

Demographics of Carpooling

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Carpooling may be defined as shared ride trips via private automobiles for the journey to and from work. In the past, researchers argued that carpoolers could not be distinguished from other commuters based on demographic characteristics. Recently, some researchers have cited the influx of women in the work force and the continuing suburbanization of jobs and housing as reasons for the sharp decline in carpooling between 1980 and 1990. A review of significant research on carpooling over the past 20 years is presented with an in-depth analysis of 1990 Nationwide Personal Transportation Study data to identify the demographics of carpooling, then and now. Prior research suggests that family income, gender, distance to work, and residential location have the greatest effect on carpool formation. This study suggests that automobile availability within households and the level of education of individual commuters may be more significant factors in carpool formation. The research shows that (a) family income has little direct effect on carpool formation other than at the lowest income levels, (b) family income does affect automobile ownership, which partially determines auto availability, (c) gender has little direct effect on the formation of nonhousehold carpools, and (d) women are more likely to form household-based carpools in families with children, particularly very young children.

Researchers have argued that carpoolers are difficult to distinguish from drive-alone commuters based on demographics only (1). Carpooling preferences among groups with similar demographic characteristics were thought to vary more significantly as a function of underlying beliefs and attitudes. It has proven extremely difficult to get drive alone commuters to switch to carpooling based on sophisticated marketing techniques alone. Between 1980 and 1990 U.S. carpooling declined by 34 percent, even as regional ridesharing programs were becoming more common across the nation.

Researchers have attributed the decline of carpooling to the increased number of woman in the work force and the suburbanization of jobs (2). Working mothers often need to serve the transportation needs of children, discouraging carpooling with other adults. And as work and home trip destinations of suburban residents grow ever more distant, matching carpool partners based on the needs of individual commuters may become more difficult in future years.

DATA AND RESEARCH METHODOLOGY

A comprehensive national overview of the demographics of carpooling follows. The literature on carpooling is reviewed in conjunction with findings from the 1990 Nationwide Personal Transportation Study (NPTS). Most NPTS data are stored in six hierarchical files relating to relevant characteristics of sampled households, persons, vehicles, and trips. In all, 22,317 households,

48,385 people aged 5 or older, 41,178 vehicles, 94,383 vehicle trips and 149,546 person trips are described in the 1990 NPTS data base. This analysis is based on person trips only. After observations with missing data were removed, 123,270 person trips (82 percent) remained. Of these, 28,623 (23 percent) were work trips, which form the core data for most of this analysis.

Carpooling is defined as any home-based work trip in which the commuter is accompanied by at least one other person in a private motor vehicle. It does not matter if the accompanying person is a household member or not, nor does it matter what the other person's trip purpose might be. In the case of nonhousehold members, no information on trip purpose or anything else is available. It is likely that most are commuters, but this can only be surmised. In this analysis, carpooling is distinguished from driving alone, public transit, and nonmotorized transportation. Driving alone means operating a car, minivan, or pickup truck without any passengers. Public transit includes subways, elevated railways, light rail, trolleys, and buses. Nonmotorized transportation includes bicycling and walking.

URBAN FORM

Oppenheim stated that carpooling increases with trip distance, firm size, and population density, but offered scant supporting evidence for these assertions (1).

Trip Distance

Daniels, Richardson and Young, Teal, and Cervero and Griesenbeck each found that carpooling increases linearly with trip distance or time, or both (3–6). Ferguson showed that in Orange County, California, carpooling decreases with distance for trips of less than 10 mi (16.1 km), increases with distance for trips of 10 to 35 mi (16.1 to 56.4 km), and decreases with distance for trips longer than 35 mi (56.4 km) (7).

The 1990 NPTS data reveal that transit use increases and nonmotorized transportation decreases with distance, a similar relationship to that shown by Dasgupta et al. for the cities of Manchester and Sheffield in Great Britain (8). Nationwide, carpooling decreases with distance for work trips of less than 15 mi (24.2 km), and increases with distance for work trips of 16 mi (25.8 km) or more (Table 1). The percentage of carpools comprising nonhousehold members increases linearly with distance. The drive-alone mode split mirrors that of carpooling, first increasing with distance and then decreasing. Household-based carpools apparently compete most effectively with nonmotorized transportation as a substitute for driving alone in the short work trip market. Nonhousehold-based carpools compete most effectively with public transit in the long work trip market. Alternatives to driving alone appear to be less viable in the medium range of work trip lengths.

