Zax and Kain 1991; Johnston-Anumonwo 1995). The short shrift given to commute mode, however, is problematic because mode is one of the most important determinants of both the length and duration of the journey to work.

Here, we focus on the increase in women's participation in the workforce—even among mothers of small children—and how their commute times differ from those of men. We have organized the literature along two major themes—urban location (of both job and residence) and other job characteristics. After reviewing the themes in the "sex differences and travel" research, we focus our analysis specifically to how these sex differences in travel vary by ethnicity. For example, White (1986, 372) noted that "for both sexes, being black is associated with a large increase in commuting journey length." Perhaps the most important finding in the spatial mismatch/sex-and-travel-behavior research is that, although white women on average have shorter commute times than white men, there is typically no significant sex difference in commute times for blacks or Latinos (McLafferty and Preston 1991; Johnston-Anumonwo 1995; McLafferty and Preston 1997). In other words, the widely acknowledged sex differences in travel behavior appear to apply primarily, if not exclusively, to whites. Furthermore, black women in the central city have been found to have the longest commute times of any sex-ethnicity category; in the suburbs, men of color still have slightly longer commute durations than women, but these differences are less than those between white men and women (McLafferty and Preston 1997). Thus, it is important to control for location when analyzing sex differences in travel by ethnicity. Regressing commute times against a variety of demographic, income, and locational factors shows that traveling via public transit contributes far more to increasing commute time than any other variable analyzed. In contrast, and quite predictably,

walking is associated with shorter commute times, particularly for women (Table 7-7). In addition, non-whites have longer commute times than whites, and men have longer commute times than women in each ethnic group. Notably, the use of automobiles – either alone or in carpools—significantly shortens commute times for Asians and Latinos, while blacks, whites, and others appear to have longer trip times when using a car. Finally, making non-work trips and trip-chaining both serve to shorten commute times for each group (though this is probably due simply to moving the to-work departure point closer to the job site).

Urban Location of Residence

The journey to work, or commute, has two ends—the home and the workplace (and, as we will discuss later, increasingly includes stops between these trip ends). While we will analyze job location in the next subsection, important differences in commute length can be explained by first distinguishing residences between suburbs and the city center (and excluding rural areas and small towns for the purpose of this analysis). For instance, Gordon, et al. (1989b) found that suburban-based commute times were longer on average than city-based commutes, but their NPTS data (like ours) did not allow for analysis of exact job location. Similarly, Preston and McLafferty, (1993) found that female commuters in the suburbs spent an average of eleven minutes more per trip than female commuters in the city, across ethnicity and household type. According to the 1995 NPTS, however, urban commute times are longer than those in the suburbs for both women and men in each household type; also, while men have longer commute times than women from the suburbs, women from the city generally have longer commutes than either men or similar suburban women (Figure 7-21). Women's commute times appear to be shortened by living in the suburbs and having a spouse and children, while men's commute trip times appear to be lengthened by the presence of children and a spouse. At the same time, women living in the city—who are more likely to be poor women of color—have the longest commutes, followed by men living in the suburbs—who are more likely both to be white men and to have higher household incomes. This may reflect two different phenomena: that of the "choice" long commuter in the suburbs, and that of the "constrained" long commuter from the city.

Meanwhile, Johnston-Anumonwo (1995) found that, while women commuting from the suburbs into the city or from the inner city out to the suburbs had significantly longer trip times than those who commuted "locally" from suburb to suburb or within the city, those commuting "in" were likely to be white women in higher-wage jobs, while those commuting "out" were more likely to be women of color in lower-status, low-wage jobs. The spatial mismatch hypothesis suggests that as employment "suburbanizes," residential segregation prevents a similar decentralization of persons of color, thus leading to longer commutes for non-whites (see, e.g., Fernandez 1994). The poor, persons of color, and women—particularly in single-worker households—are also disproportionately located in the central city. Thus, the longer commutes implied by the spatial mismatch hypothesis may be particularly applicable to these groups (Roistacher and Young 1981; Holcomb 1984; Preston and McLafferty 1993; Johnston-Anumonwo 1995). According to the 1995 NPTS, women—and black women in particular—are far more likely to be single parents than are men (Figure 7-22). Furthermore, because higher levels of congestion tend to slow trip speeds in the central city, those whose trips start and/or end in the city are likely to have longer commute times, even as the expansion of suburban roads and rapid rail increases the average speeds of non-center commutes (Johnston-Anumonwo 1995). When viewed by mode, women's urban commutes tend to take longer than suburban ones (except on transit and by bicycle), and their urban speeds are lower except when using the bus (probably due to poor suburban transit service frequencies) or non-motorized modes (Figures 7-23 and 7-24). The ethnic variation in household type and urban location means that slower commute speeds in urban areas are more likely to affect single mothers and people of color.

Table 7-7. Influences on Commute Time

ALL			Men		Women		Asian	Black	Latino	Others	White
Variable	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables					
MALEFL	-0.055 ***	-0.056 ***					- ***28	-0.074 ***	-0.079 ***	0.009	-0.049 ***
ASIANFL	-0.012 **		-0.002		-0.022 ***						
BLACKFL	0.050 ***		0.041 ***		0.055 ***						
LATINFL	0.016 ***		0.010		0.021 ***						
OTHERFL	-0.002		0.006		-0.008						
PARENTFL	0.123 ***	0.128 ***	0.092 ***	0.095 ***	0.147 ***	0.154 ***	0.057	0.138 ***	0.005	0.140 ***	0.143 ***
PRTNERFL	-0.015 ***	-0.017 ***	-0.014	-0.015 *	-0.016 **	-0.019 **	-0.063 *	-0.005	-0.040 *	0.012	-0.017 ***
WORKERFL	-0.117 ***	-0.115 ***	-0.117 ***	-0.118 ***	-0.107 ***	-0.104 ***	-0.139 ***	-0.074 ***	-0.152 ***	-0.270 ***	-0.113 ***
LICDUMMY	0.105 ***	0.099 ***	0.063 ***	0.060 ***	0.126 ***	0.118 ***	0.141 ***	0.161 ***	0.158 ***	0.164 ***	0.072 ***
INCOMEPT	0.025 ***	0.019 ***	0.046 ***	0.042 ***	0.006	-0.001	0.037	0.020	0.057 **	0.007	0.023 ***
TRDEPEND	-0.020 ***	-0.013 **	-0.018 **	-0.013	-0.024 ***	-0.016 **	-0.038	-0.034 *	- ***13	-0.006	-0.014 **
EDUCFL	0.008	0.003	-0.002	-0.007	0.013 *	0.009	-0.106 ***	0.003	-0.037	-0.007	0.017 ***
R_AGE	-0.040 ***	-0.042 ***	-0.013	-0.015	-0.052 ***	-0.055 ***	-0.061 *	- ***37	-0.062 **	-0.083 **	-0.036 ***
(Constant)	***	1.796 ***	***	1.640 ***	***	1.765 ***	***	***	***	***	***
N	33263	33580	15115	15274	18148	18306	827	2889	1805	1054	26688
Adjusted R Sq.	0.039	0.036	0.020	0.019	0.049	0.046	0.037	0.050	0.039	0.073	0.036
Sig.F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standardized (beta) coefficients shown. Probability of >T is shown as *** at the 0.01 level, ** at the 0.05 level, and * at the 0.1 level.

Figure 7-21. Men Have Longer Commute Times From Suburbs, Women From Central Cities; Married Moms' Commute Times Are Shorter, Single Moms' Longer

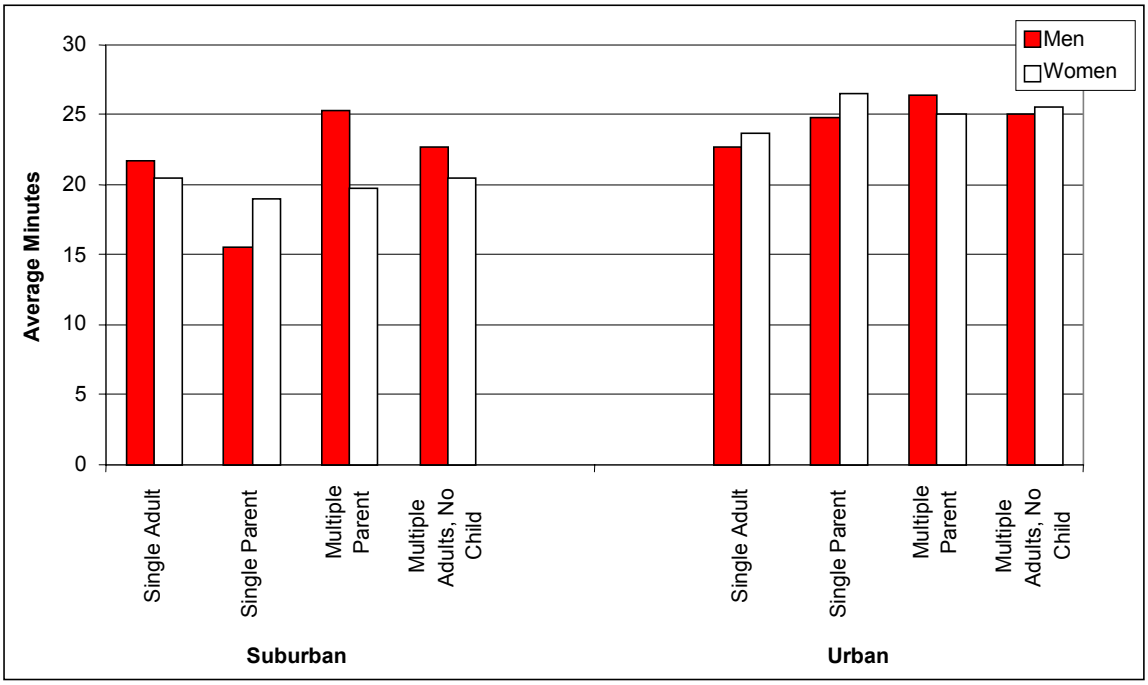


Figure 7-22. Women, Especially Women of Color and Those in the City, Are More Likely to be Single Parents

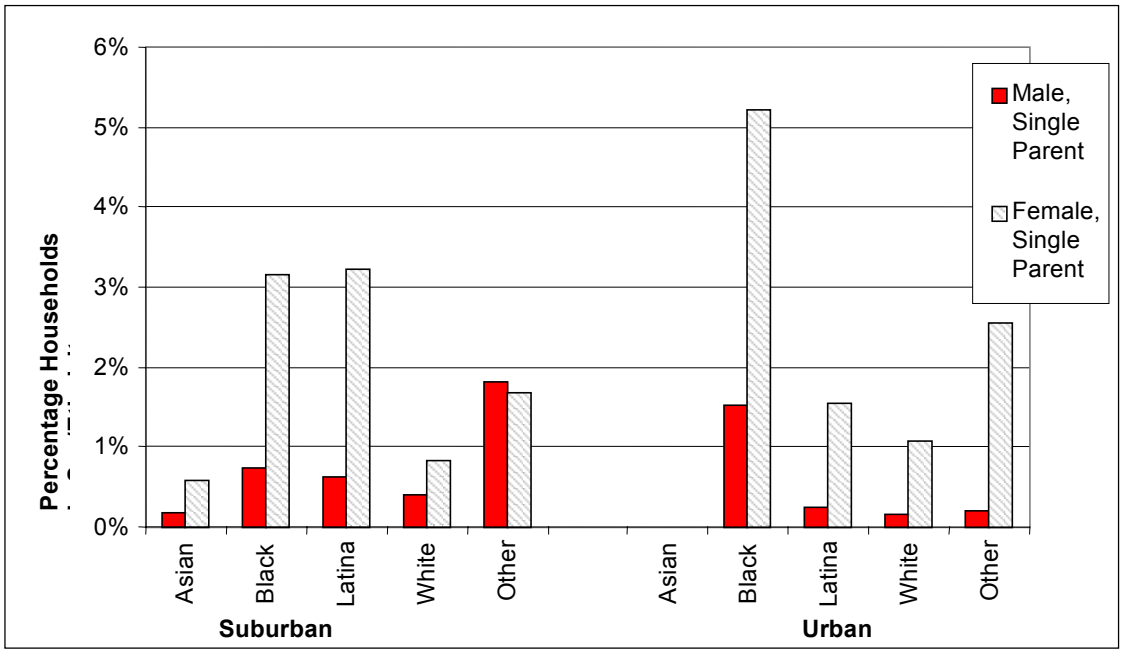


Figure 7-23. Women's Transit Commute Times Are Longest by Far; Only Bus and Bike Trip Times Are Longer in Suburbs

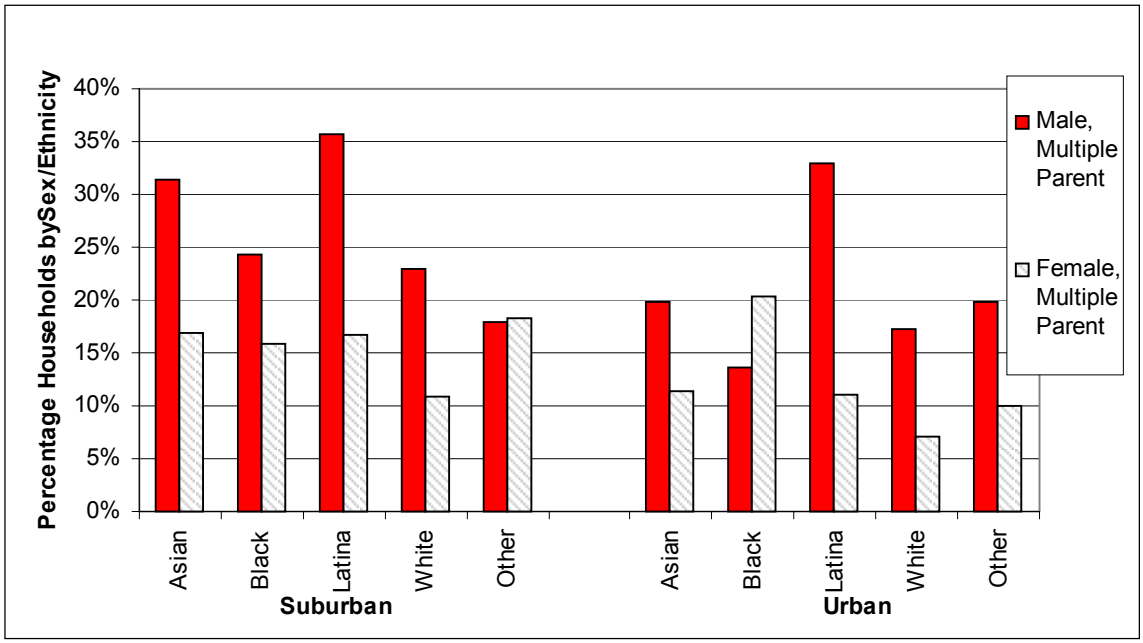
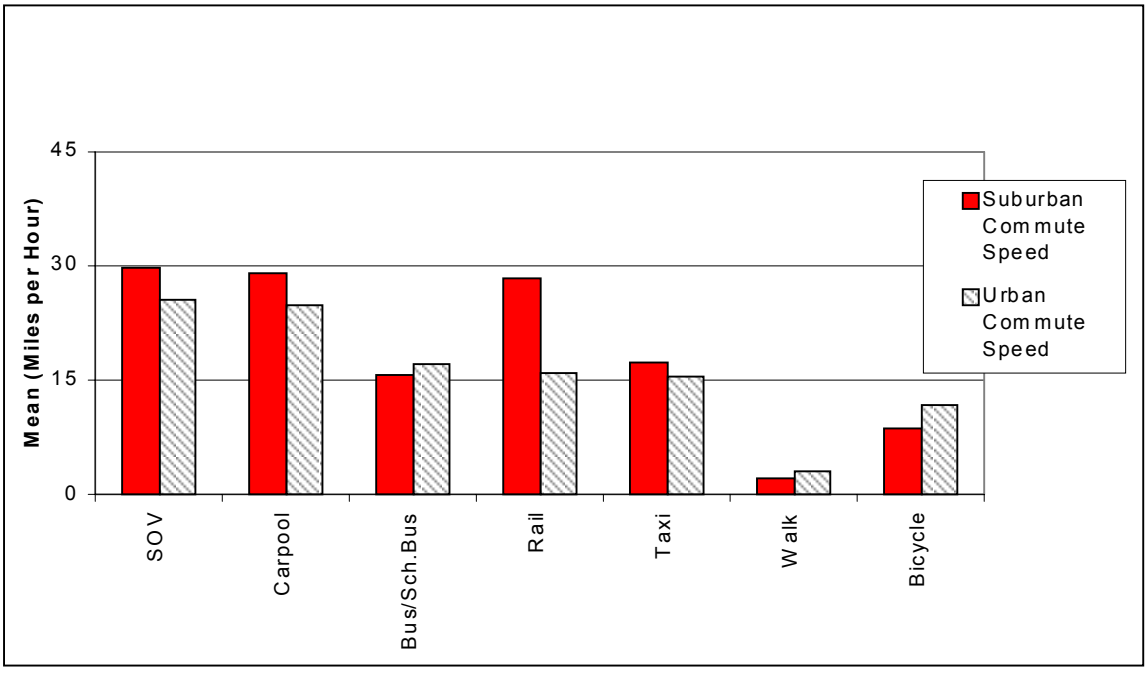


