Assessment of the Transportation Needs of Pennsylvania's Elderly Population

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We focus on the transportation needs of the elderly as determined by a randomly selected sample of 2,048 elderly Pennsylvania residents. We provide an analysis of those factors that can discriminate between the elderly (1) who express a need for transportation services versus those who do not and (2) who use transportation services and who do not. Car ownership, health status, living arrangement, race, martial status, sex, and age are significantly related to the elderly's perceived need of transportation services. Factors significant in discriminating between users and nonusers of transportation services are perceived need, car ownership, urban-rural residence, age, and living arrangement. Implications of this analysis for policy-makers and researchers are discussed.

The importance of determining the needs of the growing number of elderly persons cannot be debated. Over the last decades, the number of aged Americans has increased substantially, to 28.5 million persons (65 and over) or about 12% of our population. Even more notable is that the percentage of elderly who are age 75 and older has disproportionately increased from 29% in 1930 to over 38% in 1980, and the 85+ group is the fastest growing segment of our population. Since the 85+ group makes the greatest demand for services, one can easily see the implications for governmental resources to meet the growing needs (Cox, 1984).

We focus on transportation needs of the elderly and analyze those factors that can discriminate between (1) the elderly who express a need

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for transportation services versus those who do not and (2) the elderly who use transportation services and those who do not.

In the 1985 Pennsylvania needs assessment, the elderly identified transportation as the area of service in greatest need and most likely to be used (Iutcovich, 1985). Others have shown the importance of transportation to the quality of an older person's life (Berghorn, Schafer, Steere, & Wiseman, 1978; Carp, 1979; Cutler, 1975; McGhee, 1983; McKelvey, 1979; Revis, 1975; Wachs, 1979). Indeed, transportation can also be seen as a critical factor in use of other services. Social service agencies and the aging network have recognized this linkage between transportation and use of other services; thus community agencies often provide specialized transit services for the elderly. These services not only transport older persons to social services, but are also used to transport seniors to the doctor's office, the supermarket, and to take care of personal business. The goal of these transportation services is to help the elderly in their attempts to remain independent (Cox, 1984). These services may vary depending on funding requirements, but door-to-door service is often provided, although there may be requirements for shared-ride and advance reservations (J. Detman, Pennsylvania Department of Aging, personal communication, May 1987).

Conceptualization and Measurement

Conceptual Model

Undoubtedly, providing transportation services can be seen as a top priority of the aging network of community agencies and professionals providing services to the elderly. To gain an understanding of those factors that correlate with the need for and use of transportation services, this analysis uses a conceptual scheme developed by Anderson and his colleagues (Aday & Anderson, 1974, 1975; Anderson, 1968; Anderson & Newman, 1973). This scheme was developed for health service utilization, but it has also been applied to other types of service use.

The Anderson model conceptualizes service utilization in terms of need, enabling, and predisposing factors. These three types of factors are described as:

(1) *Need factors* indicate the level of a problem and the individual's response to it. Need factors can compromise subjective perceptions and objective judgments.

(2) *Enabling factors* include circumstances or individual characteristics that either hinder or facilitate use of a service once a need has been recognized. Financial resources, knowledge of services, and ability to locate and travel to services are examples of enabling factors.
(3) *Predisposing factors* are individual characteristics that are seen as affecting an individual's propensity to use services. Predisposing factors include age, sex, race, and marital status.

We use this conceptual scheme in two separate analyses. First we examine the expressed need for transportation services to determine what enabling and predisposing factors are significant in distinguishing between those who express a need for transportation versus those who do not. Second, we examine users and nonusers of transportation services more closely to determine those need, enabling, and predisposing factors that are significant in distinguishing users from nonusers.

Measurements

We use an elderly person's expressed need for transportation services as the subjective indicator of the need factor. We measure service use by the respondent's reported use of the transportation services designed to meet the needs of older persons in the community.

The enabling factors used are consistent with previous research (Krout, 1983a; McGhee, 1983; Wolinsky et al., 1983) and also applicable to the examination of transportation services. Specifically, we use income and car ownership as indicators of financial resources of the elderly. Respondents indicated the appropriate income level from nine categories ranging between "less than $5000" to "$50,000 or more." Car ownership was determined by asking if the respondent owned a car or did not own one. McGhee (1983) has previously shown car ownership to be related to subjective and objective measures of transportation needs.