TABLE 1 Mode of Travel by Distance to Work (16)

Mode of Travel	Trip Distance (Miles)						Total	Percent
	1-5	6-10	11-15	16-20	21-30	31+		
Drive Alone	76.35%	81.85%	83.09%	81.31%	78.84%	71.80%	22,552	78.79
Carpool	17.80%	14.33%	13.92%	14.25%	16.47%	20.66%	4,664	16.29
Household-based	11.29%	8.63%	8.22%	6.18%	6.99%	7.02%	2,670	9.33
Non-household	6.51%	5.70%	5.71%	8.07%	9.48%	13.64%	1,994	6.97
Transit	3.10%	3.70%	2.99%	4.39%	4.69%	7.54%	1,057	3.69
Nonmotorized	2.75%	0.12%	0.00%	0.05%	0.00%	0.00%	350	1.22
Total	12,411	6,544	3,744	2,162	2,131	1,631	28,623	100.00
Percent	43.36	22.86	13.08	7.55	7.45	5.70	100.00	

Residential Location

Based on his analysis of 1977 NPTS data, Teal suggested that non-metropolitan (rural) residents were more likely than urban residents to carpool (5). Hartgen and Bullard used 1980 and 1990 Census data to show that rural residents of North Carolina were more likely to carpool than urban residents of that state (9). Matthews also used Census data and found that the greatest decline in Georgia carpooling during the 1980s occurred in the rapidly growing suburban counties around Atlanta (10). Most other authors have been silent on the topic of geography and carpooling, perhaps because so much of this research has been of the case study variety, focusing on urban, suburban, or rural settings, but not all three together.

According to 1990 NPTS data, geographic location influences mode choice moderately to strongly, while affecting carpool composition only weakly, if at all (Table 2). Public transit and nonmotorized transportation are used most often in central cities, least often outside urban areas. Carpooling is most common outside urban areas, and least common inside urban areas, but outside the central city. Carpooling has been touted as the savior of the suburbs, at least in terms of alternative modes of travel, given that public transit and nonmotorized transportation are viewed as nonviable in

those areas (11,12). These results suggest that public transit and nonmotorized transportation may be less nonviable in suburban communities than previously thought. In addition, carpooling may be in for a rough ride in Edge City.

Population Density

Oppenheim asserted that carpooling increases with population density (1). Most authors have been silent on this relationship, perhaps due to a lack of data. Ferguson included residential density terms in his 1977 and 1983 carpool regression equations, but neither was found to be statistically significant (13).

Using better or more accurate measures of population density, public transit and (to a lesser extent) nonmotorized transportation increase continuously with metropolitan statistical area (MSA) population density (Figure 1). Carpooling also increases with population density, but much more modestly and only at lower population densities. At more than 5,000 persons per square mile (1,929 persons per square kilometer), carpooling mode split begins to decline in absolute terms. Relative to driving alone, carpooling increases continuously, even at the highest population densities.

TABLE 2 Mode of Travel Residential Location (16)

Mode of Travel	Residential Location			Total	Percent
	Urban-- Inside Central City	Urban-- Outside Central City	Not Urban		
Drive Alone	74.36%	81.53%	80.82%	22,552	78.79
Carpool	16.51%	14.05%	17.99%	4,664	16.29
Household-based	9.24%	8.23%	10.35%	2,663	9.30
Non-household	7.27%	5.82%	7.64%	1,991	6.96
Transit	7.19%	3.40%	0.50%	1,057	3.69
Nonmotorized	1.94%	1.02%	0.68%	350	1.22
Total	9,929	8,590	10,104	28,623	100.00
Percent	34.69	30.01	35.30	100.00	