Figure 7-24. Women's Suburban Commute Speeds Are Higher on Most Modes; Rail Even Approaches Automobile Speeds



In addition to the ethnic and racial housing segregation noted by spatial mismatch theorists, there are several other factors which help to explain the distribution of income, sex, and household-type groups across U.S. urban areas, and which therefore may contribute to differences in commute times. First, Fernandez (1994) pointed out that households (particularly those with children) which can afford to suburbanize typically do—regardless of whether such households are headed by men, professional women, or middle-class blacks—because the gains in housing amenity for the price (including neighborhood and quality of local schools) offset the increased costs of commuting. That is, higher-income households (which are typically male-headed) intentionally self-select for longer commute durations at higher speeds from suburban homes, leaving singles (mostly women of color) and low-wage workers in the center city; the lower average income of central city workers, in turn, increases the use of slower travel modes (particularly public transit) in more congested conditions (Figure 7-25). However, Preston and McLafferty, (1993) found that single mothers and childless married women were more evenly distributed between the city and suburbs than single women, suggesting that either marriage (which typically includes an increase in income) or a child (which increases the desirability of suburban living) may encourage women to locate in the suburbs (Fernandez 1994). We find that in the 1995 NPTS that, except for "other" men and black women, parents in multiple-adult households are most likely to live in the suburbs, while black single mothers are significantly concentrated in the city center (Figure 7-26). Preston and McLafferty, (1993) also found that single women had much shorter commutes in the suburbs than in the city, suggesting that single urban women might have shorter commutes if they could better afford to suburbanize. In fact, the 1995 NPTS data show that single women are the only group who live in the city when their incomes are slightly higher, while higher income multiple-person households are much more likely to live in suburbs (Figure 7-27). In both places, single-mother households have the lowest incomes; this is most striking for those in the urban center, where single mothers have household incomes which are about one-third that of childless couples in the suburbs.

Second, age of worker, because it is correlated with wealth (and thus ability to pay more for housing), is also associated with a higher likelihood to suburbanize (at least in the U.S.), and thus shorter commute times. Third, while automobile availability is practically required for suburban residence, those who live in suburbs but do not have access to an automobile are likely to have both shorter commute distances and longer commute times, because non-automobile modes take longer to travel shorter distances, particularly in suburbs. Recent expansions of commuter rail in large metropolitan areas, however, may be reducing the modal commute-time gap for suburbanites riding rail (McLafferty and Preston 1997—see again Figure 7-24). Fourth, married couples increasingly must choose their home location with regard to two commute destinations, unlike the one-worker assumptions of early residential location models (Giuliano 1989). White (1986) found that male-headed households—particularly those with non-working spouses—were more likely to locate in the suburbs. In such cases, the male typically commutes longer in both time and distance. At the same time, this longer commute responsibility of the male is made possible by the female's willingness to work at home or find a job near the selected residential location, thus allowing a shorter commute and freeing time for her household-based responsibilities (Singell and Lillydahl 1986; Hanson and Pratt 1995). If this were true, we would expect single women's commutes to be longer (controlling for education and experience) than those of married women (and more like single men's, which we would expect to be shorter than married men's), all else being equal. In fact, Preston and McLafferty (1993) found that single women's commute times were longer than those of married mothers, but that those in the suburbs also had shorter commute times than those in the center. Confirming this, we found in the 1995 NPTS that, while men's commute times are highest when both another

Figure 7-25. Urban Women More Likely Than Suburbanites to Commute on Transit, Walking

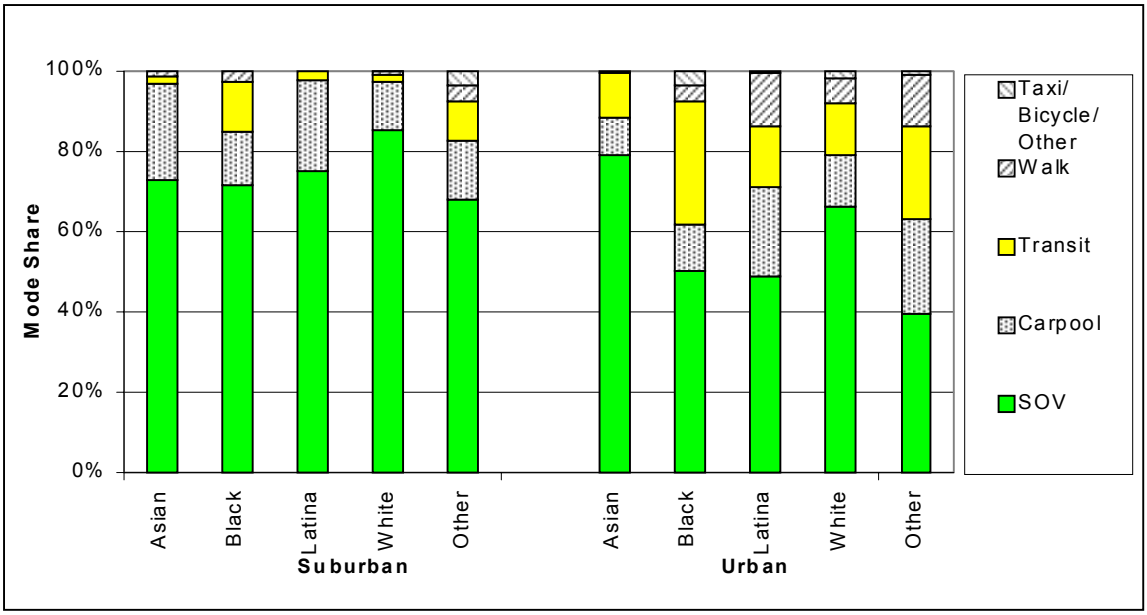


Figure 7-26. Fathers More Likely Partnered and Living in Suburbs

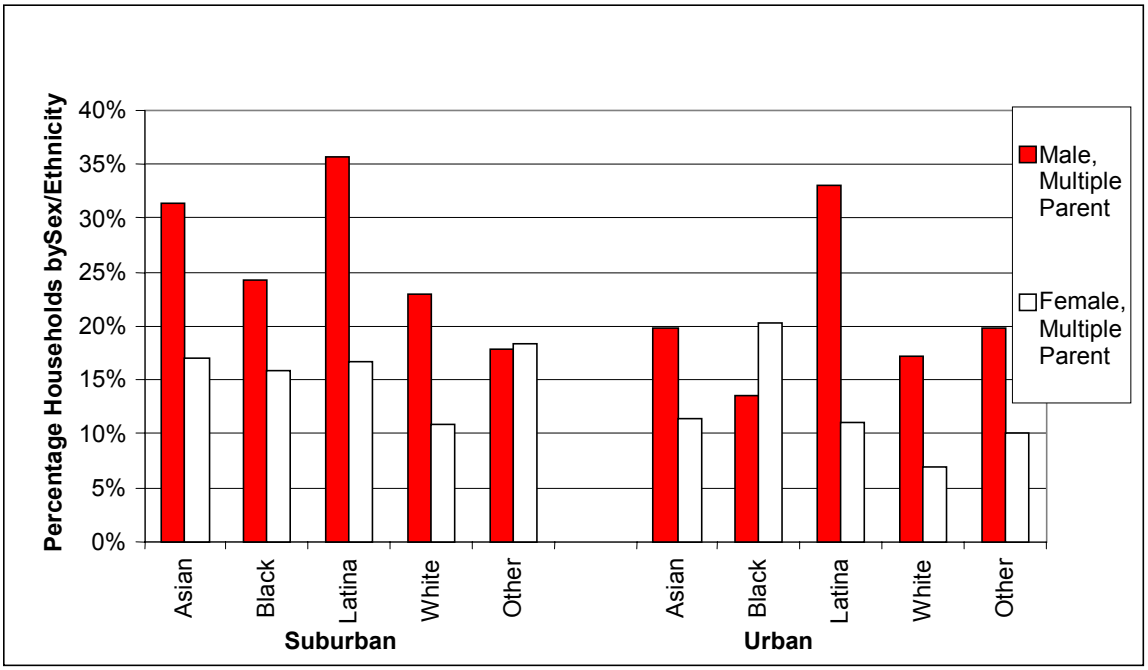
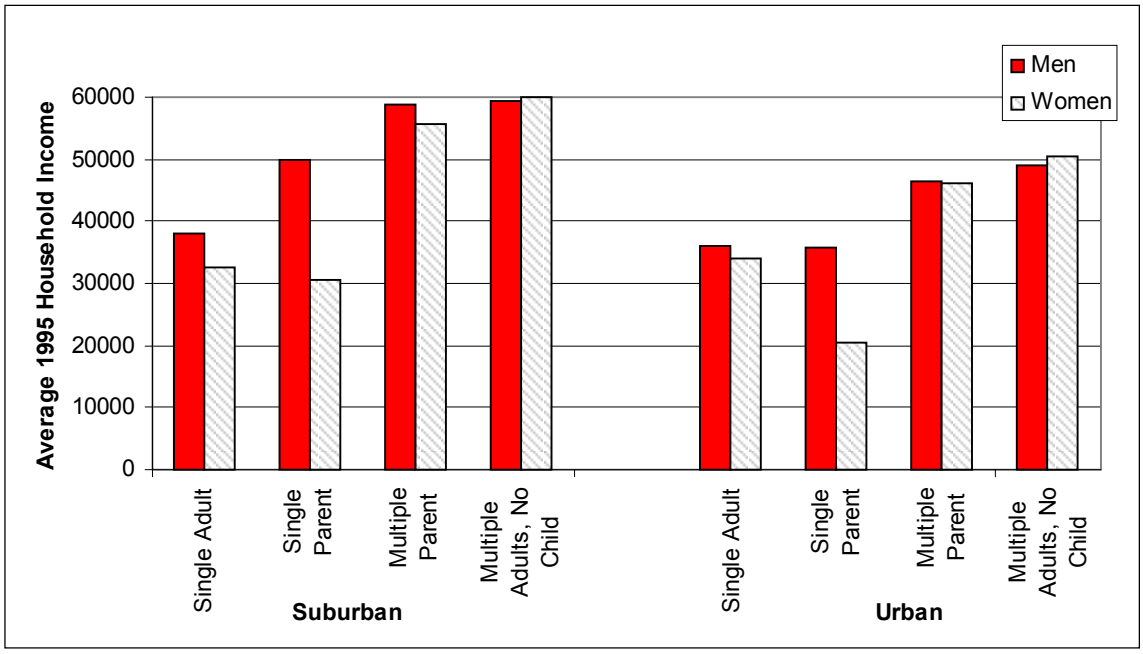


Figure 7-27. Couples With Higher Incomes Live in the Suburbs; Single Mothers With Lowest Incomes Live in Urban Centers



adult and a child are present, urban single mothers have the longest commute times of any group in any location (Figure 7-28). Madden and Chen Chiu (1990) noted that the household location decision of a married couple might be made specifically in order to reduce the woman's commute, in order to facilitate household tasks. They concluded (p.368) that "the causes of the gender wage gap are not spatial but must arise from other choices made by workers, households, and/or firms." The hypothesis is that households locate intentionally to shorten married women's commutes relative to single women's for non-income reasons, such as household responsibility (Hanson and Johnston 1985; Preston and McLafferty 1993). However, we find that men's commute time is increased significantly in childless couples only for Asians and blacks (Figure 7-29). More interestingly, we find that Asian husbands have double the commute times of single Asian men, and that only black wives' commute times outpace those of their husbands. However, when children are present, marriage does increase men's commute times, except for Latinos, while mothers' commute times do tend to drop slightly with marriage (Figure 7-30). For Latina and Asian mothers, however, commute times rise significantly with the presence of one or more other adults. It may be that, in such households, the presence of extended family members who stay with children allows them to lengthen their commutes.

Analysis of residential location by ethnicity further elucidates important distinctions in commute behavior, particularly between household types. Preston and McLafferty (1993) found that white women were most likely to be childless, Latina women were most likely to be married with children, and black women were most likely to be single mothers. The 1995 NPTS shows that fathers in households with children are significantly more likely to be married than mothers, and that black, Latina, and other women are more likely to be single mothers—or mothers at all—than are whites or Asians (Figures 7-22 and 7-26). This is interesting because the finding that women have shorter commute times than men seems only to hold for white women in the suburbs, who are the least likely to be mothers, or without another adult to share child-related duties (Preston and McLafferty 1993; Johnston-Anumonwo 1995).

Figure 7-28. Married Fathers and Urban Single Mothers Have Longest Commute Times

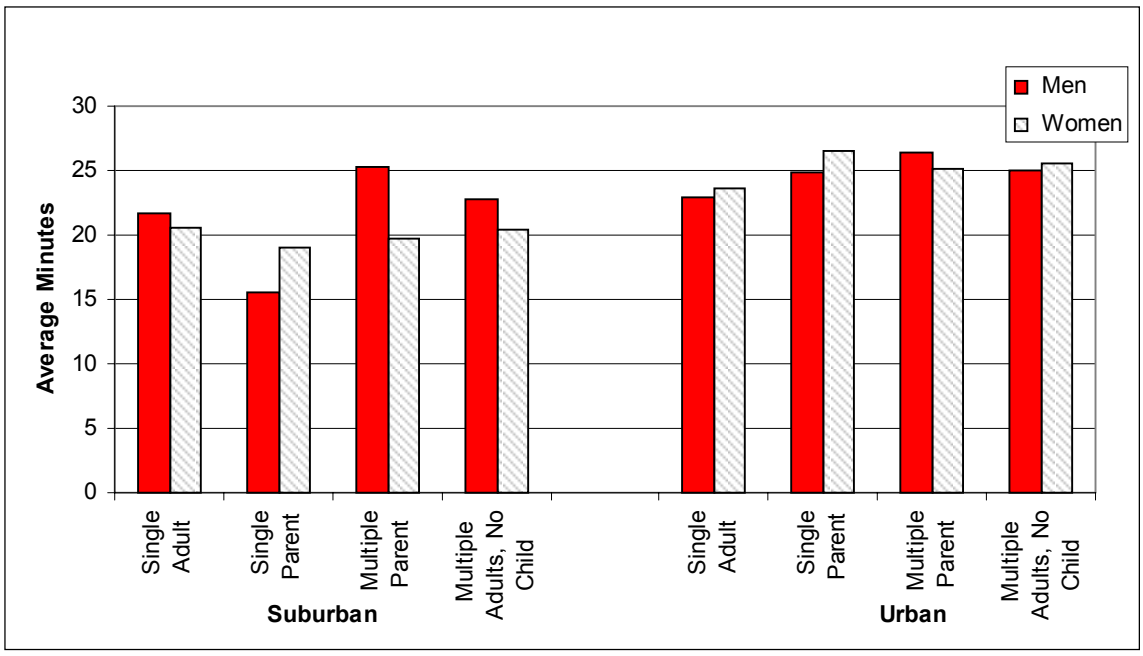


Figure 7-29. Sex Differences in Commute Times Between Single Adults and Childless Couples