We use education as an indicator of potential knowledge of the service delivery system. Coulton and Frost (1982) previously used education as an enabling factor since there is evidence to support the positive association between education and knowledge of the delivery system (Snider, 1980). The respondent's education was classified as elementary, some high school, high school graduate, some college, or college plus.

Urban-rural locations we use as an indicator of accessibility to services. Recent research has focused on the urban-rural distinction and its impact on service use (Gombeski & Smolensky, 1980; Krout, 1983a; McGhee, 1983; Patton, 1975; Schooler, 1975; Schulte, Brockway, & Murrell, 1978; Taietz & Simon, 1977; Wendley, 1983). However, there is

still inconclusive evidence as to the effect of urban-rural residence on the need for and use of services. Much of this uncertainty is because of the diversity between and within rural communities (Coward, 1979). We treated urban-rural location as a dummy variable with urban/suburban residents coded as one and rural residents coded as zero.

We also introduce health status in this analysis as an enabling factor since one's health could either facilitate or inhibit use of transportation services and affect the perception of need. In a study by McGhee (1983), different measures of health were found to be related to both objective and subjective measures of transportation needs. A health and physical status index was formed by asking respondents to indicate their level of difficulty with a number of activities, for example, getting about the house, going up and down stairs. In addition, we included questions on the number of days sick in the past month (from date of interview) and the extent of sickness (ranging from at home but up and around to in hospital/nursing home) in the index. Scores on the index could range between 8 and 40.

Predisposing factors included the cultural and socialization differences associated with an individual's age, sex, race, marital status, and living arrangement. Available data are not conclusive regarding the impact of these variables. Some researchers have found significant associations between these sociodemographic variables and service use, while others have not found the variables significant in differentiating users from nonusers (Cottrell, 1975; Fowler, 1970; Harris et al., 1975; Krout, 1981). Age of the respondent was recorded as 60-64, 65-69, 70-74, 75-79, and 80 plus. Sex, race, marital status, and living arrangement were all treated as dummy variables. Men, Whites, married people, and those living alone were all coded as one, while the alternate category was coded as zero.

Method

Data for this analysis were collected in the 1985 Survey of Older Pennsylvanians (Iutcovich, 1985). The Pennsylvania Department of Aging contracted for a comprehensive survey of noninstitutionalized older Pennsylvanians that would be comparable to a 1971-1972 survey conducted by the Pennsylvania Department of Public Welfare. The 1985 survey included information concerning the elderly's overall social, emotional, and physical well-being. Specifically, it examined demographic characteristics, living conditions, life-style, health status, economic status, and need for specialized services.

This survey used a structured research interview schedule to gather data on older Pennsylvanians. We used the interview schedule developed from the 1971-1972 survey in the 1985 survey with minor modifications where necessary (e.g., on levels of income and debt). Some questions were added concerning use of and need for Area Agencies on Aging (AAA) services. We pretested the interview schedule to ensure there were no problems in its administration and that all questions were clear to respondents.

Face-to-face interviews were completed for 2,048 randomly selected noninstitutionalized adults, 60 years and older, throughout the state. Respondents were selected using a multistage cluster sampling procedure. The multistage cluster sampling procedure used in the research involved the following steps: (1) random selection of census tracts, (2) random selection of blocks (locations) within each tract, and (3) random selection of elderly respondents within households on selected blocks.

In the final stage of sampling, all households within 500 randomly selected locations were visited and household composition was determined. In those households with one or more persons age 60 and older, a probability sampling procedure was used to select respondents. This resulted in different (but known) selection probabilities for elderly respondents. To compensate, the data were weighted prior to analysis. We used the number of elderly residents within the household as the weighting factor.

Findings

The sample for this study consisted of 2,048 randomly selected noninstitutionalized Pennsylvania adults age 60 and over. Their residence was 53% urban, 34% suburban, and 13.4% rural. A majority (63%) were women and White (90%), and the median age was 72.8. "Some high school" was the median level of education. The majority (56%) were married, 34% were widowed, and 10% had never married or were divorced. Slightly less than one-third (29%) lived alone. The median income was $11,818, and 63% owned a car. Of the sample, 33% expressed a need for transportation services provided by community agencies offering services to the elderly.