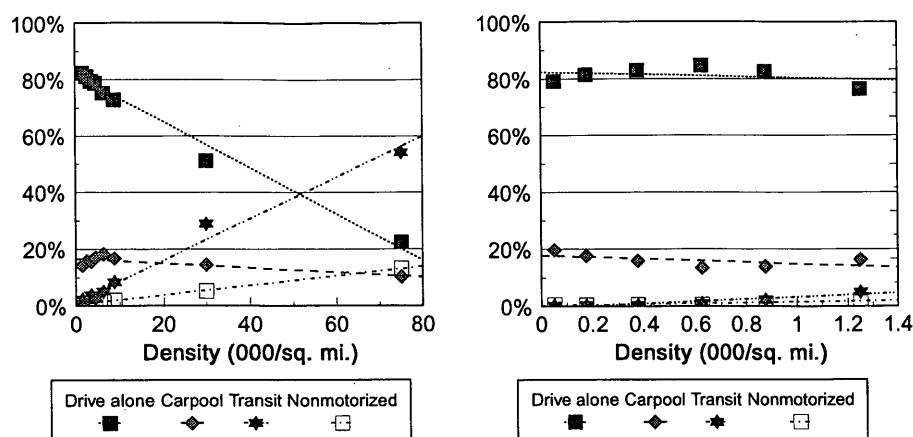


FIGURE 1 Mode of travel by residential population density: *left, inside MSAs; right, outside MSAs (16).*

MSA population density is measured categorically in the 1990 NPTS data, with much wider ranges used to describe the highest population densities. Treating these categorical range descriptions as actual point estimates located at the midpoint of each such range, all of the modal relationships are roughly linear in form. Elasticities of demand for particular modes can be measured as the slope of each line. It is clear that carpool mode split is less sensitive to population density than driving alone, public transit, nonmotorized transportation, or even carpool composition.

Outside MSAs, a different picture emerges. As non-MSA population density increases above about 500 persons per square mile (192.9 persons per square kilometer), a similar set of relations to those observed for MSAs appears, with driving alone decreasing and carpooling, public transit, and nonmotorized transportation increasing in terms of modal split (Figure 1). At less than 500 persons per square mile (192.9 persons per square kilometer), driving alone increases and carpooling decreases with increasing population density. Public transit and nonmotorized transportation are largely unaffected by population density in such sparsely settled regions. Compared to driving alone carpooling neither gains nor loses from changes in public transit and nonmotorized transportation outside MSAs, because these modes are relatively insignificant at all non-MSA population densities.

Neither mode split nor carpool composition are particularly sensitive to variations in population density outside MSAs. It appears that higher-than-average-density non-MSA regions emulate lower-than-average-density MSAs with reference to modal characteristics, and in fact these two types of regions often are contiguous in real terms.

DEMOGRAPHICS

Oppenheim reported that age, income, gender, and ethnicity were all unrelated to carpooling (1). In general, however, most published studies have ignored the effects of demographic variables on carpooling, either stating or implicitly assuming that earlier studies had demonstrated adequately that no such effects existed. This assumption is clearly mistaken, however, as will be shown using 1990 NPTS data.

Tischer and Dobson reported that commuters who drove alone to the Los Angeles central business district and who indicated having a higher-than-average propensity to switch to carpooling under appropriate conditions were more likely to be young, female, and black, with lower family incomes than those drive-alone commuters who showed little propensity to switch modes (14). Gensch reported that commuters who drove alone on the Santa Monica Freeway during the infamous Diamond Lane experiment and who indicated having a higher-than-average propensity to switch to public transit under appropriate conditions were more likely to be young, female, and Hispanic, with lower family incomes than those drive-alone commuters showing little desire to switch modes (15).

Age

Teal, in dismissing the effects of most demographic variables on carpooling, forgets to mention age among those variables that are not to be considered (5). In this Teal is far from alone, for most authors neither confirm nor deny they even looked at age as a determinant of or covariant with mode choice. An exception is Ferguson, whose research showed a statistical association between age and carpooling that is negative and significant, based on nonlinear regression analysis of 1977 and 1983 NPTS data (13).

Although statistically significant, the relationship between age and carpooling is far from powerful (Figure 2). Driving alone to work increases gradually while all major modal alternatives decrease gradually with age from about 16 to 25 up to 46 to 55. Beyond middle age, when the average worker typically reaches his or her peak performance and earning power, driving alone decreases, carpooling and public transit use increase, and nonmotorized transportation remains largely unaffected. Because there are fewer workers in the higher age groups, the effect of their changing modal preferences has less of an impact on linear regression estimates, which are dominated by more younger workers.