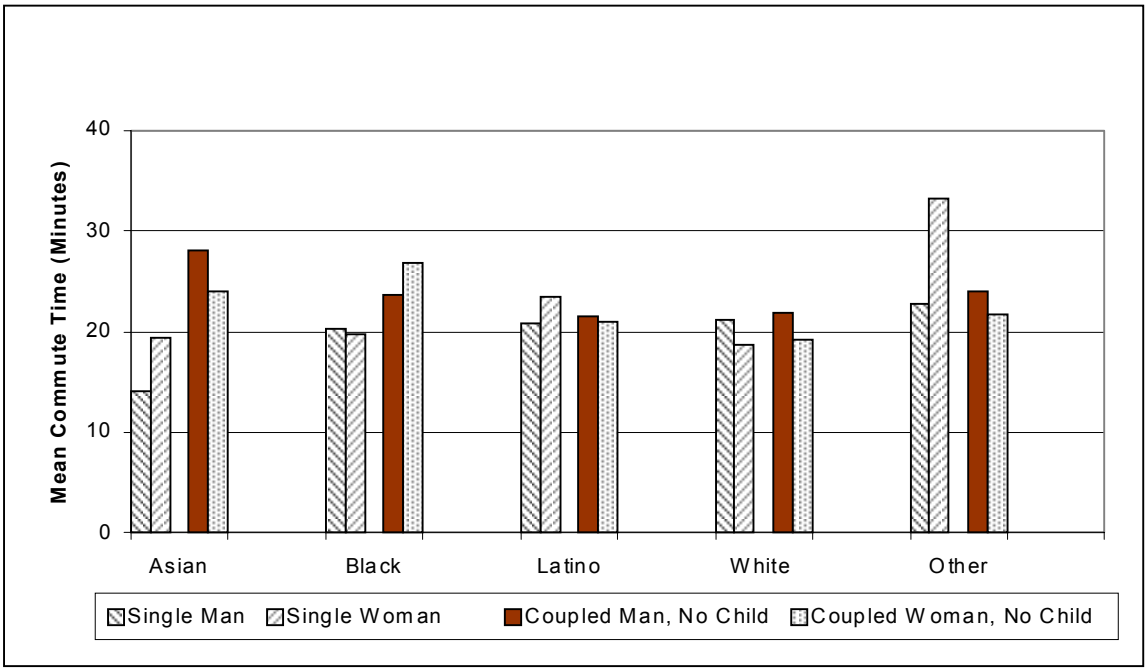
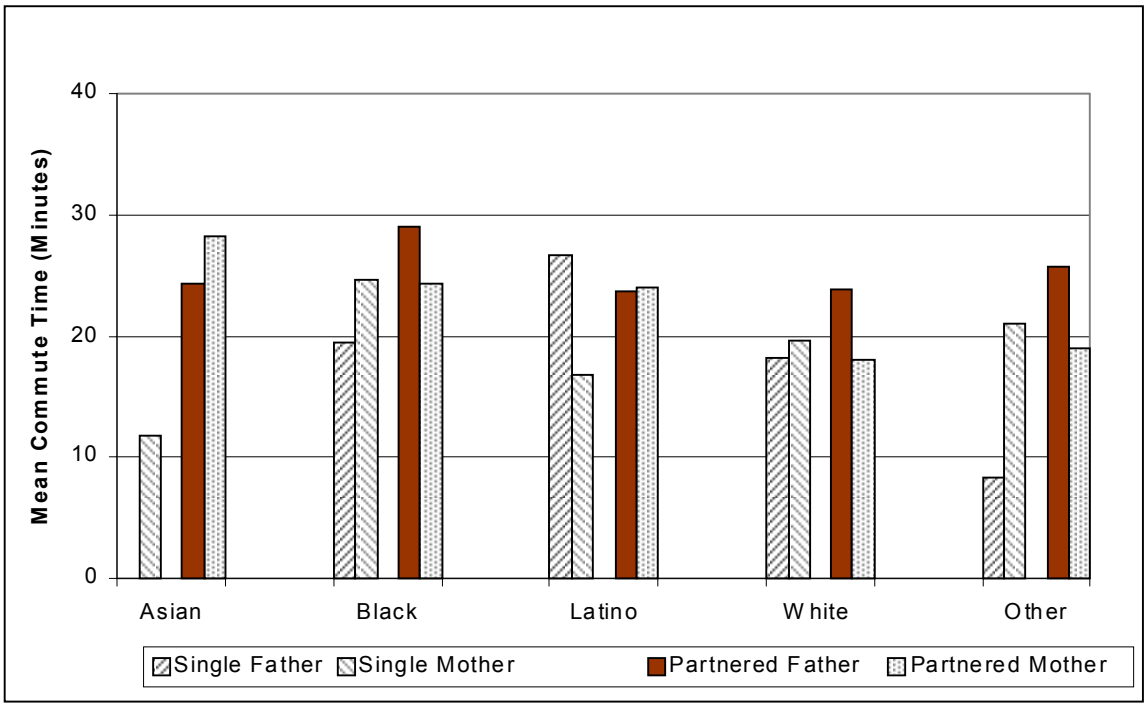
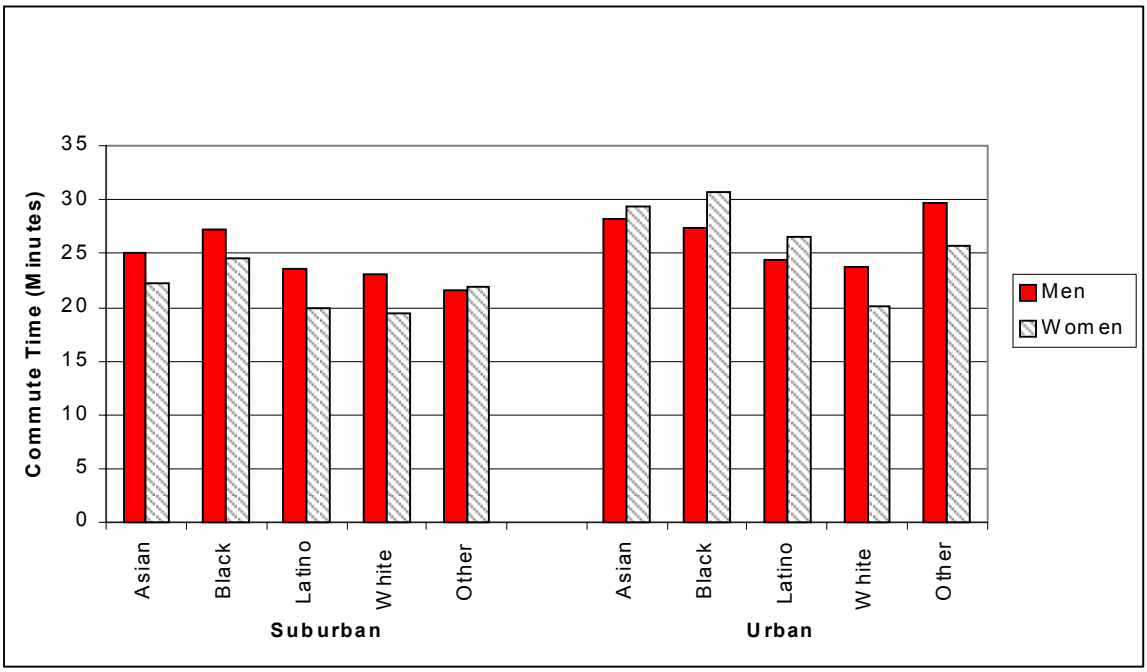


Figure 7-30. Sex Differences in Commute Times Between Single Parents and Partnered Parents



McLafferty and Preston (1997) found that black women living in the city had the longest average commutes, and white women in the suburbs the shortest; in addition, they noted that, within the suburbs, women in each ethnic group had shorter commutes than men in each ethnic group—suggesting that households of color which have suburbanized may be shifting toward the wider sex-split of whites. However, black and Latina women still had longer commutes than white women, both in suburbs and in the central city. According to the 1995 NPTS, women living in the suburbs have the lowest commute times, across ethnic groups (Figure 7-31). This suggests that suburban women take jobs closer to home, regardless of ethnicity. As noted above, those in urban locations tend to have higher commute times than those in suburban locations, except for white women. While suburban men have longer average commutes than suburban women, in urban centers the opposite is true: Asian, black, and Latina women have longer commute times than men. Preston and McLafferty, (1993) noted that in the central city, ethnicity was much more important in explaining variance in commute times than children or marriage. Since lower-income households are concentrated in the central city (Cooke and Shumway 1991)—and these are more likely to be single-worker households and persons of color— there is also a likely correlation between location and income level which appears to be the influence of ethnicity. Preston and McLafferty, (1993) and McLafferty and Preston (1997) hypothesized that women of color "entrapped" in the central city—who were more likely to be single mothers—were likely to have longer commutes than others with more residential mobility or less household responsibility. The overall magnitude of this phenomenon could be quite significant, because employed black women are even more likely both to live in the central city and to be the primary breadwinner in their households (Johnston-Anumonwo 1995). When controlling for both ends of the commute, Johnston-Anumonwo (1995) found that overall disparities in automobile use seemed to decrease from 1980 to 1990: inner-city black women commuting within the city did not gain as much automobile access as did comparable white women, and inner-city black women commuting to the suburbs reduced their use of both automobiles and transit in her sample.

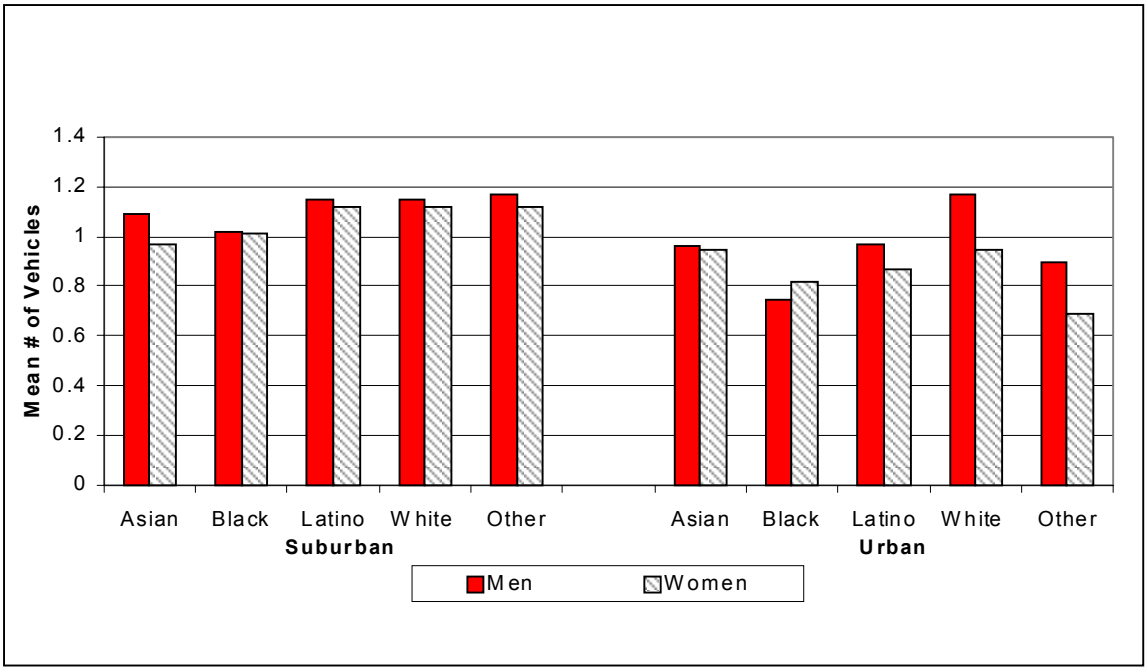
Figure 7-31. Women in the Suburbs (and White Women Anywhere) Have Shortest Commute Times



However, we found that, while blacks—and especially those in urban locations—had the lowest levels of automobile access (measured as average vehicles per driver), urban black women were the only group to have more vehicle access than comparable men (Figure 7-32). Thus, it may be that their higher incidence of single parenthood causes urban black mothers to garner the resources necessary for automobile access. This supports the finding of Rosenbloom and Burns (1995) that responsibility for children will cause even the lowest-income group of women to seek the use of a car. Johnston-Anumonwo (1995) showed that inner-city black women had longer commutes than white women regardless of mode. Preston and McLafferty (1993) found that, controlling for residential location, there were larger ethnic differences in commute duration among women in the city than in suburbs, suggesting that most commuting is toward the suburbs for women of color and more localized for white women whether they live in the city or the suburbs. Our NPTS data confirm this finding; while white women have the shortest commutes in the urban center and in the suburbs (an average of 20 minutes in each location), black women average 25 minutes in the suburbs and more than 30 minutes in the city—the longest commute time of any group (Figure 7-31).

Unfortunately, the NPTS does not allow for full analysis of job location or even occupation (which may be used as a proxy for location). Johnston-Anumonwo (1995) found that black women had longer commutes than white women when they were travelling from the inner city to suburban jobs by auto. She also found that these women were quite different from their white counterparts (who commuted in the opposite direction, into the city) in terms of both lower occupational status and lower household incomes. Thus, ethnicity may, to some degree, serve as a proxy for area of residence in determining commute trip length; however, Johnston-Anumonwo's (1995) findings show that the influence of workplace location on commute duration was much stronger than that of race/ethnicity.

Figure 7-32. Urban Black Women Are the Only Women to Have More Automobile Access Than Men

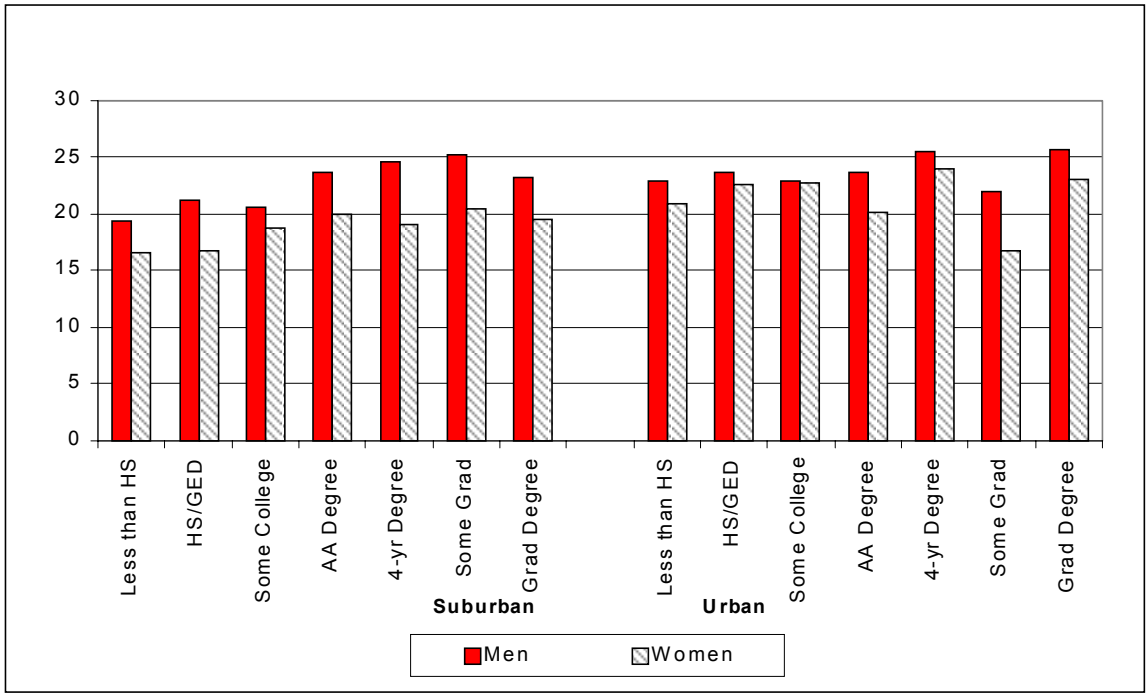


Income, Industry, and Occupation

Because professional jobs are disproportionately concentrated in central cities and service jobs are disproportionately dispersed in the suburbs, Johnston-Anumonwo (1995) found that the type of job in conjunction with place of residence were important predictors of commute length. Unfortunately, as Gordon, et al. (1989a) have noted, the NPTS does not provide information on job location. However, they and others have analyzed commute differences by occupational group, as a sort of proxy for job location, in order to make controlled comparisons between sexes and ethnic groups. Since women in general, and women of color in particular, are more concentrated than men in certain low-wage, low-status occupations, the geographic distribution of such jobs influences both the urban wage gradient and the commute destination for these workers (Madden and Chiu 1990; McLafferty and Preston 1997). Gordon, et al. (1989b) argued that women's commutes are shorter than men's because their jobs are more ubiquitous than those of men—though in another study they found women's commutes to be shorter even when controlling for occupation (1989a). Johnston-Anumonwo (1988) found that women working in the suburbs were more likely to commute to "gender-typical" jobs, although her sample sizes did not allow for many other significant findings with regard to type and location of employment. On the other hand, Hanson and Pratt (1995) found that women working in male-dominated occupations commute as many minutes as men do. However, Gordon, et al. (1989b) found that manufacturing workers—traditionally more likely to be men of color than either women or white men—did not have longer commutes than workers in other industries. Johnston-Anumonwo (1995) emphasized the ongoing shift of such jobs away from the city center and toward the suburbs, and the influence of this phenomenon on increasing commute times for women of color, but she does not compare to the commutes of similarly situated men. Preston and McLafferty (1993) and Johnston-Anumonwo (1995) found that white women in service jobs typically held by women continue to have relatively short commutes, while the commutes of women of color in the same types of jobs are longer. Overall, this effect is similar to that of job location—because service jobs and white women's residences tend to be located in suburbs, and professional jobs and black women's residences tend to be located in the city center, commutes for anyone within these areas tend to

be shorter than those between the city and suburbs. McLafferty and Preston (1997) found that, regardless of ethnicity, suburban men who work in "producer services" (likely to be downtown) and inner-city men who work in manufacturing jobs (likely to have dispersed away from the center) have longer commute times. The best (and only) proxy in the NPTS data for occupation type is education level. Figure 7-33 shows that for suburban men—and to a lesser extent, suburban women—a college degree is associated with a longer commute time, while the effect is both weaker and more varied for urban residents. That increased education has a stronger lengthening effect on men's commute times than on women's, however, is clear in both locations.