Expressed Need for Transportation Services

As expected, those expressing a need for transportation were more likely to use transportation services, although a sizable proportion of

Table 1. Comparison of the Elderly Expressing Need for Transportation and Using Transportation Services (percentages)

	Need Transportation (n = 676)	Do Not Need Transportation (n = 1372)
User	18.5	6.4
Nonuser	81.5	93.6

NOTE: $\chi^2 = 99.99$; df = 1; $p \leq .0000$.

those expressing a need for transportation did not use any aging network transportation services (Table 1).

Those expressing a need for transportation also varied according to personal characteristics (Table 2). The elderly expressing a need for transportation differed from those not needing transportation in a number of ways, especially not owning a car and having incomes under $10,000. Percentage differences in education and urban-rural residence were not as striking for those needing and not needing transportation services, although they were still statistically significant. Also, those needing transportation were more likely to be in poorer health, older, non-White, not married, women, and living alone.

We used stepwise discriminant analysis to determine which characteristics were most significant in distinguishing between those in need and those not in need of transportation services (Table 3).

This analysis resulted in a set of eight variables—car ownership, health status, living arrangement, race, martial status, sex, age, and income—that were significant in discriminating between those in need of and those not in need of transportation service. All entering variables except age and income resulted in a significant change in Rao's V, which measures the overall separation between the groups. Thus age and income added very little to our understanding of what discriminates between those in need of and those not in need of transportation services. However, all eight variables, although significant, explained only 11.6% (canonical correlation = .34) of the variation between the two groups. Furthermore, although the resulting discriminant function correctly classified 71.6% of the cases (overall), it was not as successful in predicting those in need of service—only 42% of those in need were correctly classified, whereas 86.1% of those not in need were correctly classified.

Table 2. Comparison of Selected Personal Characteristics for Those Expressing Need and No Need for Additional Transportation

Characteristic	Need Transportation (n = 676)	Do Not Need Transportation (n = 1372)
Enabling Factors		
Income* (%)		
< $5,000	21.9	12.5
$5,000-9,999	38.2	29.8
$10,000-14,999	20.8	27.3
> $15,000	19.1	30.4
Car ownership* (%)		
yes	43.6	72.8
no	56.4	27.2
Education* (%)		
elementary	32.4	28.5
some high school	29.0	24.0
high school graduate	23.3	32.4
some college	8.6	8.8
college +	6.6	6.3
Residence** (%)		
urban	89.1	85.4
rural	10.9	14.6
Health*** (mean)	15.7	14.2
Predisposing Factors		
Age* (%)		
60-64	20.7	24.9
65-69	19.8	26.0
70-74	22.0	20.3
75-79	16.6	13.8
80+	20.9	15.0
Sex* (%)		
male	28.5	41.4
female	71.5	58.6
Race* (%)		
White	86.6	92.0
non-White	13.4	8.0

Table 2 Continued

Characteristic	Need Transportation (n = 676)	Do Not Need Transportation (n = 1372)
Marital status* (%)		
married	43.2	63.0
not married	56.8	37.0
Living arrangement* (%)		
alone	40.6	23.1
not alone	59.4	76.9

*χ^2 significance $p \leq .0000$; **χ^2 significance $p \leq .01$; ***F significance $p \leq .0000$.

Use of Transportation Services

Approximately one-tenth (10.7%) of the total sample indicated their use of transportation services for the elderly, which is only a third of the number (32.8%) who expressed a need for transportation services. The low rate of use is not unexpected though, and corresponds to what other researchers have found regarding service utilization (Harris & Associates, 1975; Powers & Bultena, 1974; Schneider, Danforth, & Voth, 1980). The elderly using transportation varied according to descriptive data (Table 4). Specifically, users of transportation services were more likely to have income under $10,000, not to own a car, to live in the city, and to have poorer health. In terms of predisposing factors, the oldest individuals, women, those living alone, and those not married were more likely to be users than nonusers.

