Racial Variations in Males' Commuting Times in Atlanta: What Does the Evidence Suggest?

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Abstract:

Using a sample from the comparatively most privileged group of black males, those married and living with a working spouse, this article investigates how race-based residential locations and the spatial structure of labor markets affect commuting experiences. This research uses the most sophisticated commuting data available at the time the research was conducted, the 1990 5 percent Public-Use Microdata Samples for the Atlanta Metropolitan Area, and again confirms severe spatial mismatch problems for central-city blacks, regardless of socioeconomic status, household formation, and access to automobiles. However, the situation with black males living in suburban areas differs significantly as those in the southern (predominantly black) suburbs show considerable evidence of spatial mismatch, whereas the northern (predominantly white) suburbs show no such evidence.

Keywords: Atlanta | commuting | spatial mismatch | postindustrial cities

Article:

Introduction

While controversial, race is one of the fundamental determinants of workers' commuting experience in American cities (Zax 1990). Arguably, due to race-based residential segregation, the spatial contexts in which black residents organize their daily lives may differ markedly from those of white residents. The suburbanization of jobs over the past three decades left central city black residents behind, with fewer job opportunities close to their homes than their white counterparts (Raphael 1998a). At the same time, a variety of discrimination policies against blacks in suburban housing markets prevented these residents from adjusting their place of residence to changes in the spatial distribution of metropolitan job opportunities (Martin 2001). Thus, spatial contexts have a profound influence on commuting choices of blacks.

Consequently, the expanding literature on racial differences on commuting studies (McLafferty and Preston 1991, 1997; Johnston-Anumonwo 1995, 2001; Chung, Myers, and Saunders 2001) continues to show that, regardless of gender, black workers commute longer than do white workers. This suggests a problem of spatial mismatch, a concept initially formulated by Kain in 1968.[1] Compared with the situation in the 1960s, more blacks now have an opportunity to choose residences in suburban areas (Schneider and Phelan 1993). However, the residential segregation of blacks, especially in central cities, persists (Massey and Hajnal 1995), and much of the research validates the spatial mismatch hypothesis by assessing significant differences between blacks and whites in wages earned, occupation, household responsibilities, spatial access to employment, and modes of transportation and commuting times (Amott and Mattei 1991; Zax and Kain 1991; Goldsmith and Blakely 1992; Ihlanfeldt and Young 1994; Sultana 2003).

Nonetheless, testing of the spatial mismatch hypothesis in commuting research is still mostly based on northeastern regions of the United States, especially older industrial cities. The cities that grew in the postindustrial era, especially Sunbelt cities, have been little studied. The unemployment gap between blacks and whites is less in Sunbelt cities than in northeastern cities (Cohn and Fossett 1995); also, the spatial mismatch effect is contingent on the particular characteristics of each metropolitan area (Cooke 1996). Due to postindustrial economic trends,[2] research findings based on old industrial cities may not apply to Sunbelt cities. Therefore, a complete set of Sunbelt cities is needed to test for spatial mismatch characteristics in order to gain a clearer understanding of the racial disparities in commuting and labor markets for those cities. To analyze this process, I examine metropolitan Atlanta, Georgia, one of the few typical postindustrial Sunbelt cities (Hall 2000) in the United States, using the most sophisticated commuting data available at the time the research was conducted, the 5 percent Public-Use Microdata Samples (PUMS) for the 1990 U.S. Census.

The remainder of this article is organized into seven sections. First, I summarize the literature on the relationship between spatial mismatch problems and racial differences in commuting. Second, the context of the study area is evaluated. The third section discusses the research design, data set, and methods used for the study. The fourth and fifth sections present racial differences in commuting times and the results of multivariate analyses, followed in the sixth section by analysis of how and why racial disparities in commuting times exist between blacks and whites despite their matched socioeconomic and household status. The final section offers concluding remarks and future research directions.

Existing Literature on the Spatial Mismatch Problem and Racial Differences in Commuting Time

Since the literature on spatial mismatch is enormous, I restrict the literature review to only those studies that used commuting time as an indicator of spatial mismatch. The growing evidence in commuting research suggests that the relative location of employment within an urban area affects black workers' commuting times (Holzer 1991; McLafferty and Preston 1997; Johnston-Anumonwo 2001). Arguably, spatial and social segregation in land uses have a more profound impact on black workers than white workers because black residents are concentrated in a few neighborhoods where limited job choices are available (White 1977; Raphael 1998b). As a result, in response to suburban job supplies, black residents must be willing to commute to

suburban employment locations and hence have long commutes. Unfortunately, the option to minimize commuting time by shifting residential locations to suburban areas, as white workers do, is not as available to black workers because of exclusionary zoning and suburban housing discrimination practices (Martin 2001).

Indeed, many studies provided evidence that central-city blacks face unfavorable commutes and housing prices in suburban job and housing markets (Brueckner and Martin 1997), and suburban employment is far more beneficial in reducing the commutes of white workers compared with black workers (Dubin 1991). A series of publications, using PUMS data for different metropolitan areas (e.g., New York, Buffalo, Detroit, and Kansas City), consistently reported that minorities living in the central city had poor spatial access to employment, as reflected in longer reverse commuting times (Johnston-Anumonwo 1995, 1997, 2000, 2001; McLafferty and Preston 1997; Preston, McLafferty, and Liu 1998). These differences persisted after controlling for wages, individual and household characteristics, and mode of transportation. Similarly, Sultana (2003) found black females in metro Atlanta are severely constrained within intracity commuting despite their comparable social, marital, and economic status to white females. Contradictory to many past studies, however, her research reported shorter reverse commuting for blacks, with the exception of professional black female workers.

Many studies also confirm that the spatial mismatch is not that severe for black suburban residents (Zax and Kain 1991; McLafferty and Preston 1997). These studies indicated that, despite a continuing long commute by minority workers in suburban locations, blacks living in these areas are closer to suburban jobs than are central-city black residents. However, these findings do not confirm whether the slight evidence of spatial mismatch for minority workers in the suburban locations is a result of their dependence on public transportation. Taking a different approach, Gottlieb and Lentnek (2001) used U.S. Census of Transportation Planning Package (CTPP) data (U.S. Department of Commerce 1990) for four segregated suburban neighborhoods in Cleveland, Ohio, to show that suburban blacks have longer commuting times than suburban whites, even though the black suburbs were accessible to skill-matched jobs. Their research concluded that hiring discrimination rather than the accessibility of jobs in suburban labor markets may have forced blacks to find jobs in central-city locations, and hence, they were forced to commute longer.

In addition to residential segregation, there are ongoing debates about the importance of blacks' access to private automobiles (McLafferty and Preston 1992, 1997; Holzer, Ihlandfeldt, and Sjoquist 1994; Ihlanfeldt and Young 1994; Taylor and Ong 1995; Gottlieb and Lentnek 2001). Taylor and Ong (1995) specifically argued that longer commuting time for blacks is the result of dependence on public transportation and not the result of spatial mismatch. They suggested that when blacks and whites have equal access to automobiles, the commuting patterns are similar. Johnston-Anumonwo (2000) and Sultana (2003), in studies on Detroit and Atlanta, respectively, arrived at a different conclusion in terms of the influence of the automobile on commuting. They reported that even though access to automobiles by black female workers reduced racial disparity in the commuting times, black female workers still faced commuting constraints when access to the automobile was controlled for in the study.