Figure 7-33. Education is Associated With Longer Commute Times for Suburbanites—Particularly Men, Who May Self-Select Long Commutes—But Mixed for Urban Residents



As with the racial-ethnic spatial mismatch research, most sex-ethnicity studies have focused primarily on the journey-to-work, and have explored the explanatory power of geographic factors which vary systematically by ethnicity, including both residential and job location within the urban area, occupation—especially those which are "typically" male or female—and industry (McLafferty and Preston 1991; Johnston-Anumonwo 1995; McLafferty and Preston 1997). Given this general omission in the literature, we turn now to non-work trips, emphasizing their importance for women workers and non-workers alike.

PURPOSE OF TRIP—HOUSEHOLD RESPONSIBILITY THEORY

The *purpose* of travel is central to understanding travel behavior. Several researchers have noted that the mix of purposes in a given individual's "trip portfolio" varies by demographic characteristics such as sex, life-cycle stage/household type, employment, and marital status (e.g., Hanson and Hanson 1981; Pas 1984; Gordon, et al. 1989a). While a concern for peak-hour traffic congestion and the availability of journey-to-work data from the U.S. Census have encouraged a research emphasis on commuting, trips for all other purposes make up a much larger share of most individuals' travel. Figure 7-34 shows that about half of all trips made by men in the 1995 NPTS—regardless of ethnicity—were for shopping, personal, and household-serving purposes, while such trips constituted an even greater share of women's travel—about 70 percent of all trips. Thus, while every group of travelers makes fewer than 27 percent of its trips for purposes related to paid work (including non-commute work trips), about twice as many trips are for shopping, personal, or household purposes, and substantially more of these trips are made by women than by men.

- Women make more trips per day than men on average because they make more stops for shopping and personal/household-serving purposes. For workers, this means that women are more likely to chain these errands into their commute trips.
- Parents—particularly mothers and single fathers—take the most trips per day, and more than four times as many of these are for errands as for work.

The predominance of personal and household travel, especially among women, has prompted a number of recent studies of non-work travel, of the linking or "chaining" of work-related and non-work travel, and of sex differences in non-work travel and trip- chaining. There has been relatively little research, however, on the intersection of ethnicity, sex, and trip purpose. In this section, we will test the influence of working, presence and age of children, and marriage on sex differences in levels of travel for shopping, chauffeuring children, and other household travel. In addition, we examine trip-chaining in private automobiles for achieving multiple trips in a constrained amount of time. We will also show that there are some important variations in sex differences by ethnicity, which can only partially be explained by factors which vary systematically by ethnicity such as income or residential location.

Members of virtually every household—whether or not it includes one or more workers—make shopping and household-serving trips, such as those to medical appointments or religious services. Feminist "household responsibility" theory suggests that women are disproportionately responsible for achieving the "reproductive" ends of the household, such as child care, meal preparation, and chauffeuring family members; as a result, they will make a greater proportion of "non-work" trips, and a lesser proportion of social/recreational trips, than men. If women did not tend to have different household responsibilities than men, their travel patterns could be expected to mirror those of men. However, consistent with household responsibility theory, women in each household type analyzed here make many more of these trips on average than do men. For multiple-adult households, this means that women continue to take on a disproportionately high share of trips for unpaid household work, despite the convergence in men and women's workforce participation rates. Figure 7-35 shows that (with slight exceptions for urban Asians and suburban "others") women in each metropolitan location and ethnic group take more daily person-trips than do men. In fact, the need to juggle a journey-to-work trip with shopping and other errands has led to significantly increased "trip-chaining," or linking multiple trips and purposes into a single "tour," particularly among women. Figure 7-36 shows that women make substantially more chained trips than men regardless of ethnic group; Figure 7-37 shows that women trip-chain more than men across income groups as well, and that (all but Latino) men's chaining actually decreases as incomes rise. Thus, as

Figure 7-34. Men Make Slightly More Trips for Work; Women Make Considerably More for Errands

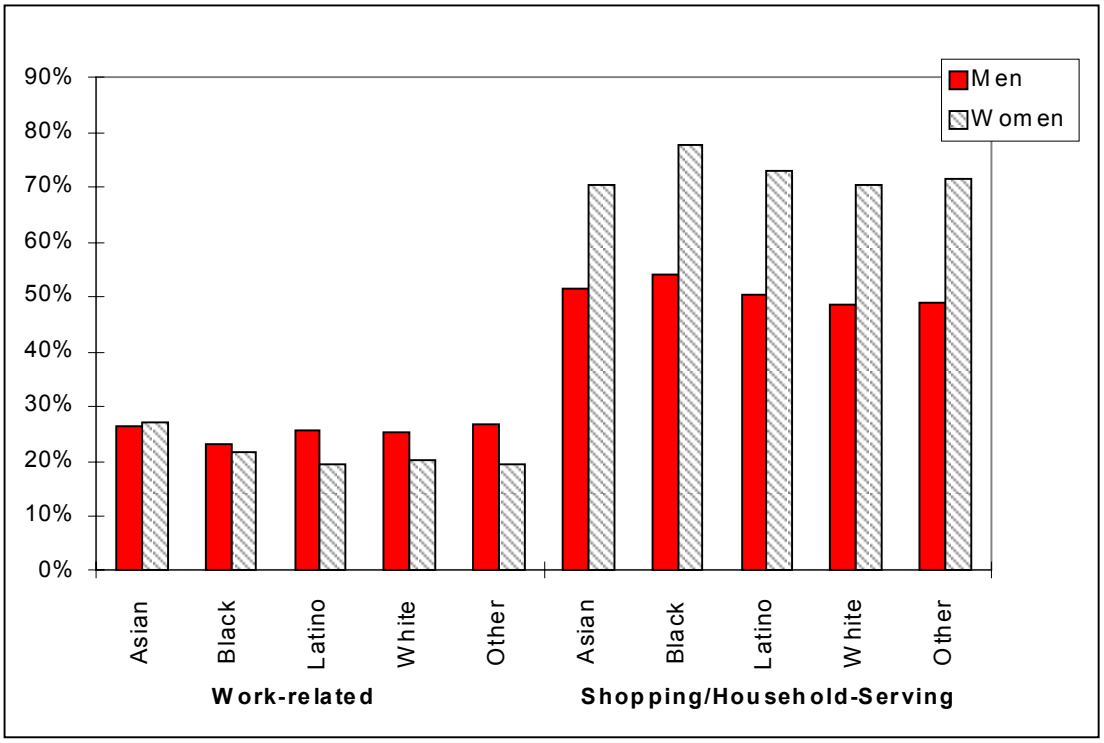


Figure 7-35. Women, Except Asians, Take More Daily Trips Than Men

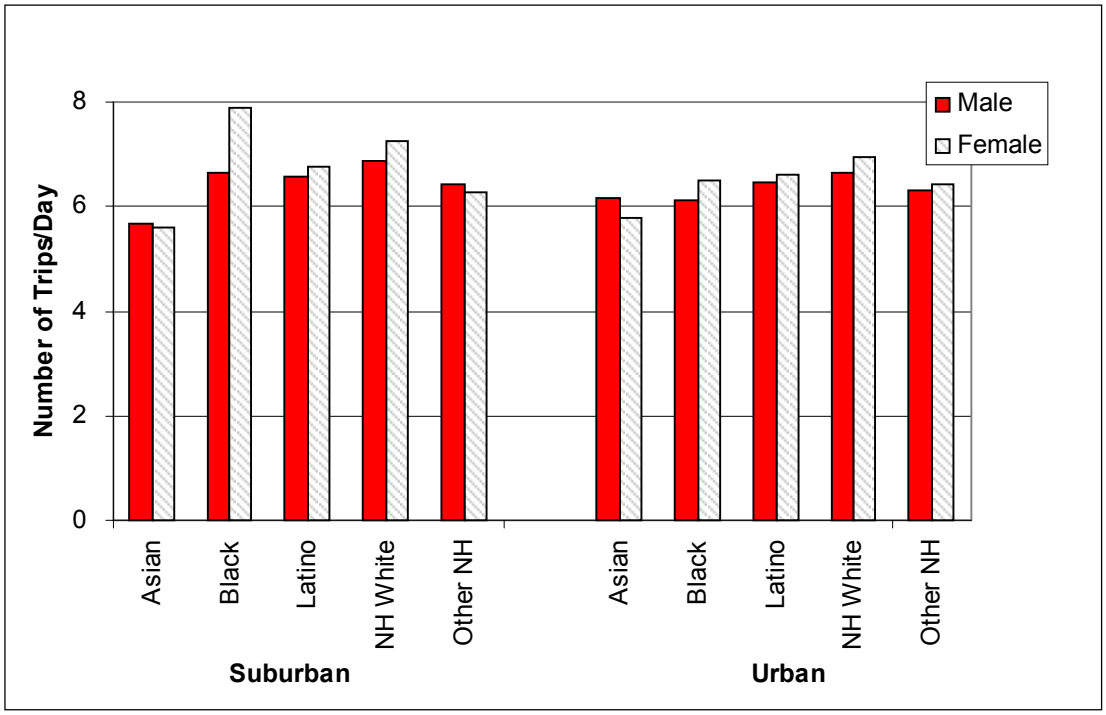


Figure 7-36. Women Chain Commute More Than Average and Men Less Than Average, Regardless of Ethnicity

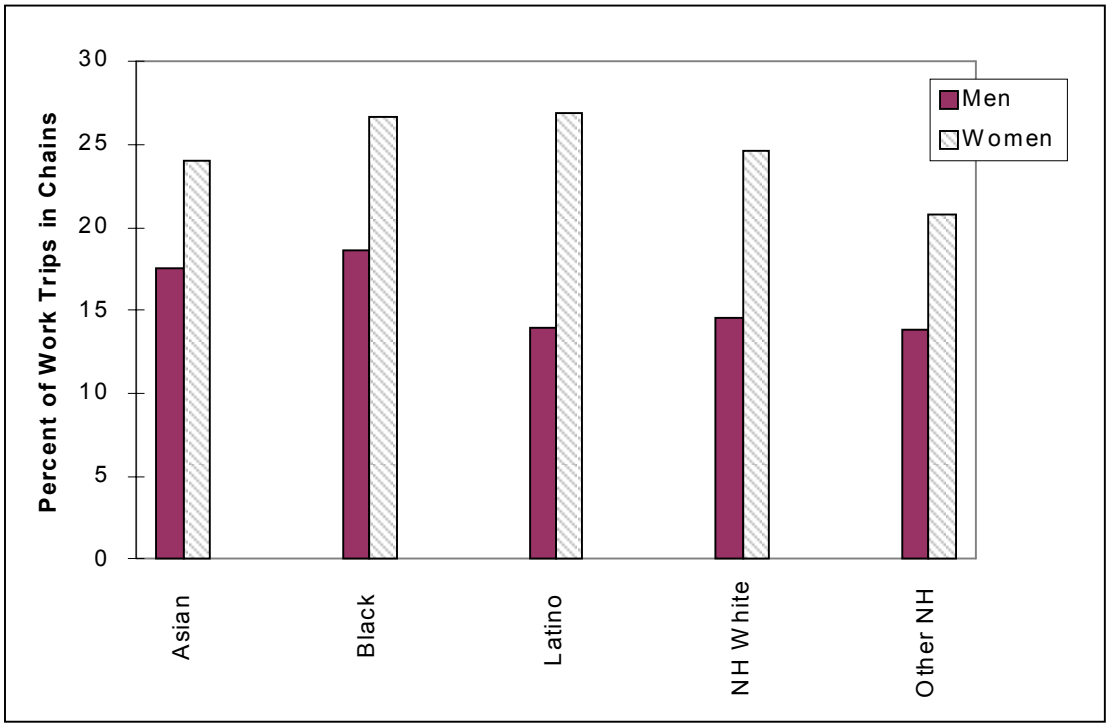
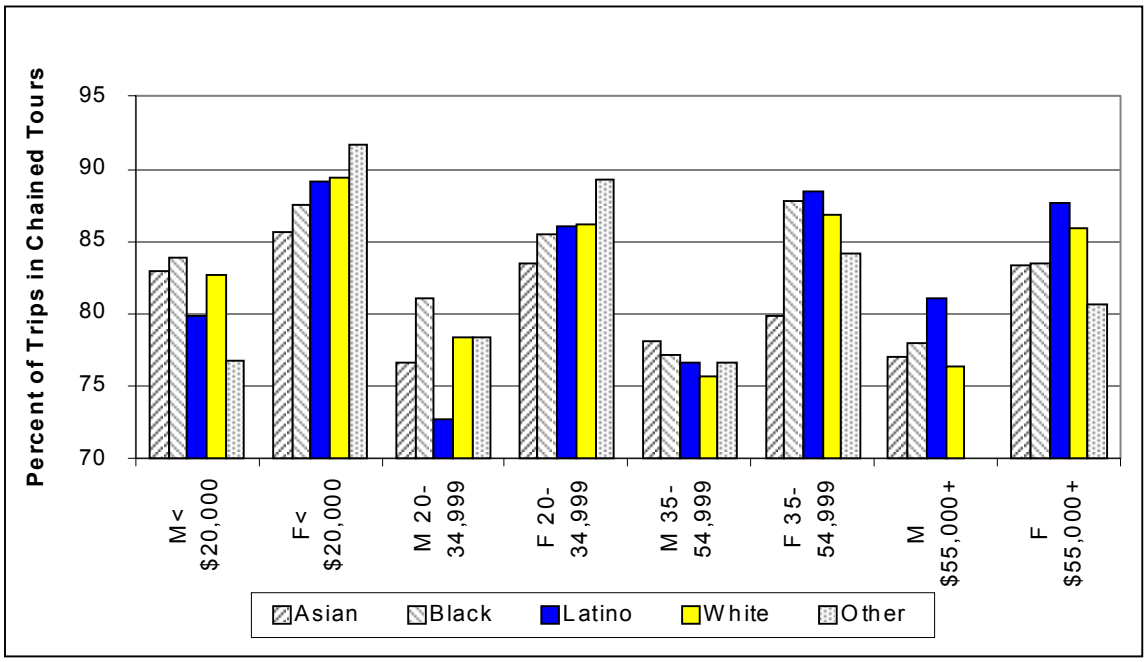


Figure 7-37. Women Trip-Chain More, Across Ethnicity and Income; Chaining Generally Decreases as Incomes Rise, Except for Most Women and Latino Men



"access" to transportation increases for men, they are less likely to need to trip-chain, perhaps because women in their households are more likely to be primarily responsible for errands and other chained trips.