Education

Education has been all but ignored in the literature on carpooling, even more so than age. The only source this researcher found was

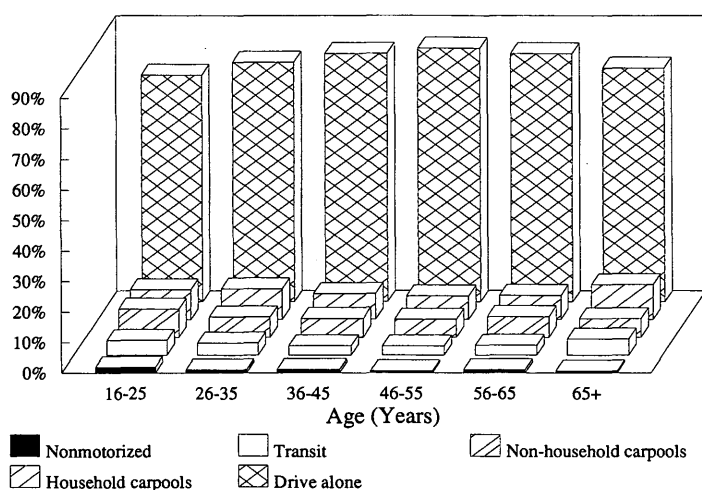


FIGURE 2 Mode of travel by age (16).

Teal, who states that no statistical relationship exists between carpooling and education, based on secondary sources (5). It has become an article of faith in the ridesharing community that carpoolers are virtually indistinguishable from those who drive alone, which is good in terms of aggregate market potential, but bad in terms of market segmentation, advertising campaign targeting, and the like. Ferguson showed that there is a statistical association between education and carpooling that is negative and significant, based on nonlinear regression analysis of 1977 and 1983 NPTS data (13). Ferguson found that auto commuters who had attended at least some college were more likely to carpool than those who had not (13).

An even more powerful relationship appears to exist between education and carpooling, based on 1990 NPTS data (Table 3). Commuters who have not completed high school behave differently than those who have high school diplomas or college educations. This relatively uneducated group is twice as likely to carpool, bicycle, or walk to work. Among commuters possessing at least a high school diploma, driving alone and the use of public transit and nonmotorized transportation increase with higher educational achieve-

ment. Only carpooling declines with education above the high school level. Whereas 17 percent of commuters with high school diplomas carpool, only 14 percent of commuters with some college and 11 percent of commuters with some graduate school carpool.

Gender

Oppenheim argued that gender was unrelated to carpooling (1). Subsequent researchers were far from silent on this demographic issue, agreeing that female and clerical workers were significantly more likely to carpool than male and professional and managerial workers (5,6,8,14,15).

Teal showed that married women were more likely to carpool than unmarried women, married men, or unmarried men (5). He argued that the relationship was statistically insignificant based on a chi-square test of a two-by-four outcome matrix. In 1977 Ferguson, using the same data structure but a different analysis method (multiple regression), showed that married women were significantly more likely to carpool than unmarried women, married men

TABLE 3 Mode of Travel by Education (16)

Mode of Travel	Education				Total	Percent
	<High School	High School Graduate	Some College	Some Graduate School		
Drive Alone	64.48%	79.51%	81.27%	82.24%	22,381	78.97
Carpool	28.58%	16.67%	13.90%	11.11%	4,579	16.16
Household-based	16.25%	8.89%	8.37%	7.02%	2,605	9.19
Non-household	12.33%	7.78%	5.53%	4.09%	1,974	6.96
Transit	4.32%	2.89%	3.84%	4.92%	1,035	3.65
Nonmotorized	2.62%	0.94%	0.99%	1.73%	347	1.22
Total	2,939	10,788	11,383	3,232	28,342	100.00
Percent	10.37	38.06	40.16	11.40	100.00	

or unmarried men (13). In 1983 Ferguson demonstrated that married men or women were significantly more likely to carpool than single men or women (13).