Although some studies question the validity of the spatial mismatch hypothesis (e.g., Cooke 1993; Wyly 1996), the weight of empirical evidence ultimately supports its existence (Preston and McLafferty 1999). The debates surrounding these interpretations persist because the comparison of interracial commuting times may be difficult if researchers do not control for socioeconomic status related to households and individual characteristics of workers (which influence an individual's commuting choices). Therefore, finding the most meaningful results from black–white comparisons requires matched pairs of groups. Moreover, the directions of commuting flow (origin and destination of traffic flows) have been neglected in commuting research (for exceptions, see Johnston-Anumonwo 2001; Sultana 2003). Crane (2000) specifically suggests that future research should include the joint effects of where people live and where they travel. This issue is particularly important since there are more spatially restricted geographical areas for blacks to choose residences in, and hence, any form of restructuring in the spatial distribution of metropolitan jobs may increase their commuting times relative to those of whites, who have far more options for changing residences in order to be close to work. Thus, this article will take into consideration all forms of socioeconomic matching factors for blacks and whites as well as directions of commuting in order to advance our knowledge on the spatial mismatch hypothesis and commuting research for the postindustrial metropolitan area of Atlanta.

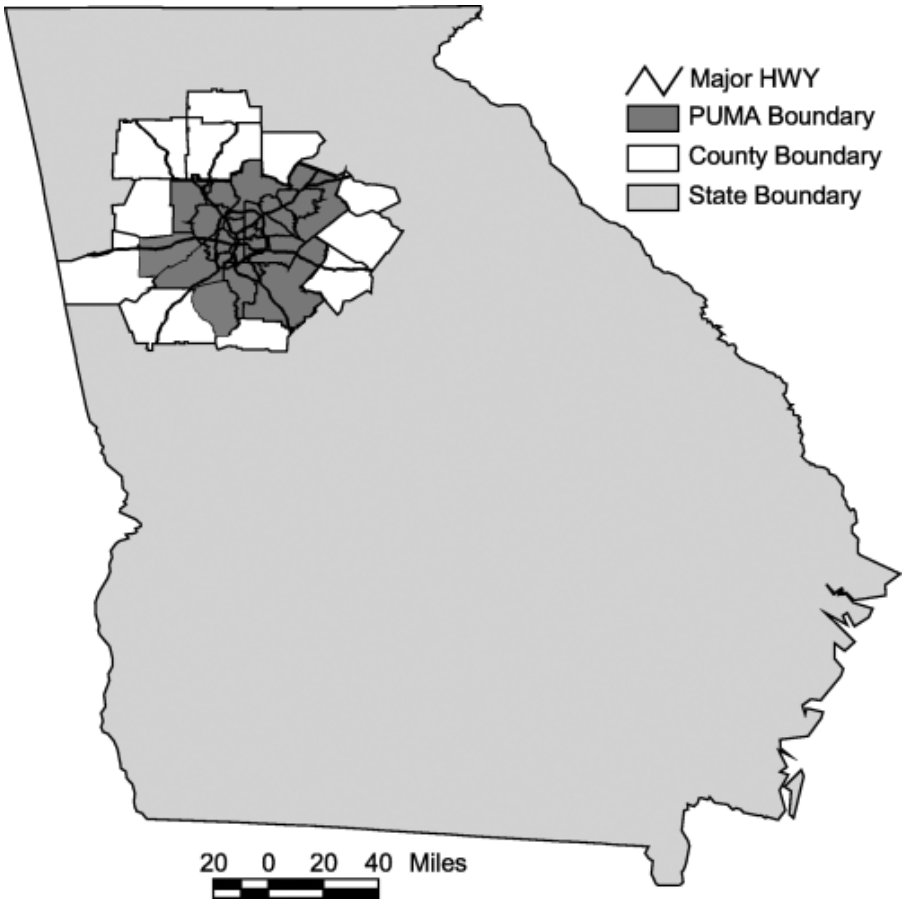

Figure 1. Study area, showing 18 Public-Use Microdata Area (PUMA) boundaries in Atlanta MSA.

Study Area

Atlanta, one of the most prosperous postindustrial metropolitan areas located in America's Sunbelt region, consisted of a twenty-county Metropolitan Statistical Area (MSA) before 2003 that included eighteen Public-Use Microdata Areas (PUMAs) (Figure 1). The foundations of Atlanta's growth lie with rapidly expanding entrepreneurial and service jobs, as well as the expansion of high-technology industry associated with the information age, especially top-management office functions. The average employment growth rate of metropolitan Atlanta, especially in the service economy, is one of highest in the United States (Keating 2001). Despite the fact that manufacturing has never been a major part of Atlanta's economy, Atlanta has also experienced positive average annual growth in manufacturing, while most other large metropolitan areas lost industrial jobs during the 1980s (Hartshorn and Ihlanfeldt 2000). It is relevant to mention that, traditionally, manufacturing has been an important source of higher-wage jobs for low-skilled black workers.

Metropolitan Atlanta's economic growth is unevenly distributed (Bullard, Johnson, and Torres 2000). Most of its expansion occurred in the northern metro area (for the location of Atlanta's employment centers and subcenters, see Fujii and Hartshorn 1995 and Sultana 2000), while the southern metro area has failed to attract financial growth. Even as the northern suburban areas gained jobs, the central city of metro Atlanta experienced substantial job losses over the past three decades. The disparity in economic growth between the north and south in the metro area would have been even greater if the Atlanta airport, the major source of jobs in the south, were not located there.

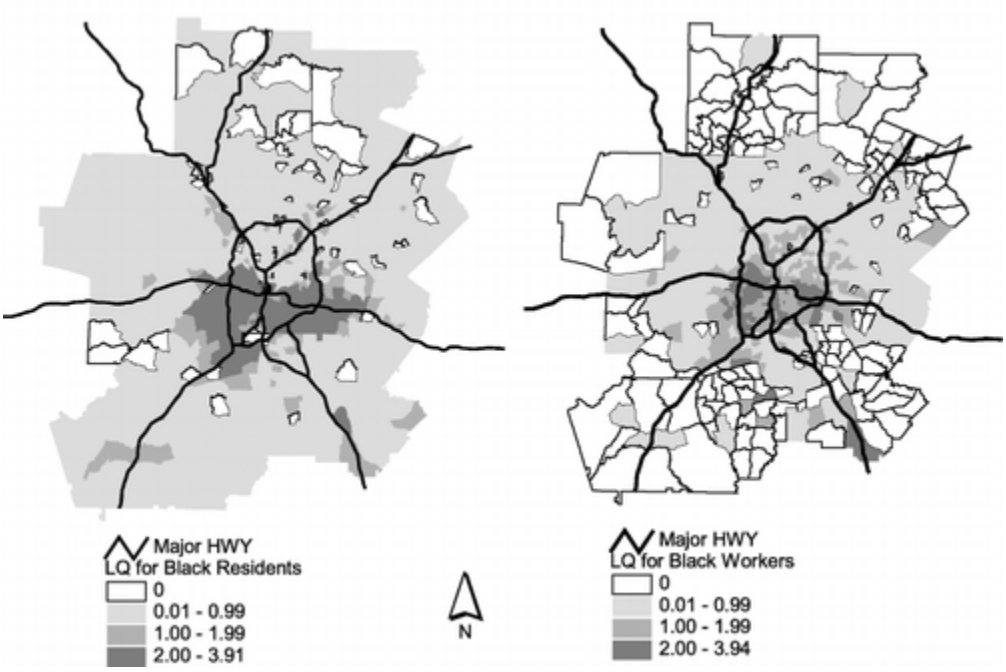

Figure 2. Spatial distributions of black residents (A) and workers (B) in Atlanta MSA.