Trip-chaining is an important transportation phenomenon for three reasons. First, the trend toward chaining belies the increasingly complicated nature of travel behavior (Pisarski 1996). If each individual's daily journey to work, for example, is interlaced with a different errand stop, it will be much more difficult for transportation planners and policymakers to predict accurately such complex, contingent travel behavior patterns. For instance, rather than evincing the same pattern of travel from day to day, each individual may travel alone or with others, along different routes, use different modes, leave at different times, and link together different trip purposes. The recognition of this complexity is at the heart of recent trend transportation modeling and forecasting toward the measurement and analysis of household activities. Second, trip-chaining may represent more efficient use of urban transportation investments, from both a user and a system perspective. That is, while women in particular may be more likely to trip chain in order to economize on time, more stops by anyone in fewer trip-tours also means slower growth in vehicle- and person-miles of travel relative to the growth in trip-making. For example, Figures 7-38 and 7-39 show comparisons of average daily person-trips between workers and non-workers. Working mothers are more likely to trip-chain than other women because they take more trips, and even mothers who do not work outside their household responsibilities are more likely than men to chain their (slightly fewer) trips together, suggesting that the more rigid time constraints of multiple trips and purposes cause mothers to trip-chain. Third, the unequal distribution of household responsibility reflected in travel patterns may also differ by ethnicity, suggesting cultural patterns in the sexual division of labor and household-serving travel. Figures 7-40 and 7-41 show trip-chaining behavior by ethnicity and sex. With Asians as the significant exception, women in each household type (but especially mothers) are more likely to chain trips together than are men; children seem to have more influence on the sex difference in trip-chaining than does marriage. In this section, we analyze the influence of marriage and children on ethnic variations among sex differences in non-work travel, with emphasis on the importance of trip-chaining. In short, we find that sex is a salient factor in determining household-serving travel across ethnic groups, that the characteristics of women's trips make them more likely to trip-chain, and that this propensity increases the need for dependable, "chainable" modes of transportation. This lends support to the "household responsibility" theory that, despite increasing female labor force participation, women still take on the majority of domestic duties, and that they have particular transportation needs as a result.

Shopping Trips

Several studies have indicated that regardless of household type or employment status, women make more shopping trips than men (Lopata 1980; Hanson and Hanson 1981; Grieco, et al. 1989; Hamilton and Jenkins 1989; Rosenbloom 1993; Mauch and Taylor 1998). The 1995 NPTS indicates that in each type of household—single, with other adults, with children or not—women take a higher proportion of their trips for shopping (Figure 7-42). Men, on the other hand, are more likely to take work-related and social and recreational trips than women in each household type we studied, consistent with the Swedish findings of Hanson and Hanson (1981). We found that in the 1995 NPTS data, these patterns held up, regardless of household type, and that presence of children results in slight increase in such trips for both sexes. However, Johnston-Anumonwo (1992) and Mauch and Taylor (1998) have argued that the number of workers in the household is an important influence on number of non-work trips, which we analyze below. Mauch and Taylor (1998) also found that women in each ethnic group consistently take about 75 percent more shopping trips than similar men, while the number of household-serving trips varies across ethnic groups. We find that in the 1995 NPTS, sex differences in the average number of shopping trips varied from 2 to 45 percent across ethnicity, but that women in each group always traveled more for shopping than men (Figure 7-43). Hanson and Hanson (1981) and Lopata (1980) point out that these trips can be particularly difficult to accomplish on non-automobile modes, or with small children along.

Figure 7-38. Workers Who Are Parents Make More Person-Trips Daily; Working Mothers Make the Most (8/Day)

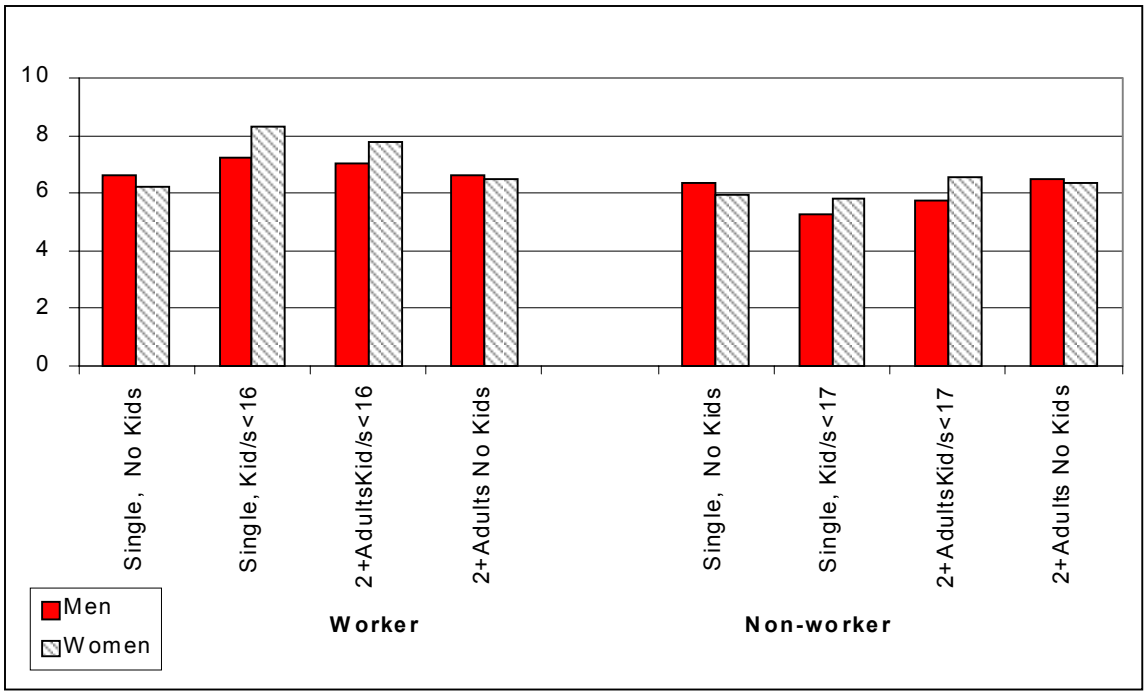


Figure 7-39. Women With Children Make the Most Chained Trips; Men Make More Unchained Trips

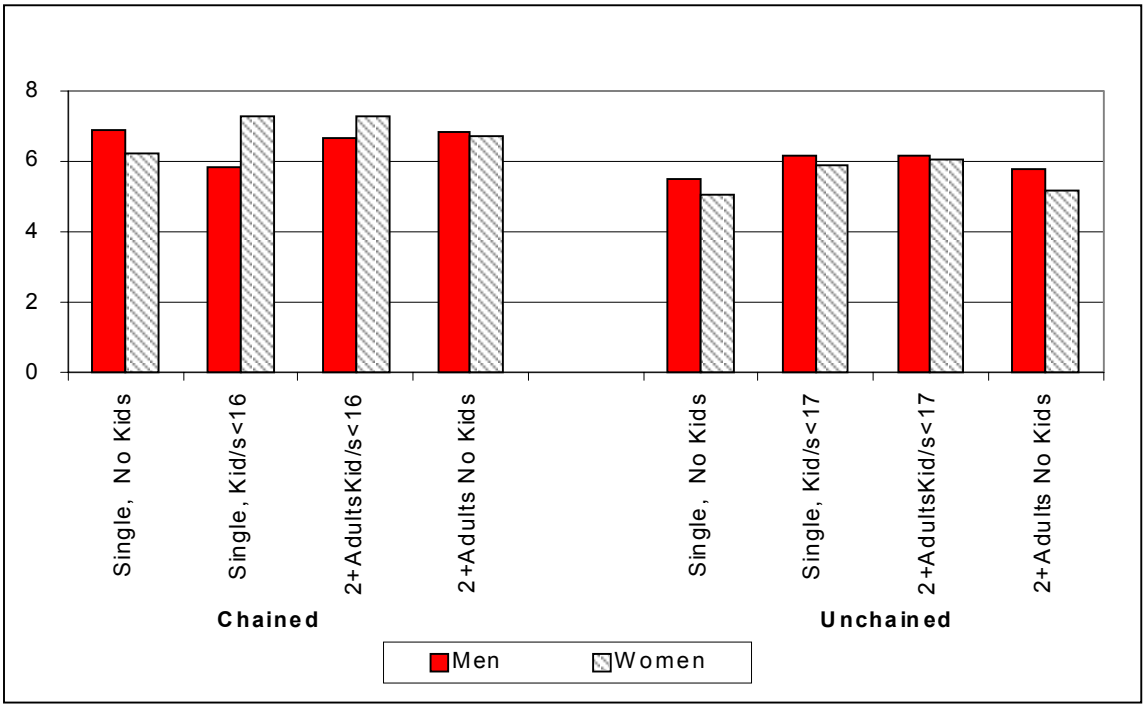


Figure 7-40. Childless Women More Likely to Chain Commute Trips Than Men, Except Coupled Asians

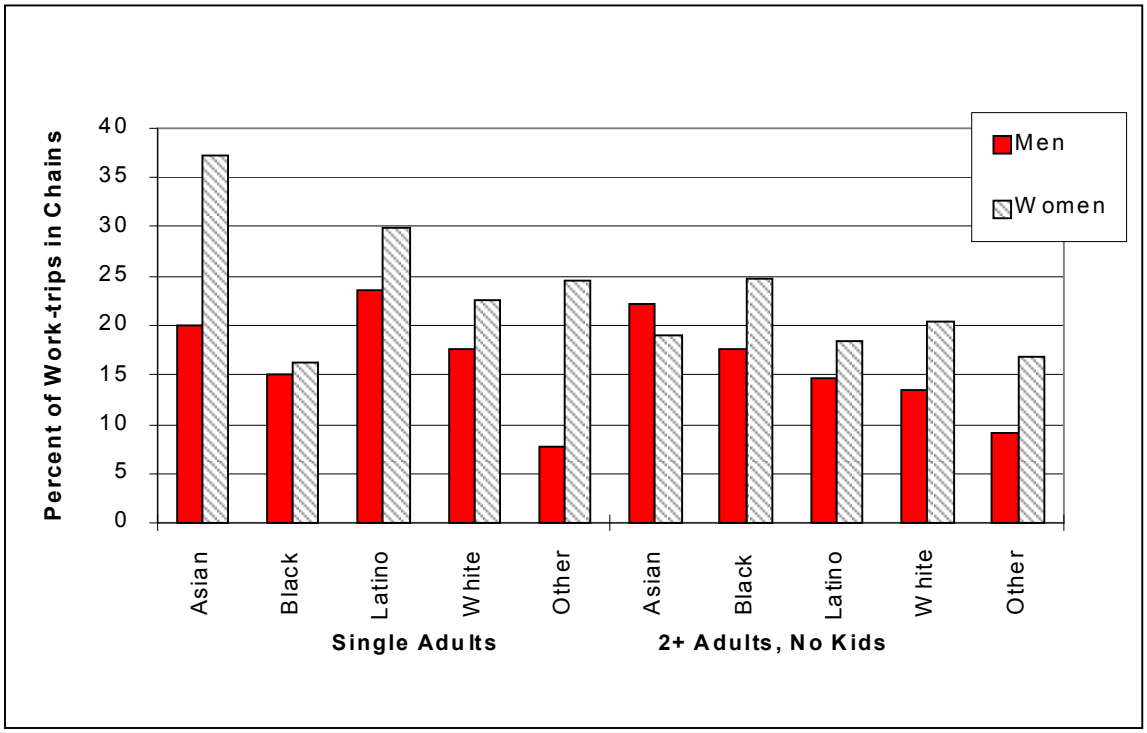


Figure 7-41. Fathers Trip-Chain Work Trips Less in Couples; Mothers Chain More Than Fathers, Except Single Asians

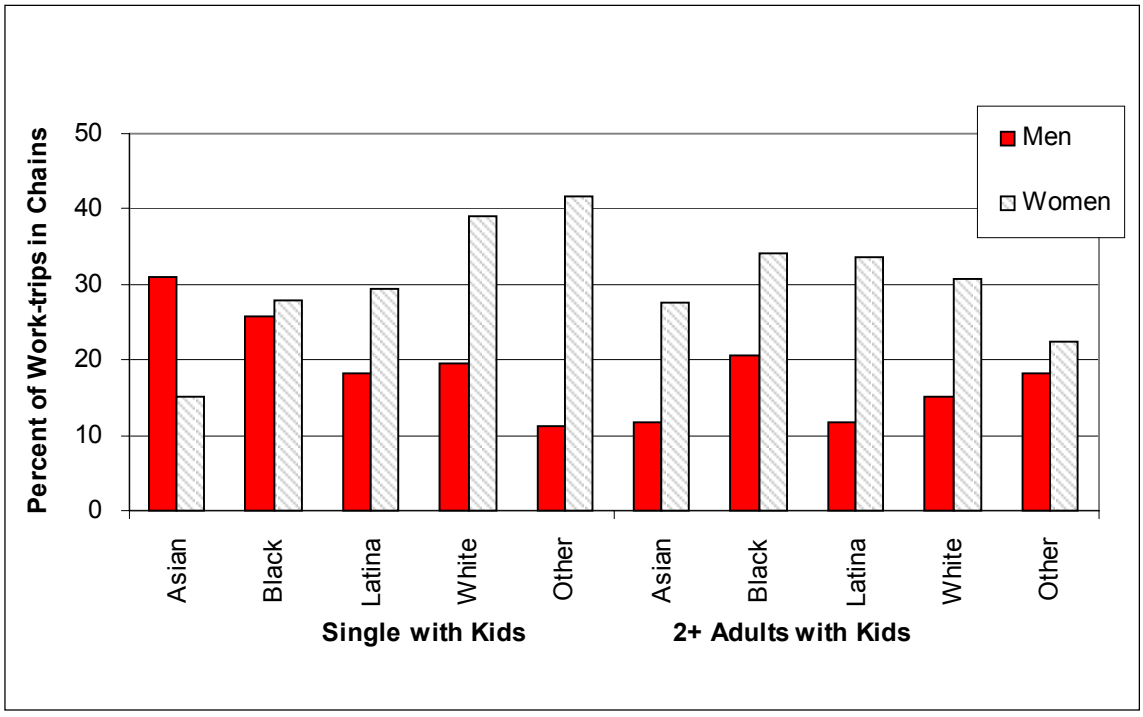


Figure 7-42. Women Take on More Household Errands When Children Are Present, Not Just a Spouse

