

Abridgment

Vanpool Travel Characteristics in Southeast Michigan

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This paper describes the results of a travel survey that was distributed by the Southeast Michigan Council of Governments to all participants in employer-sponsored vanpool programs in the seven-county southeast Michigan region. The purpose of the survey was to collect socioeconomic, travel, and attitudinal data from participating vanpoolers. This paper summarizes the results of the socioeconomic and travel portions of the survey. Data were collected that describe the vanpoolers' modal shift to pooling, use or disposal of the automobile left home by commuters who previously drove, and total vanpooler travel before and after joining the pool. Vanpooling in the Detroit area attracts few transit users and draws riders nearly equally from drive alone and ridesharing. Vanpooling does not have a significant impact on automobile ownership. Only 15 percent of the respondents reported that either a vehicle was sold or its purchase postponed as a result of vanpooling. However, only 20 percent of respondents reported that the vehicle left home was used by other household members and its use was substantially less in terms of mileage than the former commuting use. Finally, the total travel impact of vanpooling was a reduction in automobile travel of 339 miles/month for the average vanpooler.

In April 1980 the Southeast Michigan Council of Governments (SEMCOG) conducted a travel survey of all people who participated in employer-sponsored vanpool programs. SEMCOG is the metropolitan planning organization (MPO) for a seven-county region centered in Detroit. As MPO, SEMCOG has been active in planning for ridesharing in the region since 1975.

The vanpool survey was undertaken to satisfy several purposes. There was a need to collect data to identify what travel impacts had been achieved in order to evaluate the success of SEMCOG's vanpool promotion program. For transportation system management (TSM) and air quality planning activities there was a need to collect vanpooling data specific to the region that could be used as a basis for on-going planning activities. Ridesharing staff felt that attitudinal information from vanpoolers would be of assistance in refining SEMCOG's and employers' in-house promotional campaigns. Finally, there was a certain amount of curiosity about certain vanpool characteristics that had not been discussed in vanpool literature, such as, "How much is the car left home used during the day?"

This paper summarizes the socioeconomic and travel portions of the vanpool survey. In particular, the information that follows is intended to answer the following questions:

1. What are the socioeconomics of vanpoolers in the region?
2. What are their present travel characteristics?
3. What has been the mode shift to vanpools?
4. What has happened to the automobile formerly used for the work commute?
5. What net travel reduction has been achieved by the shift to vanpools?

THE SURVEY

The survey contained 52 questions and was five pages long. Concern was expressed that the survey was too long. However, in 1978 Michigan distributed a detailed four-page survey to its vanpoolers and experienced an excellent response rate. It was decided that the relatively long and comfortable travel time in the van together with the well-known vanpooler's esprit de corps would yield a good response rate. Such was the case.

All employers in the region who sponsored vanpool programs agreed to participate in the survey. Sur-

veys were distributed to all vanpoolers at each company with the exception of Chrysler, where only a sample of vanpoolers were included due to the size of its program (112 vans). Surveys were distributed through each company's vanpool coordinator. The coordinator distributed the surveys to each vanpool driver. The driver was responsible for distributing and collecting the surveys from the passengers. The survey was distributed to 98 vans and approximately 1000 vanpoolers. A 77 percent response rate was achieved.

RESULTS

Vanpoolers tend to have larger families, more employed family members, more cars, and higher incomes than the average commuter in the region. They also travel significantly greater distances to work, on the order of 24 miles.

Vanpoolers' Travel Characteristics

The length of time survey respondents had been vanpooling was only eight months. The majority of respondents had been pooling for less than a year. The data were not representative of the total vanpooling population because vanpoolers were only sampled at Chrysler, which has the oldest (operational for more than five years) and largest program in the region. As will be seen in later discussion, because such a large proportion of survey respondents were relatively recent converts to vanpooling, the effects of vanpooling on the decision to reduce household automobile ownership were masked.

More than 40 percent of the survey respondents reported being picked up at home. Of the vanpoolers who were not picked up at home, more than 50 percent met the vanpool at a shopping center. Nearly 75 percent of the vanpoolers who were not picked up at home drove alone to the pick-up point. The average distance from home to the pick-up location was 3.9 miles. Vanpoolers reported missing an average of 2.5 one-way trips/month. About 25 percent of the respondents indicated they missed some trips per month.

Vanpool drivers reported driving their vans up to 1000 miles/month for personal use. Most drivers reported monthly personal use mileage in the range of 50-300 miles. The average mileage reported was 175 miles/month. About 10 percent of vanpoolers reported an increase in their use of their employer's staff vehicles. The average increase in use was about 100 miles/month; 400-500 miles/month represented the high end of the range.