The north–south dichotomy in metro Atlanta's economic growth is partly related to the racial composition of its population, as the metro area is also divided racially between north and south

(Figure 2).[3] The black population constitutes 25 percent of metropolitan Atlanta's population, but it comprises 68 percent of the central-city population (U.S. Department of Commerce 1992). The suburbanization of blacks in metro Atlanta over the past three decades may have suggested that housing segregation between blacks and whites was declining. However, their higher concentrations on the south side of the metro area, typically known as the southern suburbs and identified as having significant job losses over time, suggest that race-based suburbanization is an important issue. Most blacks who moved to the northern suburbs located in those areas immediately peripheral to the central city, such as Fulton and Dekalb counties. In contrast, the northern part of the central city (Buckhead/North Fulton) and northern peripheral suburbs and exurbs are shared by a majority of whites both in residences and workplaces. Nevertheless, black workers' concentration is noticeable on the north side of the city of Atlanta and the suburbs within the perimeter highway, suggesting a considerable degree of mismatch for the blacks. Given these uneven characteristics of racial and economic concentration, the Atlanta metro area offers an excellent laboratory to study how race plays a vital role in the worker commuting experience when all other factors are held constant.

Research Design, Data, and Methodology

In this article, I restrict my study to males. While some recent studies have focused on females (e.g., Preston, McLafferty, and Hamilton 1993; Johnston-Anumonwo 2000; Sultana 2003), no recent equivalent studies exist for males, especially in postindustrial Sunbelt cities. To find the closest matched pairs (similar individual characteristics), I also restrict my analysis only to married men living in dual-earner households. There are three reasons for considering married males. First, because of the deep historical roots of discrimination, blacks remain a comparatively disadvantaged group of people, and this is especially the case for black males. Therefore, simple comparisons between blacks and whites, using a whole population sample, may not clearly show whether commuting disparities exist because of race-based residential segregation or are due to any other kind of socioeconomic factors that may play more profound roles. Indeed, Cooke (1996) specifically suggested future research should control household structure rather than grouping all black males into one category. Second, this research chose the comparatively most advantaged group of black males, those who are married, live in dual-earner households, and hence may have greater access to employment opportunities and residential choices (Bianchi and Spain 1986; Farley and Allen 1987; Preston and McLafferty 1999). Third, prior research suggests that relatively stable jobs are likely to be associated with shorter commuting times (Crane 1996). In general, married men have more job stability since employers may take a man's marital status as a signal of stability and responsibility (Chiodo and Owyang 2002). Historically, there are fewer married black males due to job instability, and that may complicate their commuting times. Married black males living in dual-earner households are a relatively privileged subgroup of people among blacks and, therefore, I assume they are more likely to have similar stability in jobs as white males living in dual-earner households.

Nonetheless, it is not yet self-evident how race-based residential segregation plays a role in commuting patterns when all forms of socioeconomic and household characteristics between black and white workers are similar (matched). For this investigation, I focused on the following questions: (1) Do married black and white males have similar commuting experiences when both groups have similar modes of transportation, employment status, residential location, and

directions of the commute? (2) Is spatial mismatch always a central-city problem, or is the situation more spatially complicated? and (3) Does access to automobiles for black workers reduce the racial disparity in commuting times? These three issues are still highly debated in the existing spatial mismatch literature, and this research contributes to these important areas.

The 5 percent PUMS data provide stratified, random samples of all responses to the long questionnaire of the decennial Census of Population and Housing, permitting unparalleled scrutiny of social and demographic relations at the individual and household levels. Unfortunately, PUMS data provide only coarse geographic resolutions. Samples are issued for PUMAs, consisting of specially defined municipal aggregations with a minimum population of 100,000. This data set also provides information based on place of residence, and from the data set it is also possible to link homes to workplaces. Work-trip length is reported in the PUMS as travel time, a measure that has been noted elsewhere as a better indicator of the journey-to-work than the distance between home and work (Johnston-Anumonwo 1995), since time is considered a precious variable for workers. A longer commute is important to people because it may deteriorate the quality of life by taking away time from family (Green, Hogarth, and Shackleton 1999) and other leisure activities (Koslowsky, Aizer, and Krausz 1996) and may add additional stress to individual's lives. Travel time as used in this study is the actual number of minutes spent in one-way traveling from home to work as noted by the respondents.

It is noteworthy that time spent commuting is seen in urban transport research as an implicit dichotomy—as a sign of prestige or an expression of oppression. Based on Alonso's (1965) bid-rent theory, many urban and social theories have perceived a long commute as prestigious, with affluent workers willing to accept a trade-off between travel time (transport costs) and residential amenities at the urban fringe. On the other hand, Marxist theories interpret the separation of residences and workplaces (lengthy commutes) as oppression as this is one outcome of capitalism's need to fragment working class solidarity (Harvey 1973), especially when behavioral assumptions regarding free choice and perfect information are relaxed.

Married males living in dual-earner families, working outside the home, and using either public transportation or private automobiles were selected for this study (the total sample size=10,881). These samples were later divided, based on their racial status, for a total of 1, 922 black (17 percent) and 9,059 white (83 percent) male workers (Table 1). Travel mode is classified as private automobile or public transportation in order to address the impact of transportation mode on variation in workers' commuting times. In this study, approximately 98 percent of the sample are auto users and 2 percent are public transit users. Of those public transit users (among 263 people), 56 percent are black and 44 percent are white males. Workers are classified into four occupation groups using standard census defined categories: professional/managerial, technical/sales/clerical, services, and industrial/crafts (U.S. Department of Commerce 1992).

Table 1. Married Males in Dual-Earner Households and Their Mode of Choices

Sample Types	Blacks	Whites	Total Males
Both transit and auto user samples (% sample size)	1,922 (17.30%)	9,059 (82.30%)	10, 881 (100%)
Public transit users (% sample size)	140 (55.70%)	123 (44.30%)	263 (2.40%)
Automobile users (% sample size)	1,782 (15.80%)	8,936 (84.20%)	10,718 (97.60%)

Differences in mean commuting times for black and white male workers are compared using Analysis of Variance (ANOVA). The logic of ANOVA is simple. The hypothesis is that if married black males have longer commute times (MTT1) than married white males (MTT2), there should be a higher level of variation between these two groups, that is, MTT1>MTT2, and relatively little variation within each group. This research also uses a multivariate statistic, regression analysis, in order to identify multiple factors that have an effect on black and white male workers' commuting time. The details about the regression model will be discussed later in the regression analysis section.

Analysis of Variance (ANOVA): Racial Differences in Males' Commuting Times

Controlling for Modes of Transportation

Unlike other studies, this research finds that the commuting times of black males for the entire metropolitan area are 2 minutes shorter than for that of white males, when mode of transportation is limited to automobiles (Table 2). In contrast, when the mode of transportation is considered only for transit, black males commute about 4.5 minutes longer than their counterparts. Both of these differences are statistically significant at p=<.05 and p=<.10. These initial findings suggest that when no other factors (such as locations of home and work, directions of commute, or professional status) are considered, overall, black males have shorter commutes than white males in the Atlanta metropolitan area, a finding that is contradictory to many past studies. However, this initial result suggests that black males are at a greater disadvantage than whites when public transportation is used.

Table 2. Racial Variations in Males' Commuting Times: Controlling for Modes of Transportation

Modes of Transportation	Blacks	Whites	Difference
Both modes	28.09 (n=1,922)	28.54 (n=9,059)	−.45
Auto users	26.62 (n=1,788)	28.35 (n=8,936)	−1.73*
Public transit users	46.86 (n=140)	42.35 (n=123)	+4.47**

*Significant at p = <.05. **Significant at p = <.10.

Controlling for Residential Locations and Modes of Transportation

To assess whether commuting times between blacks and whites differ by residential locations, the analysis was repeated separately for central-city and suburban residential locations (Table 3). Consistent with many past studies, this research shows that black males living in the central city commute significantly longer, 6 minutes, when mode of transportation is not controlled, 4 minutes by automobile only, and 11 minutes by public transit, compared to their counterpart white males. On the other hand, this research indicates that white males in suburban residential locations commute longer (1 minute longer when mode of transportation is not controlled, 2 minutes longer for automobile users, and 3minutes longer for public transit users) compared to black males. The variations of commuting time between blacks and whites in central-city residential locations are significantly higher compared to that of suburban residential locations.