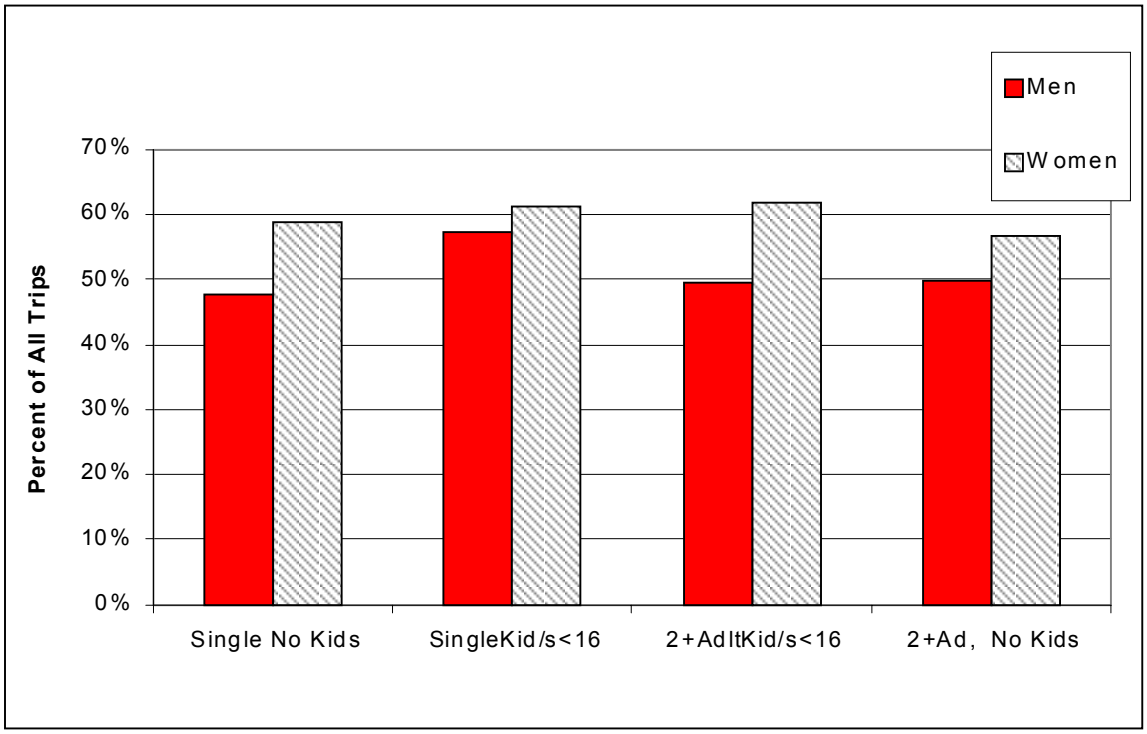
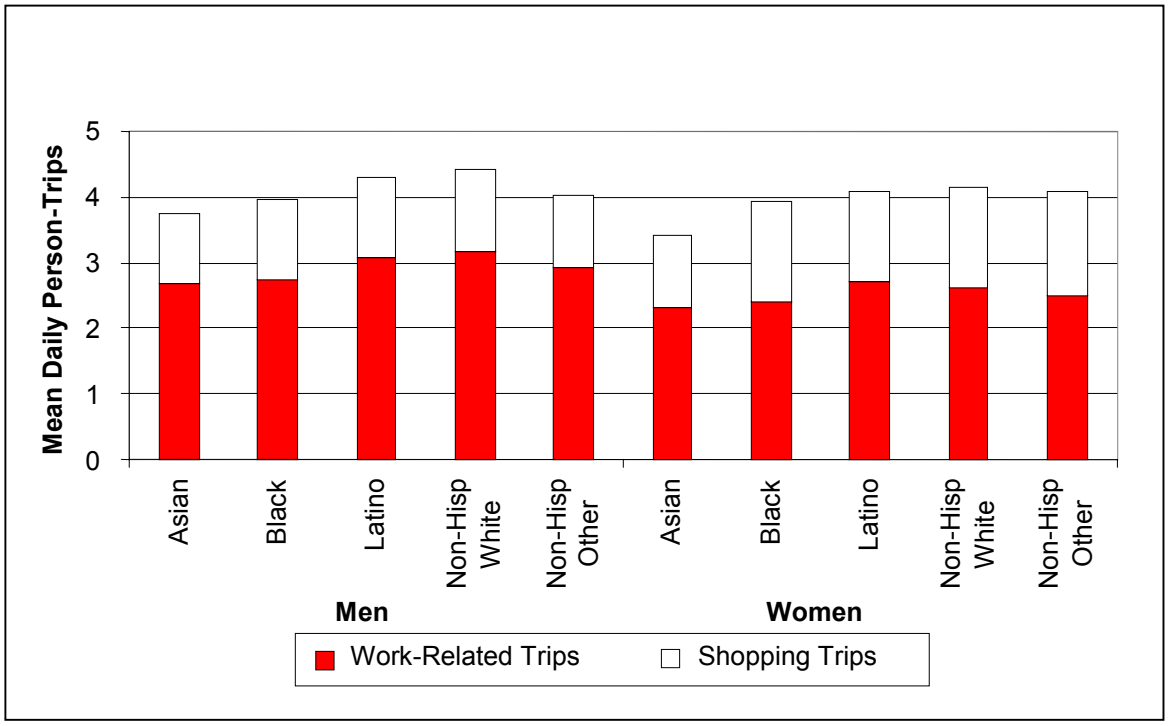


Figure 7-43. Men Make More Work-Related Trips, Women Make More Shopping Trips



Regression models for number of daily errand trips—which include both shopping and personal/household-serving trips—showed that parents make more errand trips in each ethnic group, although the influence of children is weaker among Asians and Latinos (Table 7-8). Women—particularly mothers—make more errands than men in each ethnic group except Asians, confirming Mauch and Taylor's (1998) finding that Asian men and women exhibit the least divergence in travel behavior among ethnic groups. Finally, workers make significantly fewer errand trips daily, across ethnic groups.

The Influence of Work and Presence of Children on Non-Work Travel

Johnston-Anumonwo (1988) argues that the presence of children causes women to have "weak labor force attachment," and thus to prefer the convenience of a nearby job to one that is higher-status or higher pay but farther and requiring more long-term commitment. Figures 7-38 and 7-39 also indicate that this may be due to the fact that mothers who work take an average of 8 trips per day, compared with 7 trips for fathers who work and slightly over 6 trips for working women without children. Thus, working women appear to take on more of the extra burden of trips represented by the addition of children into the family. A multivariate analysis relating demographic, economic, location, and transportation variables to the number of work-related trips shows that, as one would expect, being a worker and having a driver's license are the two best predictors of work-related tripmaking (Table 7-9). Parenthood is a stronger predictor of work-related tripmaking among women than men, while worker status is stronger predictor among men than women. Among Asians and Others, the ratio of vehicles per driver is more strongly associated with work-related tripmaking than among other ethnic groups, while transit dependence depresses work-related tripmaking among blacks more than among other ethnic groups.

Pickup (1989) and Cichocki (1980) noted that mothers who are not in the paid labor market take more shopping trips and trip-chain less than those who are in paid jobs, which may indicate fewer time constraints. In support of this hypothesis, Figures 7-44 and 7-45 show that for multiple-adult households with children, women consistently took a lower proportion of their trips for paid work and a higher proportion for shopping and personal/household-serving trips than did men. Even for households with more than one worker, women's increase in work-related travel does not bring their errand travel down to the levels shown by men. Pas (1984) noted that the presence of children in the household influences daily travel patterns of men and women differently, which he attributes to differing labor participation rates. Thus, for those not working outside the home, children may become the main job, and travel patterns reflect this. However, Rosenbloom (1993), Rosenbloom and Burns (1995), and Spain (1997) argued that mothers in "traditional" households, with another adult as the sole breadwinner, are increasingly rare. More women are adding paid work to their schedules without a concomitant shift away from household and child-serving trips. Nonetheless, Figure 7-46 shows that women in households with at least one other adult present make the largest proportion of chained trips accompanied by at least one child between the ages of 5 and 15. Unfortunately, the NPTS does not account for children under 5, so the actual number of trips made in the company of children may be substantially higher.

Young Children and "Escort" Trips

While Gordon, et al. (1989a) argue that children do not influence the length of non-work trips, they do not examine whether non-work trip times and distances become shorter as they are chained into commutes or non-work "tours." Such trips typically require the use of private vehicles, even if the average distances of individual links are shorter. Rosenbloom and Burns (1995) note that as mothers have entered the labor force, their responsibilities for childcare have to be built into their commute schedules; as a result, the younger and more numerous the children, the more likely a woman is to drive alone to work in order to balance these responsibilities, and the less likely she is to take other modes such as transit—regardless of

Table 7-8. Number of Daily Errand Trips

	ALL		Men		Women		Asian	Black	Latino	Others	White
Variable	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables					
MALEFL	0.088 ***	0.088 ***					0.103 *	0.065 **	0.091 **	0.063	0.093 ***
ASIANFL	-0.018 **		-0.012		-0.025 **						
BLACKFL	-0.031 ***		-0.029 **		-0.029 **						
LATINFL	0.000		-0.003		-0.005						
OTHERFL	-0.016 *		-0.019		-0.009						
PARENTFL	0.047 ***	0.045 ***	0.044 ***	0.042 ***	0.019	0.017	0.082	0.046	-0.024	0.021	0.055 ***
NONWTRPS	0.058 ***	0.058 ***	0.091 ***	0.092 ***	0.016	0.016	-0.005	0.087 ***	0.225 ***	-0.072	0.022 **
WORKERFL	0.079 ***	0.079 ***	0.098 ***	0.101 ***	0.086 ***	0.085 ***	0.119 *	0.050	0.031	0.015	0.076 ***
LICDUMMY	0.000	0.004	-0.014	-0.012	0.011	0.016	-0.061	0.041	-0.002	-0.035	0.000
TRDEPEND	-0.019 **	-0.024 ***	-0.029 **	-0.032 ***	-0.015	-0.020	-0.057	-0.018	-0.023	-0.068	-0.016 *
URBANFL	0.015 *	0.011	0.013	0.010	0.024 *	0.020	0.086	0.042	0.035	0.108 **	0.000
VPERDRVR	0.021 **	0.022 **	0.016	0.017	0.019	0.020	0.140 **	0.018	-0.003	-0.074	0.027 ***
WRKCOUNT	-0.034 ***	-0.034 ***	-0.020	-0.020	-0.053 ***	-0.053 ***	-0.132 **	-0.032	-0.036	-0.065	-0.015
R_AGE	0.119 ***	0.121 ***	0.157 ***	0.160 ***	0.053 ***	0.056 ***	0.138 **	0.103 ***	0.273 ***	0.102 *	0.101 ***
(Constant)	***	1.707 ***	***	1.609 ***	***	2.052 ***	***	***	***	***	***
N	13434	13540	6924	6991	6510	6549	342	1107	731	407	10826
Adjusted R^2	0.029	0.028	0.034	0.033	0.009	0.008	0.062	0.021	0.131	0.025	0.021
Sig.F	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.030	0.000

Standardized (beta) coefficients shown. Probability of >T is shown as *** at the 0.01 level, ** at the 0.05 level, and * at the 0.1 level.

Table 7-9. Number of Daily Work-Related Trips

	ALL		Men		Women		Asian	Black	Latino	Others	White
Variable	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables					
MALEFL	-0.055 ***	-0.056 ***					-0.010	-0.062 ***	-0.055 **	-0.046	-0.051 ***
ASIANFL	-0.035 ***		-0.029 ***		-0.042 ***						
BLACKFL	-0.007		-0.016 *		-0.003						
LATINFL	-0.013 **		-0.004		-0.019 **						
OTHERFL	-0.016 ***		-0.018 **		-0.014 *						
PARENTFL	0.078 ***	0.077 ***	0.047 ***	0.046 ***	0.108 ***	0.107 ***	0.010	0.111 ***	0.019	0.038	0.085 ***
PRTNERFL	-0.030 ***	-0.031 ***	-0.046 ***	-0.045 ***	-0.017 *	-0.018 **	-0.103 ***	-0.008	-0.003	0.020	-0.043 ***
WORKERFL	-0.108 ***	-0.105 ***	-0.132 ***	-0.128 ***	-0.073 ***	-0.070 ***	-0.092 **	-0.003	-0.082 ***	-0.239 ***	-0.134 ***
LICDUMMY	0.111 ***	0.113 ***	0.082 ***	0.083 ***	0.121 ***	0.124 ***	0.129 ***	0.116 ***	0.174 ***	0.163 ***	0.086 ***
INCOMEPT	0.046 ***	0.049 ***	0.049 ***	0.051 ***	0.044 ***	0.046 ***	0.016	0.060 ***	0.052 **	-0.038	0.049 ***
TRDEPEND	-0.048 ***	-0.049 ***	-0.040 ***	-0.041 ***	-0.056 ***	-0.057 ***	-0.042	-0.082 ***	-0.024	-0.042	-0.039 ***
URBANFL	0.030 ***	0.028 ***	0.051 ***	0.049 ***	0.011	0.009	0.105 ***	0.056 ***	0.034	0.017	0.023 ***
VPERDRVR	0.015 ***	0.015 ***	0.019 **	0.019 **	0.006	0.006	0.094 **	0.013	0.020	0.119 ***	0.012 *
WRKCOUNT	0.005	0.003	0.036 ***	0.034 ***	-0.027 **	-0.030 ***	0.042	-0.048 *	-0.069 **	0.053	0.027 ***
EDUCFL	0.009	0.007	0.002	0.000	0.015 *	0.012	0.048	-0.002	0.007	0.015	0.010
AGESQ	-0.056 ***	-0.052 ***	-0.017 *	-0.014	-0.076 ***	-0.071 ***	0.028	-0.064 ***	-0.090 ***	-0.011	-0.052 ***
(Constant)	***	4.311 ***	***	4.116 ***	***	4.311 ***	***	***	***	***	***
N	33263	33487	15115	15239	18148	18248	826	2864	1798	1045	26637
Adjusted R^2	0.036	0.034	0.022	0.021	0.047	0.045	0.035	0.053	0.037	0.067	0.032
Sig.F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standardized (beta) coefficients shown. Probability of >T is shown as *** at the 0.01 level, ** at the 0.05 level, and * at the 0.1 level.

Figure 7-44. Women in 1-Worker Families With Children Take on the Household Trips; Men Do Paid Work

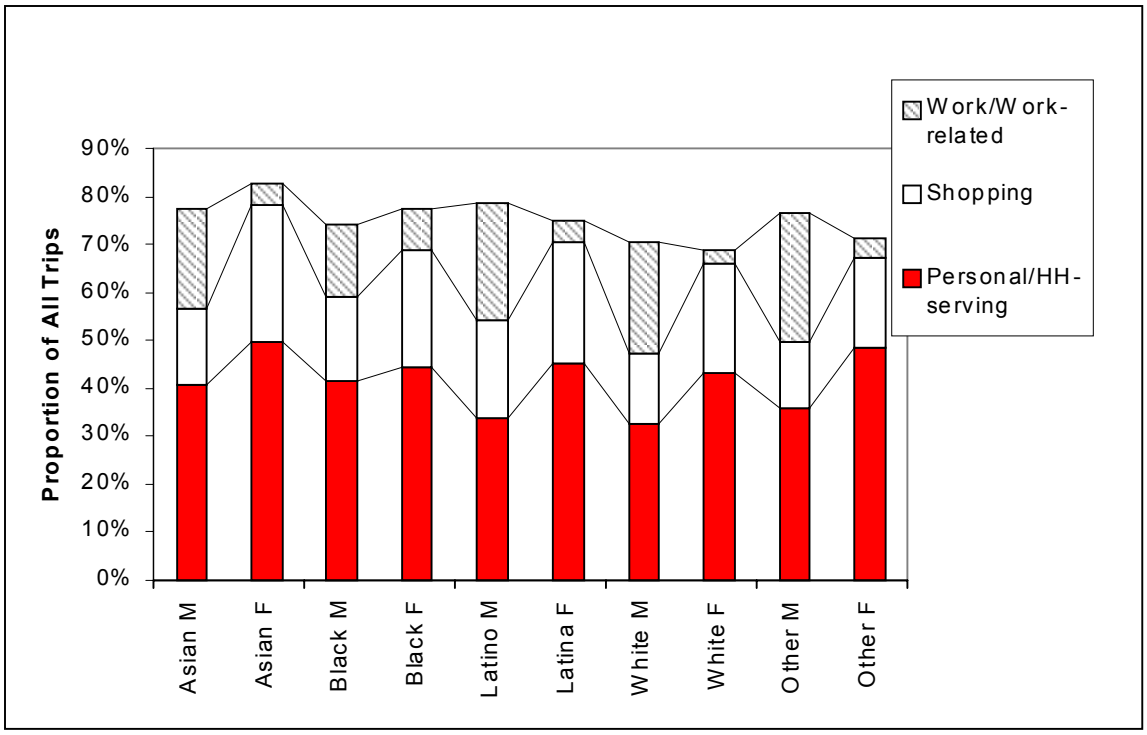


Figure 7-45. In 2-Worker Families With Children, Women Still Make Fewer Work-Trips and More Errands