Cervero and Griesenbeck used multiple regression analysis to show that professional and managerial workers in suburban Pleasanton, California, making up about 25 percent of the total work force, were significantly less likely to carpool, significantly more likely to have flexible work hours, and significantly less likely to commute outside both the morning and afternoon peak periods than all other workers (6). Although women constituted more than 60 percent of the work force in Pleasanton during the mid-1980s, Cervero and Griesenbeck failed to address the role of gender in mode choice, although they do mention it explicitly as a factor in the location of corporate "back" offices, where administrative functions not requiring direct interaction with customers often are performed (6).

Rosenbloom and Burns found that middle-income women were more likely than middle-income men to drive alone in Tucson, Arizona (2). This is the only example known to this author of a study purporting to show that women are more likely to drive alone than men. Although Tucson women earned lower salaries and held lower-status jobs on average, they nonetheless were more likely to drive alone than men, and less likely to carpool, use public transit, or ride bicycles to get to work.

As Table 4 indicates, the 1990 NPTS data indicate that nationally, female workers are about 35 percent more likely than male workers to carpool. Male workers are almost 50 percent more likely than female workers to carpool with nonhousehold members. The use of public transit and nonmotorized transportation for the work trip varies little with gender in the NPTS data. Females are 5 percent more likely than males to use public transit. Males are 15 percent more likely than females to use nonmotorized transportation.

HOUSEHOLD LIFE CYCLE

The "life cycle" of a household traditionally is defined as a categorical variable based on the number of adults (1 or 2+), the age of the youngest child (none, under 6, 6 to 15, or 16 to 21) and whether a retired person is present in the household. Oppenheim argued that workers later in their life cycle (i.e., those whose children grew to adulthood) would become more amenable to carpooling (1).

Although later authors discussed the effect of household characteristics such as number of persons, number of workers, and number of vehicles on carpooling, only Oppenheim referred explicitly to life cycle as a possible determinant of carpool formation (1).

Number of Adults

Ferguson showed that the likelihood of carpooling increased with the number of adults in the household (13). The number of working adults had a much greater positive impact than did the number of nonworking adults. Other authors have argued that the likelihood of carpooling increases with the total number of persons in the household (1) or with the number of workers only (5,14).

Figure 3 shows an interesting interaction between gender and the number of adults in the household. Men and women are remarkably similar to one another in terms of mode choices, once the number of adults in the household is controlled for. Workers in single adult households are more likely than those in multiple adult households to drive alone. Men are more likely than women to drive alone. However, men and women in single and multiple adult households are about equally likely to use nonmotorized transportation, public transit and to form non-household carpools.

The sole difference between men and women in either single- or multiple-adult households involves apparent trade-offs between driving alone and household-based carpools. Female workers in single-adult households are four times as likely as male workers in single-adult households to form household-based carpools. Female workers in multiple adult households are "only" twice as likely as male workers in multiple adult households to form household-based carpools. These results suggest that role differences may be more important than either psychological or economic differences in explaining gender variations in travel behavior.

Age of Youngest Child

Ferguson showed that the likelihood of carpooling decreased with the number of children in the household (13). No one else has modeled this relationship explicitly, though many have argued that child-care needs limit the ability of women to participate in formal carpool programs offered by employers (2).

TABLE 4 Mode of Travel by Gender (16)

Mode of Travel	Gender		Total	Percent
	Male	Female		
Drive Alone	81.09%	75.95%	22,548	78.79
Carpool	14.01%	19.11%	4,664	16.30
Household-based	6.92%	12.29%	2,670	9.33
Non-household	7.09%	6.81%	1,994	6.97
Transit	3.60%	3.81%	1,057	3.69
Nonmotorized	1.30%	1.12%	350	1.22
Total	15,790	12,829	28,619	100.00
Percent	55.17	44.83	100.00	