These findings clearly support the results of several past studies and confirm again that blacks living in the central city have poorer geographic access to employment, even in a postindustrial

Sunbelt metro area, and especially when considering public transit. Suburban residential locations constitute an extra commuting burden on both racial groups compared to their counterparts in the central city. The statistics showing slightly longer commuting times for whites males compared to black males in suburban locations, suggest that suburbanization of residential locations imposes greater burden on commuting times for whites.

Table 3. Racial Variations in Males' Commuting: Controlling for Place of Residence and Modes of Transportation

Locations	Both Modes			Auto Users			Public Transit Users		
	Blacks	Whites	Differences	Blacks	Whites	Differences	Blacks	Whites	Differences
Central	27.65 (*n*=734)	21.51 (*n*=1,151)	6.14	24.77 (*n*=641)	20.59 (*n*=1,085)	4.18	47.47 (*n*=93)	36.73 (*n*=66)	10.74
Suburbs	28.37 (*n*=1,188)	29.56 (*n*=7,908)	−1.19	27.66 (*n*=1,141)	29.42 (*n*=7,851)	−1.76	45.53 (*n*=47)	48.86 (*n*=57)	−3.33

All are significant at $p = <.05$.

Controlling for Commute Directions

Table 4 separately investigates whether racial differences in geographic location of the home vis-à-vis the workplace may contribute to differences in commuting time. In this section, the comparisons are restricted only to automobile users due to the small sample size for public transportation users in intrasuburban commutes. Recall that blacks are at a greater disadvantage when public transit is used. Consistent with past studies, black males face significant racial disparities in travel time for city-to-city and city-to-suburb work-trip destinations (Table 4 and Figure 3). Black males spend 5 minutes more for city-to-city work trips and 2.5 minutes longer for reverse commuting (city-to-suburbs) compared to their white counterparts. It is essential to note here that the spatial mismatch hypothesis is precisely concerned with the central-city black residents who commute to suburban jobs (reverse commuting). This result clearly relates to the social equity theory that blacks living in the central city face commuting constraints, whether their destinations are within the city or suburbs, and again confirms many past findings.

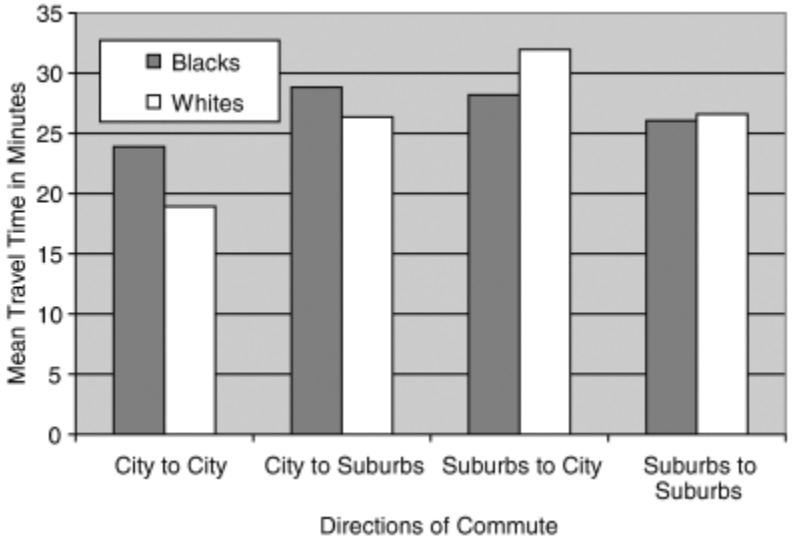

Figure 3. Racial variations in males' commuting times by directions of commute.

Table 4. Racial Variations of Males Commuting Times: Controlling for Directions of Commute (Auto Users Only)

Directions of Work	Blacks	Whites	Differences
City to City	23.90 (*n*=533)	18.92 (*n*=866)	4.98
City to Suburbs	28.81 (*n*=105)	26.35 (*n*=210)	2.46
Suburbs to City	28.20 (*n*=786)	31.97 (*n*=3,991)	−3.77
Suburbs to Suburbs	26.08 (*n*=346)	26.60 (*n*=3,720)	−0.52

All are significant at $p = <.05$.

Unlike many studies, which validated the spatial mismatch hypothesis, this research, surprisingly, finds that white males' commuting times average 4 and 0.5 minutes longer than their black counterparts from suburbs-to-central-city workplaces and suburbs-to-suburbs destinations of work trips, respectively, and suggests again that suburbanization imposes an extra commuting burden on workers compared to central-city dwellers, especially for white males. These results may be related to the widely sprawling suburbs of Atlanta.

Controlling for Occupational Status and Directions of Commute

It is clear that, without considering residential and workplace locations, addressing the mismatch hypothesis in commuting is impossible. It is not yet self-evident whether or not racial variations in commuting time exist when occupational status is controlled for in the study. For this inquiry, an additional analysis was run after controlling for occupational status and commuting direction. Again, significant racial disparities in travel time were observed, regardless of similar occupational status and transportation in city-to-city commuting flows (Table 5 and Figure 4). For all occupational types, black males in professional/managerial positions with city-to-city commuting patterns averaged 5 more minutes than their white counterparts; those with technical, sales, and clerical jobs commuted 3 minutes more, those with service jobs, 6 minutes more, and those with industrial and craft jobs, 3.5 minutes more than whites. Similarly, for reverse commuting (city-to-suburbs), black male professionals had a longer commute (4.5 minutes), as did technical, sales, and clerical workers (0.6 minutes) and service workers (0.3 minutes). Compared to blacks, however, white males in industrial and craft jobs spent 0.3 minutes longer in reverse commuting.

In contrast, these results again show that the racial gap in commuting times is reversed in suburbs-to-city commuting. Regardless of occupational status, for suburbs-to-city work trips, white males commute more minutes (professionals, 4 minutes; technical, sales, and clerical workers, 4 minutes; service workers, 1 minute; industrial and craft workers, 3 minutes) than their black counterparts. On the other hand, with suburbs-to-suburbs commuting, black males in professional and technical jobs commute longer (2 minutes and 0.04 minutes, respectively) than white males; and white males in service and industrial and craft jobs commute longer (0.4 minutes and 2 minutes, respectively) than their black counterparts in the same occupations. In sum, among professional and managerial workers, black males commute longer than whites, regardless of residential location and commuting directions (except suburbs-to-city), but the racial differences in commuting time for men in other occupations from central city to suburbs are small and may be due to a small sample size.