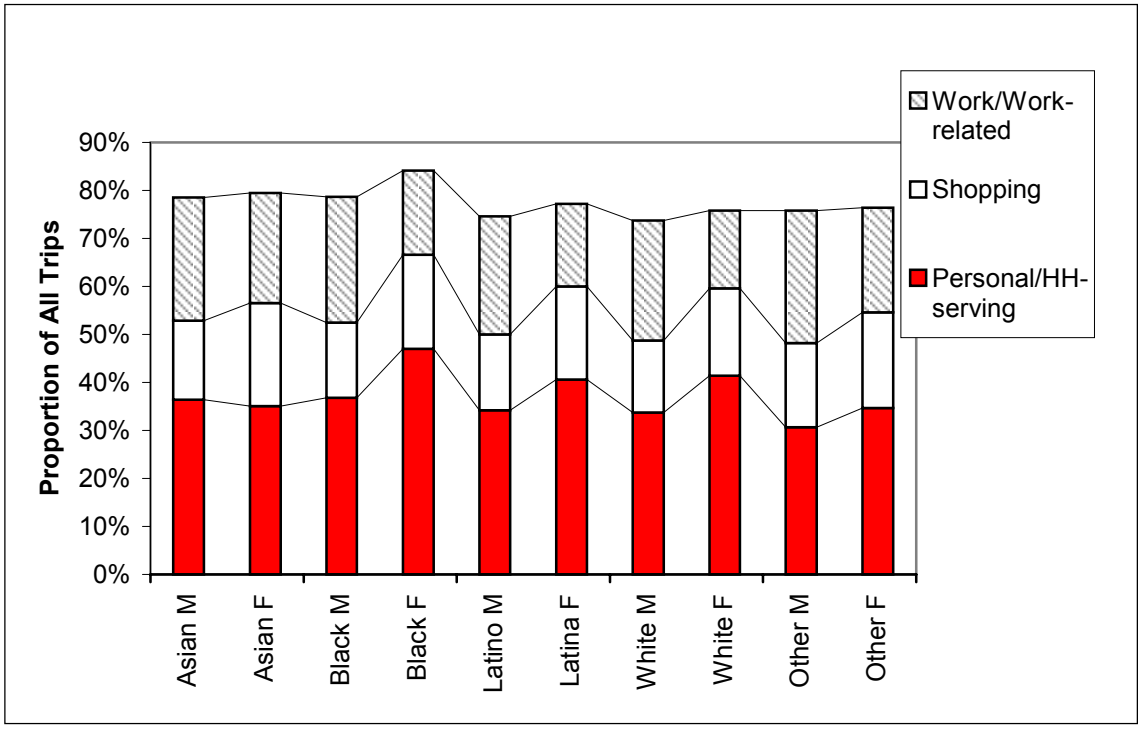
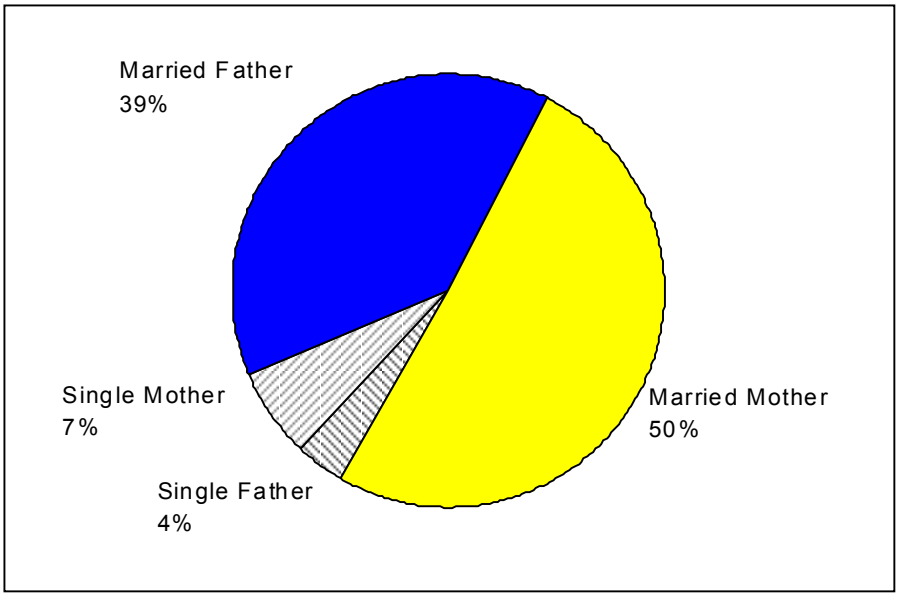


Figure 7-46. Women With Other Adult(s) Present Make Most of the Chained Trips

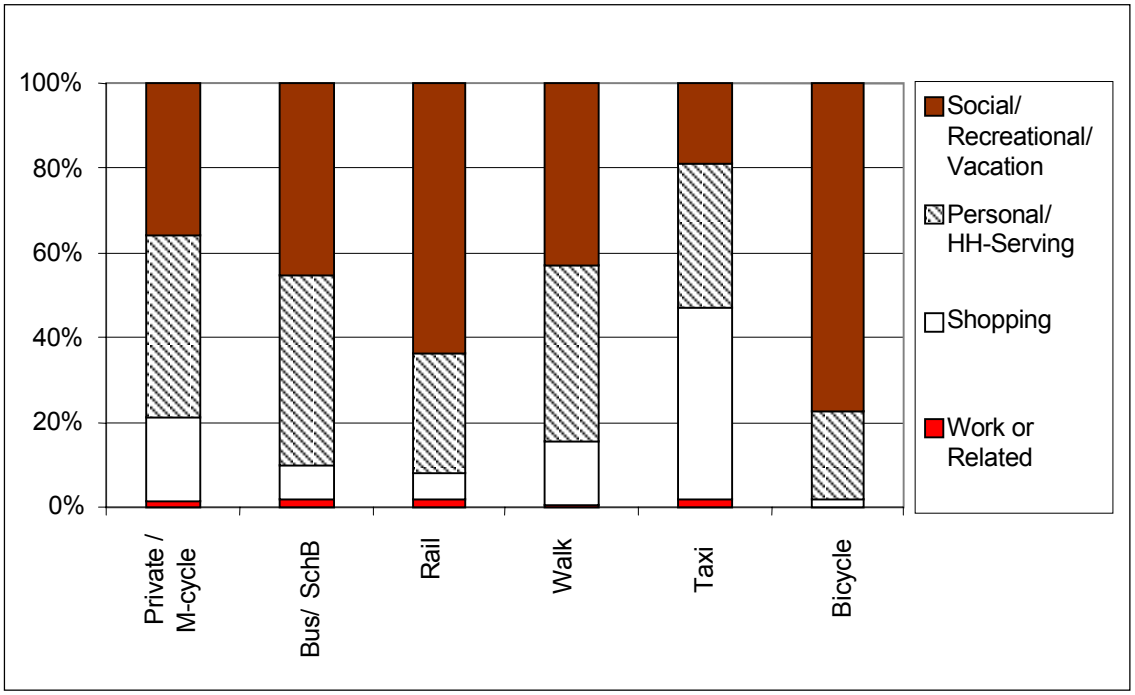


household income. The mode split for trips accompanied by at least one 5 to 15 year old child demonstrates that the type and mode of trips with children are, in fact, closely linked (Figure 7-47). Modes such as rail and bicycles are more likely to be used for recreational trips with children than for errands, while taxis and private vehicles appear better suited for daily household-serving travel.

In addition, even when children do not require daycare, mothers are often responsible for "chauffeuring" kids to school and social and recreational destinations (Taylor and Mauch, 1998; Rosenbloom, 1993; Hamilton and Jenkins, 1989; Whipp and Grieco, 1989). Several authors (e.g., Cichocki 1980; Hanson and Hanson 1981; Fox 1983; Rosenbloom 1989; Rosenbloom 1991; Rosenbloom and Burns 1995) argue that this also explains women's tendency to "trip-chain" more often than men. On the other hand, Rosenbloom (1991) found that men are more likely to chauffeur children for recreational purposes. At the same time, while the child-serving portion of a trip may be considered a "carpool," working mothers are less likely to participate in ride-sharing to work with non-members of the household because they have other responsibilities that may require a car before, after, or during work hours (Fox 1983; Rosenbloom and Burns 1995; Pucher 1998). Figure 7-47 also shows that relatively few "work-related" trips are part of chains with children; this may indicate, though, the relative lack of child care and school near worksites means that working parents are likely to drop children off early in the trip-tour to work, or to leave them at home with other caretakers.

Mauch and Taylor (1998) found significant differences in child-serving trips among ethnic groups. A multivariate analysis of trips made in the company of children indicate that making non-work trips, being a parent, and being female are best predictors of chauffeuring trips among the variables analyzed. There are, however, some notable differences among ethnic groups (Table 7-10). For example, the presence of a partner in the household is more strongly associated with increased chauffeuring among Asians, others, and whites, than among blacks and Latinos. Further, income has a far greater positive affect on chauffeuring among blacks than any other ethnic group, suggesting that tripmaking among blacks is more

Figure 7-47. Purpose of Chained, Child-Serving Trips Varies by Mode; Shopping Must be Done by Car/Taxi or on Foot



constrained by income than among other ethnic groups. Among Asians, age is a relatively strong positive influence on chauffeuring, which suggests that older adults may take more responsibility for children care in this ethnic group than in others. For "others," the number of vehicles per driver is an important influence, indicating that availability of an automobile may enable more child-serving trips.

Stete (1994) and Pickup (1989) suggest that child-escorting trips may be less necessary in urban areas than in suburban areas, because walking and bicycling are viable options for children in the city. This could mean that chained trips on non-SOV modes are more likely in urban areas than suburbs. In fact, the 1995 shows that private vehicles are essential for trip-chaining by suburbanites, while walking is the most significant alternative in urban areas (Figure 7-48). Thus, if trip-chaining is an increasingly important metropolitan travel pattern, it would appear that transit services are of limited use for these types of trips—even in the urban center, transit is used more for direct, unchained trips than for trip-chaining.

Influence of Marriage

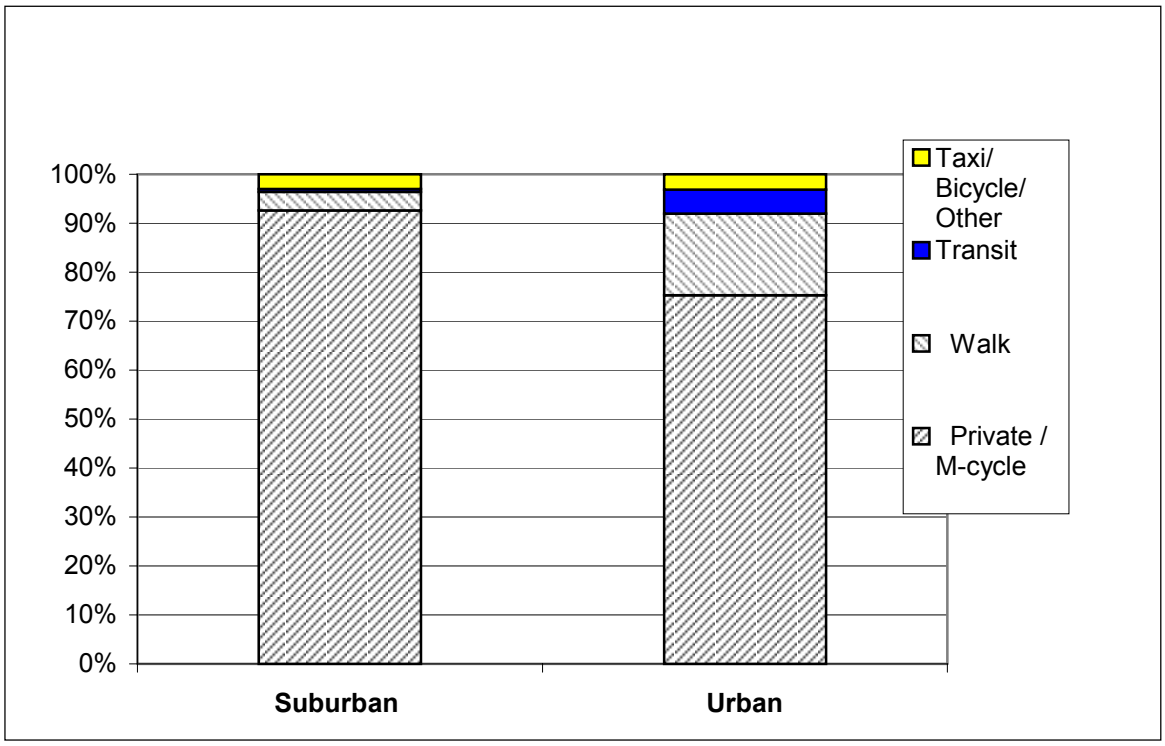
Marriage also appears to have a different influence on the travel of women than on men. In particular, women appear to take on the bulk of household responsibilities in marriage, thus reducing married men's trips for such purposes relative to single men (Hanson and Hanson 1981; Mauch and Taylor 1998). Rosenbloom (1989, 1993) noted that married women are not only more likely to make child-serving and household-serving trips than married men, but also than single women. Complementing this finding, Rutherford and Wekerle (1989) found that single women are more likely to have long commutes, and less likely to work in the suburb where they live, than comparable married women. In comparing men in dual-income versus single-income households (presumably with a male breadwinner), Johnston-Anumonwo (1992) found that even though the former were likely to have shorter commutes (and take

Table 7-10. Number of Daily Trips With Child <16 Years Old

ALL			Men		Women		Asian	Black	Latino	Others	White
Variable	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables					
MALEFL	-0.113 ***	-0.111 ***					-0.185 ***	-0.105 ***	-0.138 ***	-0.164 ***	-0.106 ***
ASIANFL	-0.006		-0.008		-0.002						
BLACKFL	-0.028 ***		-0.026 **		-0.031 ***						
LATINFL	0.023 ***		0.023 **		0.019 *						
OTHERFL	0.011		0.003		0.017						
PRTNERFL	0.290 ***	0.292 ***	0.293 ***	0.296 ***	0.266 ***	0.267 ***	0.346 ***	0.198 ***	0.188 ***	0.373 ***	0.322 ***
NONWTRPS	0.420 ***	0.419 ***	0.408 ***	0.409 ***	0.436 ***	0.434 ***	0.231 ***	0.487 ***	0.339 ***	0.417 ***	0.426 ***
WORKERFL	0.007	0.006	0.062 ***	0.065 ***	-0.024 *	-0.027 *	0.073	0.004	-0.030	0.057	0.024 **
LICDUMMY	-0.027 ***	-0.025 ***	-0.035 ***	-0.033 ***	-0.035 ***	-0.032 ***	-0.031	-0.026	0.035	-0.055	-0.035 ***
INCOMEPT	0.058 ***	0.059 ***	0.047 ***	0.047 ***	0.060 ***	0.062 ***	0.056	0.102 ***	0.024	0.059	0.055 ***
VPERDRVR	0.004	0.006	-0.023 **	-0.023 **	0.029 ***	0.031 ***	0.020	-0.012	0.070 **	0.126 ***	-0.006
WRKCOUNT	-0.106 ***	-0.105 ***	-0.128 ***	-0.128 ***	-0.076 ***	-0.074 ***	-0.187 ***	-0.069 *	-0.041	-0.266 ***	-0.132 ***
EDUCFL	0.001	0.000	0.004	0.004	-0.011	-0.012	0.068	-0.015	-0.031	-0.081 *	0.007
R_AGE	-0.046 ***	-0.047 ***	0.036 ***	0.035 ***	-0.102 ***	-0.102 ***	0.098 *	-0.083 ***	-0.076 **	0.017	-0.041 ***
(Constant)	*	-0.209 **	***	-1.079 ***		0.120	*				**
N	13434	13495	6924	6955	6510	6540	341	1107	725	406	10790
Adjusted R^2	0.270	0.269	0.239	0.238	0.286	0.285	0.174	0.302	0.171	0.306	0.285
Sig.F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standardized (beta) coefficients shown. Probability of >T is shown as *** at the 0.01 level, ** at the 0.05 level, and * at the 0.1 level.

Figure 7-48. Chained Trips With Children Require a Car, Even in Urban Centers; Walking is the Next Best Option



on more household duties) than the latter, both groups still had longer commutes than women in such households. She argued that marriage has more influence on non-work travel than does presence of children.

Household Location and Trip-Chaining

Many have argued that working women, and particularly mothers, make many decisions—including employment, childcare, errand, and household location decisions—around the need to balance these many tasks (Hanson and Hanson 1980; Hanson and Johnston 1985; Pickup 1985; Rosenbloom and Burns 1995; Rosenbloom and Raux 1985; Wachs 1991; Burns 1996). For example, Roistacher and Young (1981) and Holcomb (1984) found that single mothers are more likely to live in central cities, where they can reach more activities with fewer miles of travel. The 1995 NPTS indicates that whites of both sexes are much more likely to live in suburbs than the central city, while black women are disproportionately concentrated in the urban center (Figures 7-49–7-51). It is important, therefore, to study women's travel behavior in terms of trip-chaining, while considering the overall influence of household-serving travel on residential and job location.