Some other data related to the vanpooler's travel decision are as follows. Automobile insurance reductions have been received by 44 percent of vanpoolers. Thirty percent of respondents changed their work hours when they began vanpooling. More than 43 percent of respondents reported their employers offered at least one incentive to vanpooling, including the following:

1. Parking closer to work entrance (30 percent of respondents),
2. Parking at reduced cost (6 percent of respondents), and
3. Other incentives (13 percent of respondents).

Table 1. Variables that influence automobile ownership decision.

Variable	No-Change ^a Mean	Purchase Postponed ^a		Vehicle Sold ^a	
		Mean	Significance ^b	Mean	Significance ^b
Household size	3.09	3.82	0.0058	3.44	0.2649
No. of employed persons	1.84	2.07	0.0557	1.81	0.8145
Vehicle ownership ^c	1.97	2.97	0.0000	2.76	0.0000
No. of employed persons per vehicle ^c	1.00	0.72	0.0006	0.68	0.0000
Licensed drivers per vehicle ^c	1.14	0.91	0.0000	0.91	0.0001
Avg. income (\$)	26 600	28 500	0.1564	31 200	0.0043
No. of months in pool	8.30	10.47	0.0256	11.55	0.0040
No. of miles to work	24.10	22.73	0.3659	20.96	0.0785

^aAlthough the number of samples in each vehicle ownership decision category varies by variable depending on nonresponses, typical sample size is 570 responses for no change, 70 responses for purchase postponed, and 48 responses for vehicle sold.

^bF-test comparison of variable means for purchase postponed and vehicle sold responses with no change responses.

^cVehicle ownership is vehicle ownership before respondent began vanpooling.

Table 2. Variables that influence use of vehicle left home.

Variable	Automobile Used ^a Mean	Automobile Not Used ^a	
		Mean	Significance ^b
Household size	3.67	3.08	0.0057
Employed persons	2.04	1.82	0.0182
Vehicle ownership	3.01	1.98	0.8006
Employed persons per vehicle	1.14	0.98	0.0015
Licensed driver per vehicle	1.51	1.12	0.0000
Avg. income (\$)	28 600	26 700	0.0774
Months in pool	11.19	8.16	0.0001
Miles to work	21.67	24.45	0.0223

^aAlthough the number of samples varies by variable depending on nonresponses, typical sample size is 125 responses for automobile used and 550 responses for automobile not used.

^bF-test comparison of variable means for automobile not used respondents with automobile used respondents.

Employer incentives influenced the vanpooling decision of 13 percent of respondents.

Mode Shift to Vanpools

Almost all respondents (89 percent), were users of private vehicles and about equally split between drive alone and ridesharing. Only 7.5 percent of respondents reported transit as their prior mode. Respondents who formerly carpooled reported that the average carpool size was 3.1 people and that 80 percent of the carpools involved shared driving responsibilities.

The shift to vanpools involved an increase in travel time and distance for most respondents. Increases in time are associated with waiting for the van and any extra trip distance. Increases in distance are associated with travel to the pick-up location and trip circuitry once in the van as other poolers are picked up. The average increase in travel time was 12 min, and the average increase in travel distance was 2.9 miles.

Use of the Vehicles Left Home

Concern has been expressed that the vehicle left home when the shift to vanpooling is made is used by other household members for work and nonwork travel. This use could offset some or even all of the private vehicular travel reduced by the vanpooler's work trip.

Vehicle Ownership Decision

About 6 percent of respondents indicated that they had sold the vehicle formerly used for commuting.

Another 9 percent indicated that they had postponed the purchase of another vehicle. The vehicle ownership decision was analyzed in regard to several variables to determine whether certain socioeconomic or other factors were related to the vehicle ownership decision. Table 1 shows a statistical comparison of variable means for respondents who reported either

1. No change in household vehicle ownership due to vanpooling (no change),
2. Postponement of the purchase of a vehicle (purchase postponed), or
3. The sale of a vehicle (vehicle sold).

Note that vehicle ownership as used in this table is vehicle ownership before the respondent began vanpooling. The significance value shown in the table is based on the F-test. It represents the probability that, for a given variable, the mean for either the vehicle-sold or purchase-postponed populations is the same as the mean of the no-change population.

A review of Table 1 reveals that the mean vehicle ownership, employed persons per vehicle, and licensed drivers per vehicle were the most significantly different between the three automobile ownership decisions. All were significantly different at the 1 percent level. The table also shows that the respondents' automobile ownership decision is dependent on the length of time he or she has been vanpooling (months in pool). The longer the respondent had been in the pool, the greater the likelihood of selling a vehicle.

Vehicle Use Decision

Approximately 20 percent of respondents who reported either no change or purchase postponed indicated that the vehicle left home was used by another person for work or nonwork travel. An analysis was performed to determine how the variables previously discussed affected the automobile-use decision of the respondent. The results are presented in Table 2. Unlike Table 1, no distinction need be made about whether the vehicle ownership used in the analysis is before or after vanpooling because, obviously, no vehicle ownership change was reported by these respondents.