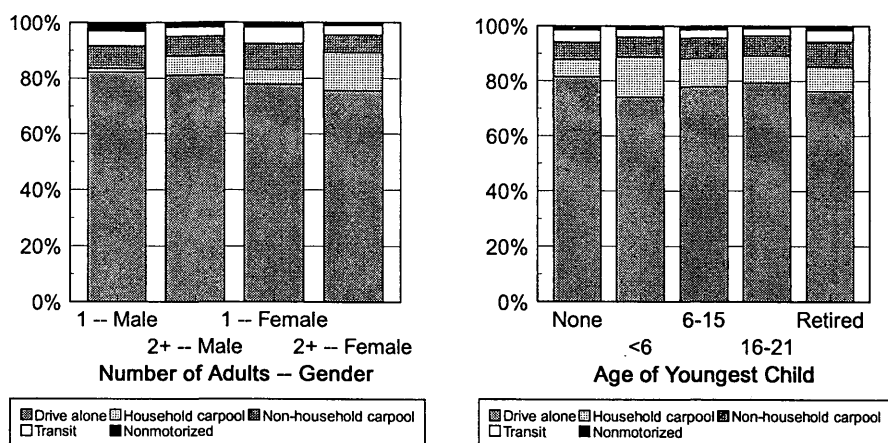


FIGURE 3 Mode of travel by life cycle characteristics: *left, adults; right, children* (16).

Figure 3 shows an interactive relationship between gender and the presence of children in the household. Men and women exhibit virtually identical travel behavior if there are no children or retirees in the household. Female workers with small children in the household are more than three times as likely as women with no children in the household to carpool with fellow household members; there is virtually no difference between these two groups of women in nonhousehold carpooling. Male workers with small children are 50 percent more likely than men with no children to carpool with other household members and 25 percent more likely to carpool with non-household members.

Women are more likely than men to serve the travel needs of small children. However, men appear to be slightly more likely to travel with strangers (presumably in the stranger's car) so women will have an auto available to serve their children's needs. The presence of older children in the household has a similar effect, but is far less pronounced for either gender. Male and female workers respond similarly to the presence of children in the household, but females respond more. These results provide further evidence that gender differences in travel behavior are the result of differences in gender roles, not economics.

HOUSEHOLD SIZE

Oppenheim suggested that people living in larger households and those owning larger automobiles were more likely to carpool (1). Tischer and Dobson; Gensch; Teal; and Dasgupta et al. all found that as the number of vehicles per household increased, the likelihood of choosing alternatives to driving alone fell (5,8,14,15). Tischer and Dobson; and Teal found that carpooling increased with the number of workers in the household (5,14). Gensch found that public transit use fell with the number of workers in the household (15). The propensity to carpool should increase with the number of persons, adults, and workers, and fall with the number of vehicles, particularly as this relates to the number of drivers, licensed or unlicensed, within the household.

Ferguson found that carpooling positively correlated with the number of adults in the household and negatively correlated with the number of vehicles available to the household (13). Ferguson estimated that carpooling for the work trip was three times more

sensitive to the presence of working adults than it was to the presence of nonworking adults (13). Ferguson estimated that carpooling was about twice as sensitive to the number of vehicles up to and including the number of working adults in the household as it was to the number of vehicles in the household that exceeded the number of working adults (13).

Number of Persons

As Figure 4 shows, carpooling is fairly sensitive to the number of persons in the household. Commuters living in households with five or more persons are two-and-one-half times more likely to carpool than those living in single-person households. The biggest leap in carpooling propensity occurs between one- and two-person households, however. Commuters in two-person households are 77 percent more likely than those in single-person households to carpool.

As household size increases, household-based carpools increase substantially while nonhousehold based carpools remain relatively unaffected. In fact, single-person household commuters are slightly more likely to carpool with nonhousehold members than commuters in households with more than one person. Much of the increase in carpooling that occurs with increasing household size appears to be drawn from alternatives to driving alone, such as public transit and nonmotorized transportation.

Number of Vehicles

As Figure 4 shows, carpool is also sensitive to the number of vehicles in the household. Commuters in households with no vehicles are almost twice as likely to carpool as those in households with four or more vehicles. Commuters living in households with one vehicle are in several ways more similar to those living in households with no vehicles than they are to those living in households with two or more vehicles. Commuters in households with either zero or one vehicle are more likely to carpool, use public transit and use nonmotorized transportation to get to work. One-vehicle household commuters nonetheless drive alone 67 percent of the time, while zero-vehicle household commuters drive alone a mere 11 percent of the time.