Trip-Chaining and Mode Choice

Giuliano (1979) pointed out that linking multiple trips together is difficult on transit, and Rosenbloom and Burns (1995) made the same point for ridesharing. Gordon, et al. (1989a) claimed that as the number of daily person-trips increases, so does the propensity to trip-chain, and Ewing (1994) makes the same point about suburban residence. A multivariate analysis of trip-chaining from the 1995 NTPS, however, indicates that urban residence is associated with higher levels of trip-chaining, particularly for Asians (Table 7-11). Again, for Asians, having a partner significantly decreases the amount of chaining,

Figure 7-49. Whites Much More Likely to Live in Suburbs; Only Black Women Much More Likely in Urban Center

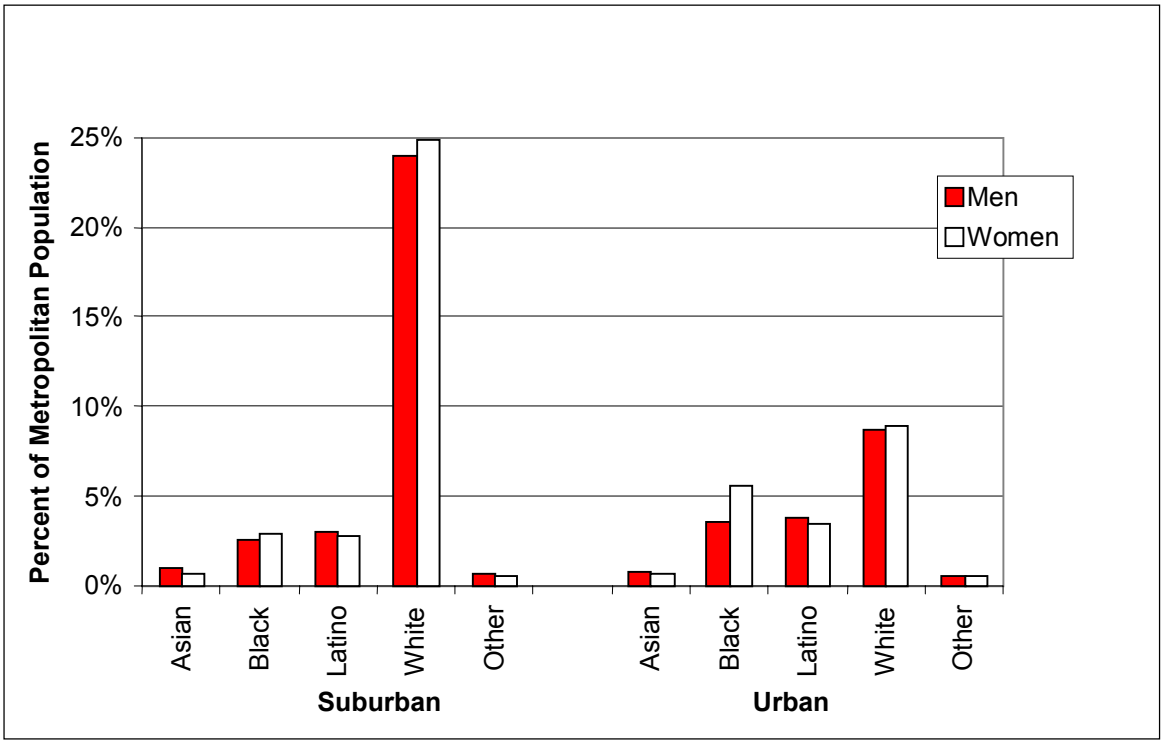


Figure 7-50. In Suburbs, Women in Each Ethnic Group Tend to Trip-Chain More Than Men

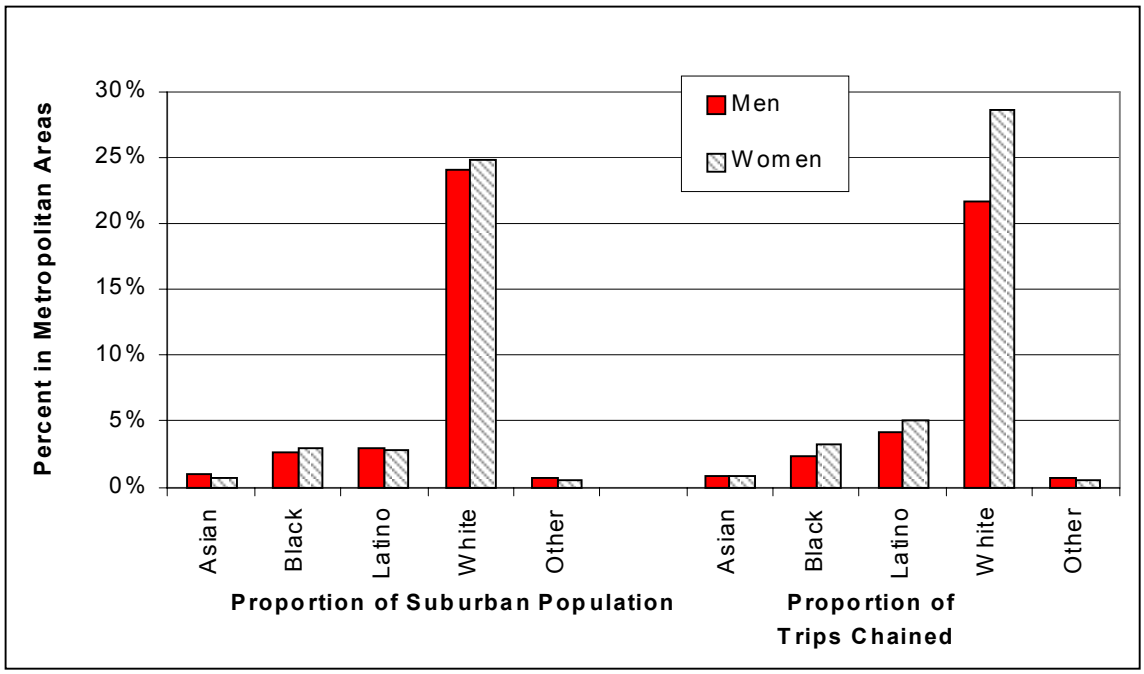
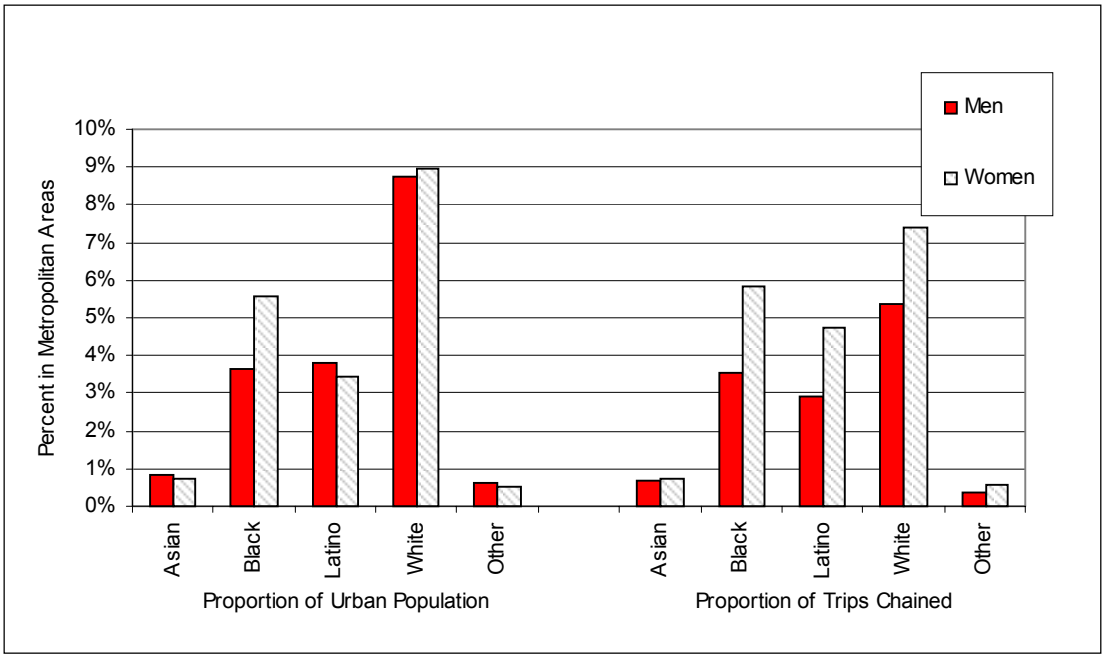


Figure 7-51. In Urban Centers, Latino Women Chain More, But Whites Chain Proportionately Less Than Other Groups



suggesting more sharing of non-work trip duties. Also, black parents are again seen to make significantly more trips in trip-chains than non-parents, while others are more likely to chain if they have vehicles in the household. In addition, across ethnicity, having a driver's license (and thus, being able to use a car) is the strongest indicator of trip-chaining, while workers (particularly men) are less likely to trip-chain. Thus, trip-chainers, the majority of whom are women, rely heavily on automobiles, a flexible mode which allows them to successfully combine and complete trips made in service of households. Transportation planning and policy, therefore, must increasingly consider the increasing likelihood of trip-chaining non-work trips into the commute, its implications for peak-hour congestion, and the spatial and temporal constraints on women, who disproportionate shoulder responsibility for household-serving travel.

CONCLUSION

This study uses data from the 1995 National Personal Transportation Survey to analyze the intersection of ethnicity and sex in travel behavior. In general we find that race/ethnicity appears to be a more important influence than sex on mode choice and commuting behavior, although sex differences persist, especially by household type. Studying non-work travel, however, shows the sharp distinctions between men and women across ethnic groups, and suggests that the fundamental difference in women's travel is that they have been compelled—more so than men—to respond to sprawl and congestion by chaining vehicle trips together.

With respect to the choice of travel mode we find:

- Women hold drivers' licenses at nearly the rate of men, particularly in younger cohorts, and have nearly as many vehicles-per-driver as men do.

Table 7-11. Number of Daily Trips in Trip-Chains

	ALL		Men		Women		Asian	Black	Latino	Others	White
Variable	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables	With Ethnic Variables	Without Ethnic Variables					
MALEFL	-0.320 ***	-0.056 ***					-0.10	-0.28 ***	-0.33 ***	-0.33 ***	-0.23 ***
ASIANFL	-0.580 ***		-0.43 ***		-0.73 ***						
BLACKFL	-0.060		-0.08		-0.08						
LATINFL	-0.090		-0.03		-0.14 *						
OTHERFL	-0.218 **		-0.19		-0.25 **						
PARENTFL	0.487	0.077 ***	0.25 ***	0.046 ***	0.70 ***	0.107 ***	0.32 *	0.31 ***	0.31 ***	0.54 ***	0.45 **
PRTNERFL	-0.167 ***	-0.031 ***	-0.23 ***	-0.045 ***	-0.12 *	-0.018 **	-0.60 **	-0.27 *	0.14 ***	-0.18 ***	-0.22
WORKERFL	-0.617 ***	-0.105 ***	-0.77 ***	-0.128 ***	-0.42 ***	-0.070 ***	-0.34	-0.09	-0.58	-0.69 ***	-0.66 ***
LICDUMMY	0.945 ***	0.113 ***	0.79 ***	0.083 ***	0.95 ***	0.124 ***	0.66 ***	0.67 ***	1.05	1.00 ***	0.87 ***
INCOMEPT	0.000 ***	0.049 ***	0.00 ***	0.051 ***	0.00 ***	0.046 ***	0.00	0.00 *	0.00	0.00 ***	0.00
TRDEPEND	-0.762 ***	-0.049 ***	-0.71 ***	-0.041 ***	-0.82 ***	-0.057 ***	-0.63 **	-0.85 ***	-0.69	-0.76 ***	-0.97 ***
URBANFL	0.126 ***	0.028 ***	0.17 ***	0.049 ***	0.08 *	0.009	0.25	0.18	0.17	0.14 ***	-0.17
VPERDRVR	0.051 **	0.015 **	0.04	0.019 **	0.04	0.006	0.34 **	-0.04	-0.01 **	0.06 **	0.14
WRKCOUNT	-0.020	0.003	0.02	0.034 ***	-0.08 **	-0.030 ***	-0.03	-0.03	-0.14	0.00	-0.05
EDUCFL	0.118 **	0.007	0.07	0.000	0.15 ***	0.012	0.15	0.25 *	0.15	0.11 ***	-0.08
AGESQ	-0.000 ***	-0.052 ***	0.00 *	-0.014	0.00 ***	-0.071 ***	0.00	0.00 ***	0.00 **	0.00 ***	0.00
(Constant)	4.416 ***	***	4.34 ***	***	4.32 ***	***	3.85 ***	4.55 ***	4.43	4.34 ***	4.57 ***
N	13432	33487	6924	15239	6510	18248	341	1107	725	406	10790
Adjusted R^2	0.270	0.034	0.239	0.021	0.286	0.045	0.174	0.302	0.171	0.306	0.285
Sig.F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standardized (beta) coefficients shown. Probability of >T is shown as *** at the 0.01 level, ** at the 0.05 level, and * at the 0.1 level.

- Ethnicity and income are better predictors than sex of licensing and automobile availability, and thus mode choice and number of trips taken.
- Men are more likely than women to drive alone, and women are more likely to carpool and to ride transit—mostly buses; this pattern is especially pronounced at lower income levels and in urban centers.
- Women now make more daily trips, on average, than men do—excepting Asians.

With respect to the journey-to-work we find:

- Sex and household type predict differences in commute time, and these differences vary by ethnicity; specifically, black women have the longest commute times of any group.
- White women in couples are likely to have shorter commute times than similar men, particularly in the suburbs.
- Women of color, especially those living in the center city, have disproportionately long commute times, which largely can be explained by a low average levels of income, non-SOV mode choice, disproportionate responsibility for household members such as children, and lower average levels of education (which translates into limited job prospects).
- Non-white ethnicity to some degree acts as a proxy for urban location, lower income, and transit use, which are associated with increased commute times.
- A multivariate analysis of commute time by sex, ethnicity, presence of children, presence of other adults, location in suburbs or urban centers, travel mode, household income, education level, and age show that the most important predictors of longer commute time are transit use and being a black woman, and the most important factor associated with shorter commute times is trip-chaining non-work trips into the daily schedule.

And with respect to the purpose of travel we find that:

- Women make more trips per day on average because they make more stops for shopping and personal/household-serving purposes. For workers, this means that women are more likely to chain these errands into their commute trips.
- Parents—particularly mothers and single fathers—take the most trips per day, and more than four times as many of these are for errands as for work.

In sum, ethnicity clearly matters in the study of travel behavior. Several scholars (notably geographers Johnston-Anumonwo (1995, 1997, 1998), McLafferty and Preston (1991, 1993, 1997), Preston and McLafferty (1993), Mauch and Taylor (1998), and Wyly (1996)) have noted that most of the research on sex and travel behavior has failed to adequately consider how sex differences in travel behavior vary by ethnicity. This study has attempted address this gap in the literature through an analysis of the 1995 National Personal Transportation Survey. While we observe significant sex differences in travel between whites and non-whites, this report also shows that simple distinctions between whites and minorities fail to capture the complex and nuanced patterns of travel among the principal ethnic populations in the U.S. While the sex differences in travel patterns among Asians, blacks, Latinos, and others are often distinct from whites, they are also frequently distinct from one another. In places like California, Florida, New York, and Texas, which are experiencing significant increases in Asian and Latino populations, the observed variation in travel patterns between Asians, blacks, Latinos, and whites are increasingly

important. The causes of the travel patterns observed here and the implications of these patterns for policy deserve increasing scrutiny in the coming, increasingly multi-cultural years ahead.

Postscript

While the NPTS is a unique and powerful source of information on travel behavior and human activity in the U.S., some additions to future surveys would significantly add research on many of the social, economic, and behavioral transportation issues explored here. For example, data on individual wages (in addition to household income) would allow better analyses of the choices household members make to balance home and work responsibilities. More detailed occupation data (both job type and firm location) would assist analyses of residential location and commuting behavior. More complete information on the movement of children—including pre-schoolers—would allow for a more complete analysis of family dynamics and household-serving travel. And, finally, some basic household activity data would shed light on the travel choices and tradeoffs made within various households.

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Chapter 7 Appendix

Variable	*Description*	*Variable Type*
ASIANFL	Person is from Asian household	Binary (dummy)
BLACKFL	Person is from black household	Binary
LATINFL	Person is from Latino/a household	Binary
OTHERFL	Person is from non-Hispanic "other" household	Binary
PRTNERFL	Person has other adult(s) at home	Binary
DRVALONE	Drove alone on this trip	Binary
LICDUMMY	Person holds a driver's license	Binary
NONWTRPS	Number of non-work related trips	Integer
CARPOOFL	Trip in carpool	Binary
PTRANSFL	Trip on transit	Binary
WALKEDFL	Trip on foot	Binary
VPERDRVR	Vehicle-per-driver ratio	Continuous
CHAINDFL	Trip was part of a trip-chain	Binary
INCOMEPT	Income as an imputed point	Integer-continuous
EDUCFL	Person has a 4-year degree or +	Binary
WRKCOUNT	Workers in household	Integer
PARENTFL	Child(ren) under 16 years in home	Binary
URBANFL	Person lives in center/2nd city	Binary
PCTTRANS	Percentage of trips taken on bus or rail	Continuous
R_AGE	Respondent's age	Integer