Ten percent of total respondents indicated that the vehicle left home was used for work trips an average of 280 miles/month. Thirteen percent of total respondents indicated that the vehicle left home was used for nonwork trips an average of 180 miles/month. Intuitively, survey respondents could not be expected to have an accurate idea of how much the vehicle left home is used. If anything, this mileage was previously underestimated by survey respondents.

Total Travel Impact of Vanpooling

The bottom line in the evaluation of vanpooling's travel impacts is how much a vanpooler's household travel by private vehicle changed after the vanpooler began vanpooling. The basis for the comparison is the vanpooler's commuting mileage before versus the sum of the following:

1. Vanpooler's mileage by private vehicle to the vanpool pick-up location,
2. Vanpool's mileage, and
3. Mileage put on the vehicle left home.

For the purposes of this analysis, total travel impacts were calculated for the total group of respondents. The basic unit for comparison should be the travel associated with a vanpool's members before and after in order to properly account for the van's mileage. In addition, the sample collected has a representative number of vanpool drivers (10 percent of the total).

In the after case, mileage on the vehicle left home is calculated directly from the survey responses and added to the after-commuting total. Carpools were assumed to stay in operation after the vanpooler left it to join the vanpool. Calculated on this basis, the average survey respondent traveled 578 miles/month to work in a private vehicle before beginning to vanpool. After joining the vanpool, the vanpooler's average household private vehicle use consisted of the following:

1. 188 miles/month to work including access miles and van miles prorated to the survey respondent,
2. 28 miles/month for commuting in the vehicle left home per survey respondent (235 miles/month per automobile left home that is used x 10 percent of survey respondents who reported automobile left home is used for commuting trips), and
3. 23 miles/month for noncommuting trips in the vehicle left home per survey respondent (180 miles/month per automobile x 13 percent of survey respondents who reported automobile left home is used for noncommuting trips).

This totals to an average of 239 miles/month per survey respondent. Hence, the shift to vanpooling resulted in a reduction of 339 miles/month per vanpooler. This is an average saving. Vanpoolers who drove alone would save much more. Vanpoolers who previously used transit would save nothing.

SUMMARY AND CONCLUSIONS

In April 1980, SEMCOG conducted a comprehensive sur-

vey of all employer-sponsored vanpools in the south-east Michigan region. An excellent response rate was achieved; therefore, I believe that the survey results provide an accurate picture of the vanpoolers and their travel habits in the Detroit area. There is one important exception, however. The survey undersampled long-term vanpoolers in the region because

1. Only a small sample (5 percent) of vanpoolers was surveyed from the oldest and largest vanpool program in the region (i.e., Chrysler Corporation, which has 112 vans in operation for five years) and
2. No other vanpool programs in the region were more than 18 months old at the time of the survey.

As a result, the impact of vanpooling on the automobile ownership decision cannot be completely identified from the survey results because this decision is highly correlated with length of time in a vanpool.

A review of survey results indicated several areas where the survey could be improved. More details about travel habits of former ridesharers are desirable, particularly the fate of the carpool after the ridesharer left it for the vanpool. Responses to questions on travel time and distance before vanpooling were not always consistent (e.g., some respondents indicated their travel distance to work was 5 or more miles less after vanpooling), which indicates a need to revise these questions. The question about the vehicle ownership decision is potentially ambiguous in regard to the purchase-postponed decision--it could be interpreted to relate to the decision of whether or not to replace an existing vehicle or to the decision of whether or not to increase the total number of vehicles owned. Both decisions are of interest. Finally, an independent means of checking the respondent's estimate of the use of the vehicle left home needs to be found.

The principal travel results of the survey are as follows. Vanpooling attracts few transit users and draws riders nearly equally from drive alone and ridesharing. Vanpooling does not have a significant impact on automobile ownership. Only 15 percent of respondents reported that either a vehicle was sold or its purchase postponed as a result of vanpooling. (As discussed above, the estimate is probably low.) However, only 20 percent of respondents reported that the vehicle left home was used by other household members and their use was substantially less in terms of mileage than the former commuting use. Finally, the total travel impact of vanpooling was a reduction of 339 miles/month for the average vanpooler.

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Commuter Demand for Ridesharing Services

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Ridesharing has recently become one of the most discussed topics in the fields of transportation system management and energy conservation. It is increasingly being looked on by both public and private sectors as a short-term answer to a variety of economic and environmental ills. Ridesharing behavior is manifested in two distinct ways: Regular ridesharing refers to the adoption of

shared commuting on an ongoing basis; emergency ridesharing is characterized by swift, but short-term, shifts from driving alone to pooling for the home-to-work trip. This paper characterizes both types of behavior and addresses the implications for providing assistance to commuters in both settings.