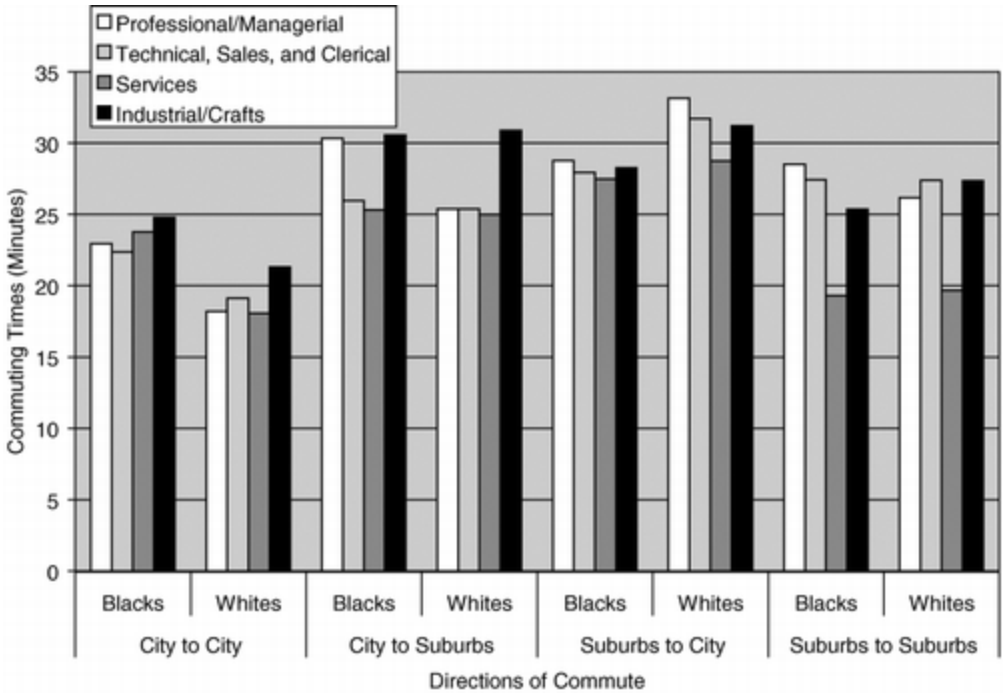

Figure 4. Racial variations in males' commuting times by occupational status and directions of commute.

Table 5. Racial Variations in Males' Commuting Times: Controlling for Occupational Types and Commute Directions (Auto Users)

	Directions of Commute											
	City to City			City to Suburbs			Suburbs to City			Suburbs to Suburbs		
Occupational Types	**Blacks**	**Whites**	**Diff.**	**Blacks**	**Whites**	**Diff.**	**Blacks**	**Whites**	**Diff.**	**Blacks**	**Whites**	**Diff.**
Professional/Managerial	22.93	18.21	4.72	30.33	25.39	4.94	28.76	33.13	−4.37	28.51	26.16	2.35
	(*n*=86)	(*n*=484)		(*n*=15)	(*n*=99)		(192)	(1,539)		(74)	(1,197)	
Technical, Sales, and	22.37	19.13	3.24	25.95	25.39	0.56	27.93	31.73	−3.80	27.43	27.39	0.04
Clerical	(*n*=102)	(*n*=230)		(*n*=21)	(*n*=70)		(228)	(1,539)		(89)	(1,079)	
Services	23.77	18.07	5.7	25.31	25.00	0.31	27.49	28.74	−1.25	19.32	19.69	−0.37
	(*n*=66)	(*n*=30)		(*n*=16)	(*n*=4)		(72)	(221)		(28)	(180)	
Industrial/Crafts	24.79	21.30	3.49	30.57	30.89	−0.32	28.26	31.21	−2.95	25.37	27.36	−1.99
	(*n*=279)	(*n*=118)		(*n*=53)	(*n*=37)		(292)	(1,078)		(153)	(1,255)	

All of the above are statistically significant at $p = <.05$. Diff. = difference.

Multivariate Analysis: Multiple Factors on Commuting Times

What creates the distinction between the commuting times of black and white males within metropolitan areas? While valuable, ANOVA does not consider the effects of other independent variables. A multivariate statistic, in this case, stepwise multiple regression, is the next stage in the analysis to identify the multiple factors with an effect on commuting times. The dependent variable is one-way mean travel time (MTT), and the independent variable coefficients are compared to show how the effect of variables on commuting time differs among models (black vs. whites and northern suburbs vs. southern suburbs vs. central city). The suburban areas are divided into north and south, based on racial dichotomy, to determine whether or not certain variables are more influential in one location compared to other locations in explaining

commuting time. The variables are chosen carefully, based on the existing literature. A large body of theoretical and empirical research suggests a number of determinants for measuring work-trip length (e.g., Wyly 1998). The independent variables are listed and described in Table 6. The stepwise selection procedure is used to add and remove variables in the models. Therefore, all the models are free from multicoliniarity.

Table 6. Variable Names, Descriptions, and Definitions

Variable Names	Definition and Description
MTT	One-way mean travel time to work
AGE	Age of workers
YEARSCG	Years of schooling
RACE_BW (Dummy)	Race of workers; black=0 and white=1
MCPD_FP (Dummy)	Full-time dual-earner households[1]; full-time=1 and part-time=0
RHHINC	Median household income
HVALUE	Median housing value
OCCUP2 (Dummy)	Technical/service/clerical occupations=1 and managerial/professional=0
OCCUP3 (Dummy)	Service occupation=1 and managerial/professional occupations=0
OCCUP4 (Dummy)	Industrial/crafts occupations=1 and managerial/professional=0
SPOUSE_FP (Dummy)	Spouse's work hours; full-time=1 and part-time=0
PRESCHLD (Dummy)	Presence of children under age 18=1 and without children=0
CENTSUB (Dummy)	Location of residence; suburbs=1 and center=0
TRNSMODE (Dummy)	Mode of transportation; car user=1 and public transit user=0

Notes: 1. Full-time dual-earner households=both spouses worked at least 35 hours per week; part-time dual-earner households=both spouses worked at least 15 hours per week.

Table 7. Determinants of Commuting Time

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	37.26*	28.24*	34.60*	38.08*	38.35*
AGE	−.09	−.15*	−.10*	−.175*	−0.05
YEARSCG	ne	ne	ne	ne	ne
RACE_BW	na	na	−2.93*	.165	−5.18*
OCCUP2	−0.63	0.83*	−.67	.87*	1.15
OCCUP3	−0.63	−3.28*	−1.95	−2.38*	5.08**
OCCUP4	−0.88	−2.28*	−4.29*	−.52	5.08
RHHINC	0.01	.01	.01	.05	0.02
CENTSUB	3.53*	6.75*	na	na	na
TRNSMODE	−18.24*	−10.07*	−11.18*	13.56*	−15.92*
HVALUE	.29*	.18*	.26*	.20*	.09
PRESCHLD	1.35	−.37	1.09	.26	.61
SPOUSE_FP	4.73*	6.04*	5.58*	6.03*	−2.12
F- statistics	18.62*	43.42*	10.94*	27.36*	7.08*
R square	0.14**	0.07*	.09*	.05*	.23*
Total observations	1,922	9,059	1,826	7,229	2,044

**statistically significant at $p = <.10$. *statistically significant at $p = <.05$. Notes: Model 1: Black Males; Model 2: White Males; Model 3: Southern Suburbs; Model 4: Northern Suburbs; Model 5: Inner City; ne: not entered; na: not applicable

Models 1 and 2 are used to compare the magnitude of the predicted values of influential variables for explaining commuting times between black and white males (Table 7). An extensive literature documents longer commutes among workers at their peak age (Hanson and Pratt 1995), as does this research. Age has a negative effect on the white males' commuting time, though the coefficient is small, but age does not have an influence on black males' commuting

time. Similarly, occupation status is also significant for white workers' commuting time. As expected, white professional males commute longer (3 minutes) than do white service and industrial/craft workers (2 minutes). In contrast, occupation status is insignificant to black workers' commuting time, which implies that black males' commuting time is not associated with occupational status.

Location of residence has an important effect on commuting time for both white and black male workers, but the magnitude is less for white males than for black males. Suburbanization of residence adds a burden of 3.5 additional average minutes of commuting time for black males compared to central-city black males, whereas suburbanization of white residences adds an extra 7 minutes to commuting time, compared to central-city white residents. The widening gap in commuting time between central-city white males and suburban males is a result of the shortest commuting time being associated with white males living in the central city, and the longest commuting times by those in suburban residential locations, as is shown in the ANOVA results.