The discriminant analysis resulted in a set of eight variables that were significant in discriminating between users and nonusers of transportation services (Table 5). The stepwise analysis resulted in this order of entering variables: need for transportation, age, car ownership, urban-rural residence, living arrangement, income, education, and health. Adding the last three variables did not result in a significant change in the separation between the groups. The entire set of eight variables only explained 7% (canonical correlation = .266) of the variation. And, although it may appear that the function is successful because it

Table 3. Discriminant Analysis to Distinguish Between Those in Need and Not in Need of Additional Transportation

Characteristic	Standardized Discriminant Function Coefficients
Enabling Factors	
income	−.07**
car ownership	.74
education	eliminated*
urban-rural	eliminated*
health	.32
Predisposing Factors	
age	−.11**
sex	−.15
race	−.19
marital status	.18
living arrangement	.31
Percentage Correctly Classified	71.6%

*F to enter function was not significant; **Change in Rao's V was not significant with addition of this variable.

correctly classifies 89% of all the cases, a closer examination reveals something different.

None of the users of transportation services (10% of the total sample) were correctly classified, whereas 99.9% of the nonusers were correctly classified. This tells us that the discriminant function does not result in accurate predictions for the user group, in which our greatest interest lies.

Discussion

We address two questions of importance in this article. First, to what extent are need, enabling, and predisposing factors significant in understanding the differences between users and nonusers of transportation services for the elderly? Second, how do enabling and predisposing factors affect the elderly's perceived need for transportation services?

The perceived need for transportation services was by and large the most powerful predictor of the use of transportation services. This finding is consistent with other studies that have examined other types of service utilization (Coulton & Frost, 1982; Wolinsky, 1978; Wolinsky

Table 4. Comparison of Selected Personal Characteristics for Users and Nonusers of Transportation Services

Characteristic	Use Transportation (n = 676)	Do Not Use Transportation (n = 1372)
Need Factor		
Expressed need* (%)		
yes	58.7	30.0
no	41.3	70.0
Enabling Factors		
Income* (%)		
< $5,000	24.8	14.5
$5,000-9,999	42.3	31.4
$10,000-14,999	21.5	25.5
> $15,000	11.4	28.7
Car ownership* (%)		
yes	36.8	66.2
no	63.2	33.8
Education (%)		
elementary	32.0	29.5
some high school	26.7	25.5
high school graduate	25.1	29.9
some college	10.2	8.5
college +	5.9	6.5
Residence* (%)		
urban	93.4	85.8
rural	6.6	14.2
Health** (mean)	16.0	14.6
Predisposing Factors		
Age* (%)		
60-64	5.6	25.6
65-69	21.8	24.3
70-74	22.8	20.6
75-79	22.8	13.8
80+	27.0	15.8
Sex* (%)		
male	26.9	38.2
female	73.1	61.8

(continued)

Table 4 Continued

Characteristic	Use Transportation (n = 676)	Do Not Use Transportation (n = 1372)
Race (%)		
White	89.8	90.2
non-White	10.2	9.8
Marital status* (%)		
married	36.1	58.7
not married	63.9	41.3
Living arrangement* (%)		
alone	46.6	26.8
not alone	53.4	73.2

*χ^2 significant $p \leq .0005$; **F significant $p \leq .0000$.

et al., 1983). Some of the enabling and predisposing factors were also significant in differentiating between users and nonusers. The enabling factors of car ownership and urban-rural residence were important discriminators. Urban residents and those without a car were more likely to use transportation services for the elderly. Indeed, previous studies have shown that urban residents have greater access to specialized transportation services since the cost of providing service to rural areas is especially high (McKelvey, 1979). Furthermore, the level of car ownership is higher among rural than urban elderly (Ecosometrics, Inc., 1981). This higher level of car ownership is probably because of the dearth of transportation alternatives for rural residents (McGhee, 1983). Thus it is predictable that elderly urban residents are less likely to own cars and are therefore more likely to use the transportation services available to them.

Two of the predisposing factors also entered into the discriminant function: age and living arrangement. Age was an even more powerful predictor than the enabling factors of car ownership and residence. This finding supports the findings of others that being older and living alone makes one more reliant on specialized transportation services, perhaps because these individuals have fewer social supports. The other predisposing factors, however, did not enter into the discriminant function as we might predict based on the social support argument. Sex, marital status, and race were all eliminated. These variables may not

Table 5. Discriminant Analysis to Distinguish Between Users and Nonusers of Transportation Services

Characteristic	Standardized Discriminant Function Coefficients
Need Factors	
need transportation	−.52
Enabling Factors	
income	−.16**
car ownership	.24
education	.11**
urban-rural	.19
health	.09**
Predisposing Factors	
age	.39
sex	eliminated*
race	eliminated*
marital status	eliminated*
living arrangement	.16
Percentage Correctly Classified	89%

*F to enter function was not significant; **Change in Rao's V was not significant with addition of these variables.

provide additional information beyond that contained in the other variables.