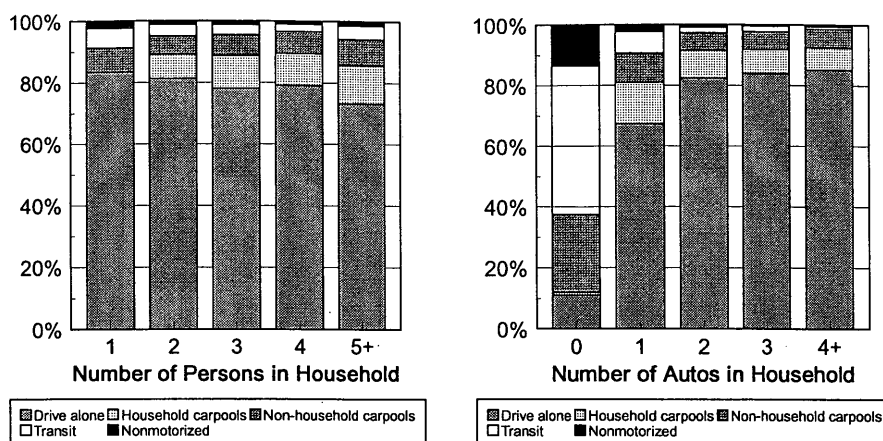


FIGURE 4 Mode of travel by automobile availability: *left, demand; right, supply* (16).

Zero- and one-vehicle households account for only 20 percent of the total commuters in the 1990 NPTS sample. For households with two or more vehicles, which account for more than four out of five sampled commuters, mode of travel to work is far less sensitive to the number of vehicles in the household. Household-based carpooling, public transit, and nonmotorized transportation use decline slightly with vehicle ownership in this range, while nonhousehold based carpools actually increase, if only slightly. These results suggest that households with two or more vehicles are more or less saturated, at least in terms of the marginal effect on mode choice for the journey to work of adding another vehicle to the household.

Family Income

Oppenheim argued that income had no effect on the propensity to carpool (1). Tischer and Dobson; and Gensch, both using disaggregate data, found that the propensity to switch from driving alone to carpooling or public transit under the influence of suitable modal incentives was higher for individuals with lower incomes (14,15). Teal found that carpooling was more prevalent among lower-

income groups (5). In particular, Teal found that when the ratio of out-of-pocket drive-alone commuting costs exceeded 5 percent of average family income per worker, the propensity to carpool increased by a factor of two or three (5). Ferguson found that family income was unrelated to the likelihood of carpooling after controlling for other variables through multiple regression (13). Hartgen and Bullard; and Matthews, both using aggregate data, found that the percentage of commuters who carpooled decreased significantly with per capita income at the county level in the North Carolina and Georgia using 1990 Census data (9,10).

As Figure 5 shows, the 1990 NPTS data indicate that carpooling declines with income at lower-income levels, but is largely unrelated to income at higher-income levels. Workers living in households with family incomes of less than \$30,000/year show large increases in driving alone and even larger relative decreases in carpooling, public transit, and nonmotorized transportation usage as income increases from \$0 to \$30,000. Workers living in households with family incomes of \$30,000 or more show virtually no change in driving alone as income increases, although there is some slight substitution of public transit for carpooling at the very highest income levels. Workers living in households with family incomes

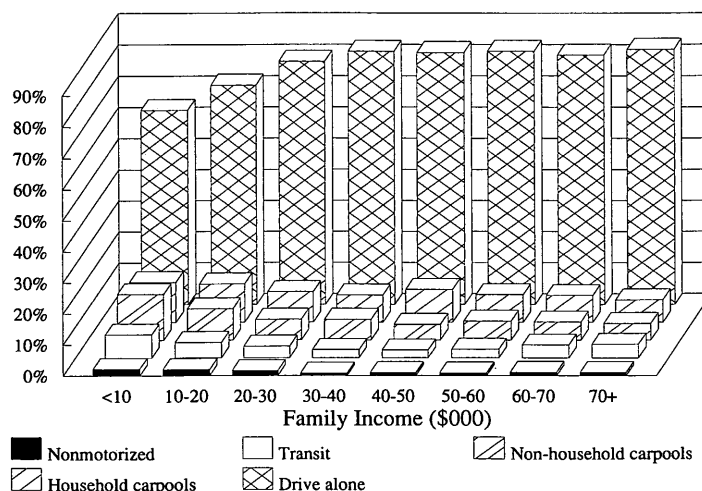


FIGURE 5 Mode of travel by family income (16).

of less than \$20,000 are somewhat more likely than their higher-income brethren to carpool with nonhousehold members.