Mode of transportation has the most important effect on commuting time. Public transit lengthens commuting time for both races (18 minutes for blacks and 10 minutes for whites, compared to workers who used cars), but the magnitude is higher for black males (8 minutes longer than for whites). Housing values also have a negative significant influence on commuting time for both black and white workers, with housing values increasing as the commuting length increases. These models also have taken into consideration domestic responsibility (e.g., presence of children and the presence of a full-time working spouse) of married males and find no significant effects due to the presence of children on commuting time for either racial category. Spouses' working hours have a significant influence on commuting times for both races. White males' commuting time increased to 6 minutes when their spouses worked full-time, while the presence of a full-time working spouse for black males increased their commuting time by 5 minutes.

Models 3, 4, and 5 were run separately for the southern suburbs, the northern suburbs, and central-city residential locations to see what factors provided explanations for commuting times for each location. As expected, the southern suburbs are predominantly black, and in this area, race still matters in explaining commuting behavior (Model 3), as it does in central-city locations (Model 5). In contrast, racial relations are insignificant in explaining commuting behavior in the northern suburbs (Model 4). Black males commute 3 minutes longer in the southern suburbs than their white counterparts, and central-city black males commute 5 minutes longer than white males who also live in the central city.

Other variables such as mode of transportation, spouses' working hours, and housing values significantly lengthen journey-to-work time for the southern and the northern suburban residents. Except for mode of transportation, these variables have no significant relationship with central-city residence. In terms of occupational status, in every location, professional residents' commutes are significantly longer than others, except to jobs in the northern suburbs, where residents in technical and clerical jobs commute slightly longer (1 minute). The magnitude of variation is higher for professional residents in the southern suburbs and central city.

What Does the Evidence Suggest?

Contrary to many past studies, which indicate that, regardless of gender, black workers commute longer, this research finds that, overall, white males' one-way, journey-to-work time is longer than that for black males in metro Atlanta when residential and workplace locations are not controlled. This is consistent with Sultana's (2002) study on Atlanta. Consequently, this current research suggests again that shorter commutes by black workers in the Atlanta MSA are a result of their disproportionately higher representation (either by residence or workplace choices) in the central city and those suburbs immediately peripheral to the central city. Hence, black workers' commutes are slightly less, compared to white workers, who live in more distant areas of Atlanta suburbs and exurbs.

Conversely, when workers' residence and workplace are controlled in the analysis, these findings suggest that even when access to a car is not restricted, the central-city residential location continues to place a disproportionate commuting burden on black male workers compared to their white counterparts. While some past studies suggest the central city is the most popular location for dual-earner households in order to minimize commuting time (e.g., Green 1997), such an opportunity is not available for the blacks living in the central city. Race-based residential segregation is important in Atlanta and may still be a strong constraint for central-city's black male workers who seek to optimize their jobs and residential locations, as reflected by their longer commuting times. Therefore, black males living in central-city areas face a spatial mismatch that necessitates longer commuting times than those of white males with similar social and economic characteristics (McLafferty and Preston 1996) and equal access to transportation (Johnston-Anumonwo 2000; Sultana 2003).

These findings do support the hypothesis that the spatial mismatch problem is more severe in central city locations, which is consistent with Zax and Kain (1991) and McLafferty and Preston (1996). These findings cannot show whether or not the suburbanization of the black population minimizes this problem. This research only provides evidence that the situation with blacks living and working in the suburbs differs significantly. Blacks who live in segregated suburbs (e.g., southern suburbs), where there is a higher proportion of black population, suffer from a spatial mismatch (Gottlieb and Lentnek 2001), but this may be to a lesser extent. The situation for blacks living in the northern suburbs, where there is a higher proportion of white population, differs, with no evidence of explicit mismatch found with the multivariate statistics results. This finding may not suggest a positive outcome as other research (Bullard, Johnson, and Torres 2000) suggests there is substantial racial discrimination in Atlanta's housing and job markets as well as differing access to public transportation in suburban locations.

I argue that this result may suggest a more complicated situation for blacks. Compared to many industrial metro areas, blacks in the Atlanta metro area may not be free to select residential locations and job opportunities in distant suburbs and exurbs (Figure 2) because of discriminatory attitudes against them. Their lack of a social network or lack of comfort in living and working in predominantly white suburbs may also be an issue (Thomson 2000). Or, one may argue that since black suburbanization is a more recent phenomenon than white suburbanization, blacks have just started moving to the suburbs and they will adjust to the outer suburbs or exurbs over time, as did whites. A recent study gives evidence of discrimination in affluent and predominantly white suburban housing markets in metro Atlanta (Holloway and Wyly 2001), so

this process of adjustment will clearly require a greater resolution of racial issues. As a matter of fact, these constraints may not play that strong a role upon professional and technical and clerical workers due to their longer commuting time in intrasuburban directions, compared to their white counterparts as reflected in ANOVA results (Table 5).

In contrast to many past studies, this analysis reveals that, regardless of occupational status, white males living in suburban Atlanta have the longest commuting times; therefore, it is necessary to ask whether this is indicative of a spatial mismatch or of living choice. I argue that, despite the longer commuting times of white males, which do constitute a disadvantage for them, white males do not suffer from a spatial mismatch. Rather, the longer commuting times of white males in suburban residential locations can be partly explained by Atlanta's jobs–housing imbalance[4] (Sultana 2002), as housing value has a positive affect on lengthening commuting time for northern suburban residences. This finding suggests higher housing values have forced workers, especially technical and clerical workers, to live farther from the workplace and thus increase their commuting time. Metro Atlanta is known for its tremendous growth toward the suburbs and exurbs without balancing housing and job location, and this situation has forced white workers, especially middle-income (technical and clerical) workers seeking better living conditions (better schooling for the children and more affordable and larger housing for the middle-class population), to commute greater distances from central-city jobs. This finding may be responsible for separating suburban and exurban white males from central-city workplaces.

This research provides strong evidence that mode of transportation has an important influence on commuting time and suggests again that transit users are in a disadvantaged position when attempting to economize commuting time, although black males are at a greater disadvantage when public transit is used. This article clearly suggests that the racial differences in commuting times are the result of a spatial mismatch, not an automobile mismatch. This finding is contrary to some past studies (Taylor and Ong 1995; Gottlieb and Lentnek 2001) and also eliminates the dilemma of many studies that agreed on the presence of a spatial mismatch but were not sure whether it was from blacks' greater reliance upon public transit (Holzer 1991; McLafferty and Preston 1996). In addition, this research suggests that blacks' access to the automobile reduces the commuting burden, but access to automobiles by blacks does not entirely eliminate the spatial mismatch problem.

Traditional urban economic theory perceives that high-income people commute longer than low-income people because of trade-offs between housing space and commuting time. Therefore, certainly, professional workers' longer commute does not constitute a disadvantage. The insignificant relationship between household income and commuting time may be due to the fact that

> the tendency for high-income whites and low-income blacks to occupy the central city is not unique to Atlanta. Research by urban economists indicates that the former group prefers a city location because they place a high value on commuting time and can afford to send their children to private schools.
>
> —(Hartshorn and Ihlanfeldt 2000)

The presence of a full-time working spouse significantly lengthens males' commuting times. This variable has a greater effect on white males. While this research does not provide an opportunity to answer why the presence of full-time working wives lengthens commuting more for white males than it does for black males, it is a fact that gender differences in commuting times are greater in white households (Wyly 1998). Clearly, the historical roots of racial discrimination complicate black workers' household characteristics as well as their commuting experience.

Conclusions and Future Directions

Recognizing the spatial mismatch problem for the comparatively most privileged group of central-city black males in the metropolitan Atlanta—those married and living with working spouses—this article has confirmed several issues raised by others and suggests that racial disparity in commuting times will most likely remain as long as the black residential segregation dichotomy exists in American cities. Ultimately, cities bear the imprint of racialized processes such as racial and ethnic segregation and discrimination, and urban space in turn affects those processes (Delaney 2002). Geographical space, whether the built, social, or natural environment, has a significant influence on the concept of spatial mismatch, and hence, like many others (e.g., Kain 1992; Gottlieb and Lentnek 2001), I also think spatial mismatch problems are more likely to be a result of the spatial manifestation of a combined housing and employment discrimination possessing deep historic roots.