Although some of the enabling and predisposing factors were significant in discriminating between users and nonusers, as indicated above, the need factor was the most powerful discriminator. It is important to see how the enabling and predisposing factors are linked to the need factor. The enabling factor of car ownership was the most powerful predictor of expressed need (a subjective measure). This finding is understandable since car ownership, in other instances, would be used as one objective indicator of transportation needs. The health variable also proved to be a significant enabling factor in differentiating between those expressing or not expressing a need for transportation. This finding is interesting since health was not as significant a predictor of use of services. McGhee (1983) also found one indicator of health (self-rated health) to be significant in differentiating between those needing and those not needing transportation.

All of the predisposing factors—living arrangement, race, marital status, sex, and age—were significantly related to perceived need. This

finding lends some support to the notion that sociocultural differences influence differences in perception of need. However, it must be kept in mind that, together, the significant enabling and predisposing factors only accounted for 11.6% of the variation in perceived need. Although this proportion of explained variation is consistent with that found in other studies of health service needs (Wolinsky, 1978; Wolinsky et al., 1983), it means there is still a sizable proportion of unexplained variation. This unexplained variation is also evident in the discriminant function of users and nonusers, in which only 7% of the variation is explained.

Overall, it appears that Anderson's model of need, enabling, and predisposing factors (as conceptualized here) does not provide sufficient discriminatory power in our study of the elderly's need for and use of transportation services. Thus sweeping policy implications aimed at restructuring the service delivery system are unjustified at this time given the large amount of unexplained variance. Other factors must be introduced and examined to determine their influence on need and use of special transportation services. Others have suggested that service utilization partly reflects basic attitudes toward particular services that persist and that past utilization can explain a sizable proportion of the variation in current utilization of services (Cantor & Meyers, 1975; Coulton & Frost, 1982; Newcomer, 1976; Powers & Bultena, 1974).

Indeed, the overall low utilization rate for specialized services for the elderly may be partly explained by the negative attitude (and/or lack of awareness) toward these services. For example, some of the transportation services provided within the aging network may not have met the expectations of the users or potential users. In Pennsylvania, lottery funds are used to support transportation services provided through the aging network. This funding requires use of a "shared-ride, advance registration" system (personal communications: J. Detman, Pennsylvania Department of Aging, May 1987; and V. Whisker, Erie County Department of Human Services, May 1987). Because of these requirements, many elderly people prefer not to use the service. Moreover, among many elderly persons today there is a desire to remain independent as long as possible; therefore, even though they may need a service and recognize this need, they will exhaust all other resources before turning to a public agency for help.

Although not definitive, some implications for policy and future research can be drawn from this study. First, we do know that need for service is a powerful predictor of its use. Therefore, as need grows so will

the rate of use. However, a sizable proportion of those in need do not use a service either because they are not aware of it, have a negative attitude toward it, or it is not available to them. Any one of these factors may play a role in the use of transportation services. Future research should focus on this questions: What other factors influence service use (in addition to those identified in this study) for individuals with an identified need? Such research would have implications of marketing these services to those in need.

This study has pointed to the discrepancy between the elderly in need of transportation services and those who actually use them. There are elderly people within the community who could benefit from specialized transportation services yet they do not use what is available. We did identify some of the factors that are significant in identifying those in need of specialized transportation and those who use it. And the Anderson model may prove to be an efficient way of uncovering potential riders, particularly if additional factors are included as specific enabling and predisposing factors. Furthermore, it may be important to go beyond the needs of the elderly and their personal characteristics (in terms of enabling and predisposing factors) by identifying their attitudes toward specialized transit services as well as characteristics of the service delivery system (Krout, 1983b). Analysis of this type should provide a fuller understanding of the use of transportation services. Without a better understanding of the factors associated with use of transportation services by the elderly there will continue to be a mismatch between service users and those in need. This clearer understanding of service use is needed "if service providers are to design, implement and operate programs that reach target populations and make the most efficient use of limited resources" (Krout, 1983a, p. 504).

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