Ethnicity

Oppenheim asserted that ethnicity had no effect on carpooling (1). Most other authors have remained silent on this issue. Tischer and Dobson found that blacks had a higher propensity to switch to carpooling from driving alone (14). Gensch found that Hispanics had a higher propensity to switch to public transit from driving alone (15). Both of these studies deal with stated rather than revealed preferences, however.

As Table 5 shows, ethnicity and mode choice are indeed related. Whites are more likely than all other ethnic groups to drive alone to work. Blacks are more likely than all other ethnic groups to use public transit to get to work. Hispanics are more likely than all other ethnic groups to carpool to work. Members of other racial or ethnic groups are least likely overall to carpool with nonhousehold members.

It appears from a cursory examination of the data that the influence of ethnicity on mode choice can be explained almost entirely as a function of differences in family income or residential location, or both. Whites generally have the highest incomes and are most likely to live in suburban environments. The fact that whites are most likely to drive alone and least likely to use any of the alternatives should come as no surprise. Blacks generally have lower family incomes and are less likely to live in suburbs than whites. Blacks are least likely to drive alone, most likely to use public transit, second most likely to carpool, and third most likely to use nonmotorized transportation.

CONCLUSIONS

There are some interesting variations in carpooling by gender. Most such variations appear to be the result of role differences rather than being specific to the gender of commuters. There are also some interesting variations in carpooling with respect to urban form, but most of these effects were much smaller than expected.

The largest variations in carpooling appear to be related to household size, including both the number of persons and the number of

vehicles, and the age and education of the respondent. Vehicle availability has long been known to influence transit versus highway mode choice decisions. The relatively large effect of vehicle availability on carpooling has not hitherto been emphasized much in the literature. The effects of age and education generally have been ignored in the literature on carpooling. In fact, age and education appear to be much more important in explaining recent declines in carpooling than urban form, female work force participation, or family income.

These results suggest that carpool marketing and research efforts may need to be better focused, if not entirely redirected. Suburbs may not be such a bad place for carpooling after all. Men and women are almost identical in terms of commuting behavior, once household-based carpools are controlled for. The transportation needs of small children may become more important in carpool formation in future years, but only if child-care facilities are provided closer to the workplace and are utilized by working women and men.

Given that most households are nearing saturation in terms of vehicle ownership, can carpools still be formed? This will depend largely on the extent to which carpools are made more attractive through preferential treatments and differential pricing. Vehicle availability might be reduced through policy measures, but this would require large-scale changes in land use or population density that probably would benefit public transit and nonmotorized transportation more than carpools.

The large negative effect of education and the smaller but still significant effect of increasing age on carpooling remain something of a mystery. It appears that these effects reflect increasing expectations or decreasing tolerance of others. If public relations has a role to play in modifying mode choice through marketing efforts in the future, it would appear to lie in this largely unexplored realm of commuters' attitudes.

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TABLE 5 Mode of Travel by Ethnicity (16)

Mode of Travel	Ethnicity				Total	Percent
	White	Black	Hispanic	Other		
Drive Alone	81.02%	64.33%	66.12%	72.58%	22,449	78.77
Carpool	15.31%	22.22%	23.25%	18.95%	4,655	16.33
Household-based	8.88%	9.95%	14.92%	12.23%	2,665	9.35
Non-household	6.43%	12.27%	8.33%	6.72%	1,990	6.98
Transit	2.52%	12.04%	8.58%	6.85%	1,045	3.67
Nonmotorized	1.15%	1.41%	2.06%	1.61%	350	1.23
Total	24,143	2,201	1,411	744	28,499	100.00
Percent	84.72	7.72	4.95	2.61	100.00	

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