So, what is next? While this research offers significant evidence that racial differences in commuting times are more likely to be a result of race-based residential segregation (either self-imposed or forced) that exists in Atlanta, it does not answer the question as to what extent housing and employment discrimination influence black workers' commuting times. PUMS data are not suited to answering this question either; therefore, future researchers will need to collect data based within residentially segregated neighborhoods (Census Transportation Planning Package [CTPP] data can be an option). Moreover, subsequent research has reported that social and economic characteristics of neighborhoods may have an independent influence on employment and wages separate from the effects of spatial access (O'Regan and Quigley 1996; Immergluck 1998). Future research should identify similar characteristics of neighborhoods before making racial comparisons.

This research does not perceive professional workers' long commutes as disadvantaged. Among professional and managerial workers, black males average longer commutes than whites, regardless of residential location or commuting direction. Future research may specifically try to find answers as to whether or not professional black males are at a disadvantage in their trade-off between commuting (transport costs) and housing amenities compared to white males.

In addition, while this research confirms that the spatial mismatch is not a result of an automobile mismatch, it does not answer directly whether the mismatch is from poor geographic access to the transportation network, as that also varies within metropolitan areas. Future research can investigate this issue by coupling commuting research with geographic information systems (GIS) technology. Given the fact that segregated black neighborhoods are typified by congested (often narrow) roads and limited street connectivity, it can be expected that blacks from these neighborhoods travel much greater times than whites who live in neighborhoods with

wider and well-established network connectivity, regardless of the presence of nearby jobs. Future research should also consider the space-time constraints of workers, which highlight gender differences and employment status (Weber and Kwan 2002), in order to develop more accurate measures of spatial mismatch. In addition, future research should broadly address spatial mismatch definitions, combined with the job/housing imbalance concept, as commutes may result if the mix of jobs and housing prices are not compatible.

While considerable research indicates that married men, because of their domestic responsibilities, have different commuting choices than single men (e.g., Johnston-Anumonwo 1997), this research does not find the presence of children to have a significant influence on males' commuting times. The presence of a full-time working spouse, however, does have a significant effect on men's commuting times. Consequently, this finding complicates married men's commuting behaviors and allows a range of possibilities, such as when the husband works full-time and the spouse works part-time or vice versa. While this research did not sort out these kinds of dual-earner households, these issues can be examined in future research by using 2000 PUMS data. Finally, because the effect of a full-time employed spouse has more influence on white males' commuting time than that of black males, this situation requires us to look at another dimension of commuting and spatial mismatch research based on both race and gender. Some have argued (Stasiulus and Yuval-David 1995), in fact, that the significance of race and ethnicity cannot be understood separately from gender.

Literature Cited

Alonso, W. 1965. *Location and land use*, Cambridge, MA: Harvard University Press.

Amott, T. and Mattei, J. 1991. *Race, gender and work, A multicultural economic history of women in the United States*, Montreal: Black Rose Books.

Bianchi, S. M. and Spain, D. 1986. *American women in transition*, New York: Russell Sage Foundation.

Brueckner, J. K. and Martin, R. W. 1997. Spatial mismatch: An equilibrium analysis. *Regional Science and Urban Economics*, 27: 693–714.

Bullard, R., Johnson, G. S. and Torres, A. O. 2000. *Urban sprawl: Race, politics, and planning in Atlanta*, Washington, DC: Island Press.

Chiodo A. J., Owyang M. T., 2002, For love or money: Why married men make more. *The Regional Economist*, 2 April (last accessed 13 May 2004). http://www.stls.frb.org/publications/re/2002/b/pages/marriage.html

Chung, C., Myers, S. L. Jr. and Saunders, L. 2001. Racial differences in transportation access to employment in Chicago and Los Angeles, 1980 and 1990. *American Economic Review*, 91: 174–77.

Cohn, S. and Fossett, M. 1995. Why racial employment inequality is greater in northern labor markets: Regional differences in white-black employment differentials. *Social Forces*, 74: 511–42.

Cooke, T. J. 1993. Proximity to job opportunities and African American male unemployment: A test of the spatial mismatch hypothesis in Indianapolis. *The Professional Geographer*, 45: 407–15.

Cooke, T. J. 1996. City-suburb differences in African American male labor market achievement. *The Professional Geographer*, 48: 458–67.

Crane, R. 1996. The influence of uncertain job location on urban form and the journey to work. *Journal of Urban Economics*, 39: 342–56.

Crane, R. 2000. The influence of urban form on travel: An interpretive review. *Journal of Planning Literature*, 15: 3–23.

Delaney, D. 2002. The space that race makes. *The Professional Geographer*, 54: 6–14. 10.1111/0033-0124.00309

Dubin, R. 1991. Commuting patterns and firm decentralization. *Land Economics*, 67: 12–29.

Farley, R. and Allen, W. R. 1987. *The colorline and the quality of life in America*, New York: Russell Sage Foundation.

Fujii, T. and Hartshorn, T. A. 1995. The changing metropolitan structure of Atlanta, Georgia: Location of functions and regional structure in a multinucleated urban area. *Urban Geography*, 16: 680–707.

Goldsmith, W. W. and Blakely, E. J. 1992. *Separate societies: Poverty and inequality in U.S. cities*, Philadelphia: Temple University Press.

Gottlieb, P. D. and Lentnek, B. 2001. Spatial mismatch is not always a central-city problem: An analysis of commuting behavior in Cleveland, Ohio, and its suburbs. *Urban Studies*, 38: 1161–86.

Green, A. E. 1997. A question of compromise? Case study evidence on the location and mobility strategies of dual career households. *Regional Studies*, 31: 641–57. 10.1080/00343409750130731

Green, A. E., Hogarth, T. and Shackleton, R. 1999. Long distance commuting as a substitute for migration in Great Britain: A review of trends, issues and implications. *International Journal of Population Geography*, 5: 49–67. 1229487010.1002/(SICI)1099-1220(199901/02)5:1<49::AID-IJPG124>3.0.CO;2-O

Hall, T. 2000. *Urban geography*, London: Routledge.

Hanson, S. and Pratt, G. 1995. *Gender, work, and space*, London: Routledge.

Hartshorn, T. A. and Ihlanfeldt, K. R. 2000. “Growth and changes in metropolitan Atlanta”. In *The Atlanta paradox*, Edited by: Sjoquist, D. L. 15–41. New York: Russell Sage Foundation.

Harvey, D. 1973. *Social justice and the city*, London: Edward Arnold.

Holloway, S. R. and Wyly, E. K. 2001. The color of money extended: Geographic contingence and race in Atlanta. *Journal of Housing Research*, 12: 55–90.

Holzer, H. J. 1991. The spatial mismatch hypothesis: What has the evidence suggest?. *Urban Studies*, 28: 105–22.

Holzer, H. J., Ihlanfeldt, K. R. and Sjoquist, D. L. 1994. Work, search, and travel among white and black youth. *Journal of Urban Economics*, 35: 320–45. 10.1006/juec.1994.1019

Ihlanfeldt, K. R. and Young, M. V. 1994. Intrametropolitan variation in wage rates: The case of Atlanta fast-food restaurant workers. *Review of Economics and Statistics*, 76: 425–33.

Immergluck, D. 1998. *Neighborhood jobs, race, and skills: Urban employment and commuting*, New York: Garland Publishing.

Johnston-Anumonwo, I. 1995. Racial differences in the commuting behavior of women in Buffalo, 1980–1990. *Urban Geography*, 16: 23–45.

Johnston-Anumonwo, I. 1997. Race, gender, and constrained work trips in Buffalo, NY, 1990. *The Professional Geographer*, 49: 306–17. 10.1111/0033-0124.00079

Johnston-Anumonwo, I. 2000. Commuting constraints of black women: Evidence from Detroit, Michigan. *The Great Lakes Geographer*, 7(2): 66–75.

Johnston-Anumonwo, I. 2001. Persistent racial differences in the commutes of Kansas City workers. *Journal of Black Studies*, 31(5): 651–70.

Kain, J. F. 1968. Housing segregation, negro employment, and metropolitan decentralization. *The Quarterly Journal of Economics*, 82: 175–97.

Kain, J. F. 1992. The spatial mismatch hypothesis: Three decades later. *Housing Policy Debate*, 3: 371–460.

Keating, L. 2001. *Atlanta: Race, class, and urban expansion*, Philadelphia: Temple University Press.

Koslowsky, M., Aizer, A. and Krausz, M. 1996. Stressor and personal variables in the commuting experience. *International Journal of Manpower*, 17: 4–14. 10.1108/01437729610119478

Martin, R. W. 2001. The adjustment of black residents to metropolitan employment shifts: How persistent is spatial mismatch?. *Journal of Urban Economics*, 50: 52–76. 10.1006/juec.2000.2211

Massey, D. S. and Hajnal, Z. L. 1995. The changing geographic structure of black-white segregation in the United States. *Social Science Quarterly*, 76: 527–42.

McLafferty, S. and Preston, V. 1991. Gender, race, and commuting among service sector workers. *The Professional Geographers*, 43: 1–15.

McLafferty, S. and Preston, V. 1992. Spatial mismatch and labor market segmentation for African-American and Latina women. *Economic Geography*, 68: 406–31.

McLafferty, S. and Preston, V. 1996. Spatial mismatch and employment in a decade of restructuring. *The Professional Geographer*, 48: 420–31.

McLafferty, S. and Preston, V. 1997. Gender, race, and the determinants of commuting: New York in 1990. *Urban Geography*, 18: 192–212.

O'Regan, K. and Quigley, J. 1996. Spatial effects upon teenage outcomes. *New England Economic Review*, May/June: 41–58.

Preston, V. S. and McLafferty, S. 1999. Spatial mismatch research in the 1990s: Progress and potential. *Papers in Regional Science*, 78: 387–402.

Preston, V., McLafferty, S. and Hamilton, E. 1993. The impact of family status on black, white, and Hispanic women's commuting. *Urban Geography*, 14: 228–50.

Preston, V. S., McLafferty, S. and Liu, X. F. 1998. Geographical barriers to employment for American-born and immigrants workers. *Urban Studies*, 35(3): 529–45.

Raphael, S. 1998a. Intra- and intra-ethnic comparisons of the central city-suburban youth employment differential: Evidence from the Oakland Metropolitan Area. *Industrial and Labor Relations Review*, 51: 505–24.

Raphael, S. 1998b. The spatial mismatch hypothesis and black youth joblessness: Evidence from the San Francisco Bay Area. *Journal of Urban Economics*, 43: 79–111.

Schneider, M. and Phelan, T. 1993. Black suburbanization in the 1980s. *Demography*, 30: 269–79.8500640

Stasiulus, D. and Yuval-Davis, N. 1995. *Unsettling settler societies*, London: Sage.

Sultana, S. 2000. Some effects of employment centers on commuting times in the Atlanta metropolitan area, 1990. *Southeastern Geographer*, 41: 225–33.

Sultana, S. 2002. Job/housing imbalance and commuting time in the Atlanta Metropolitan Area: Exploration of causes of longer commuting time. *Urban Geography*, 23: 728–49.

Sultana, S. 2003. Commuting constraints of black female workers in Atlanta: An examination of the spatial mismatch hypothesis in married-couple, dual-earner households. *Southeastern Geographer*, 43: 249–59.

Taylor, B. D. and Ong, P. M. 1995. Spatial mismatches or automobile mismatch? An examination of race, residence and commuting in U.S. metropolitan areas. *Urban Studies*, 32: 1453–73.

Thomson, M. A. 2000. "Black-white residential segregation in Atlanta". In *The Atlanta paradox*, Edited by: Sjoquist, D. L. 88–115. New York: Russell Sage Foundation.

U. S. Department of Commerce. 1990. *Census of transportation planning package*, Washington, DC: U.S. Bureau of the Census.

U. S. Department of Commerce. 1992. *Census of population and housing: Public use microdata samples, technical documentation*, Washington, DC: U.S. Bureau of the Census.

Weber, J. and Kwan, M. P. 2002. Bringing time back in: A study on the influence of travel time variations and facility opening hours on individual accessibility. *The Professional Geographer*, 54: 226–40.

White, M. J. 1977. A model of residential location choice and commuting by men and women workers. *Journal of Regional Science*, 19: 41–52.

Wyly, E. K. 1996. Race, gender, and spatial segmentation in the Twin Cities. *The Professional Geographer*, 48: 431–44.

Wyly, E. K. 1998. Containment and mismatch: Gender differences in commuting in metropolitan labor markets. *Urban Geography*, 19: 395–430.

Zax, J. S. 1990. Race and commutes. *Journal of Urban Economics*, 28: 336–48.

Zax, J. S. and Kain, J. F. 1991. Commutes, quits, and moves. *Journal of Urban Economics*, 29: 153–65.

[1] The argument of the spatial mismatch hypothesis is that the suburbanization of jobs has imposed constraints on the spatial access to employment opportunities of blacks living in central

cities and suggests a linkage between the decentralization of jobs and the high volume of unemployment and poverty among central-city black residents.

[2] The foundation of postindustrial city growth is significantly different from the old industrial city. Postindustrial city growth lies in service and high-technology industrial sectors, contains a variety of complex social and cultural processes, and is accompanied by a high level of poverty (Hall 2000).

[3] This analysis also uses detailed journey-to-work data from the 1990 U.S. Census of Transportation Planning Package (CTPP) for mapping the location of black residents and workers. The 1990 CTPP data includes three parts, classified according to the type of persons surveyed. Data are provided at a finer spatial resolution, as Transportation Analysis Zones (TAZs). Data from the first and second parts are used in this research, which provides information on residents and workers, such as location of residents and employment. Location Quotients (LQ) are used for visualizing the location of black residents and workers with a higher or lower proportion of their population compared to the total population of the Atlanta metropolitan area (MSA) and how these localities relate to each other (clustering around a number of areas or spreading throughout the city). An LQ value of 1.0 represents an area where the percentage of the black residents or workers is the same as that of the Atlanta metropolitan area as a whole. LQ value of <1.0 represents an area where a smaller share (underrepresentation) of black residents or workers than that of the regional average exists, and LQ values of >1.0 imply places where a higher percentage (overrepresentation) of the black residents or workers than that of the regional average can be found, e.g., an LQ value of 3.9 means that percentage of black population is almost four times the Atlanta MSA average.

The following formula for computing an LQ of black residents or workers for a TAZ is:

$$LQ = \frac{TBi/TPi}{TBa/TPa}$$

Where, *TBi* = Total number of black residents or workers in TAZi,
TPi = Total residents or workers in TAZi,
TBa = Total number of black Residents or workers in the metro Atlanta,
TPa = Total residents or workers in the metro Atlanta.

[4] The concept of job-housing imbalance implies areas that have a much higher concentration of employment than the number of housing units or vice versa, leading to longer commuting times. Similarly, a job-housing imbalance also occurs when the price and other characteristics of housing in an area are unsuitable for the workers who hold jobs there.