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Determinants of In-Home Health and Support Service Utilization for Rural Older Adults

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DETERMINANTS OF IN-HOME HEALTH AND SUPPORT SERVICE UTILIZATION FOR RURAL OLDER ADULTS

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ABSTRACT

This study examined the relationships between rural older adults' likelihood of receiving four in-home health and support services (personal emergency response system, home-delivered meals, homemaking, and chores) and (1) predisposing characteristics (gender, race, age, education level, and marital status); (2) enabling characteristics (residence, living in an extended family, living alone, and unavailability of informal [family] caregivers); and (3) need characteristics (physical and cognitive function). We adapted these three sets of characteristics from Andersen's socio-behavioral model. The study sample consisted of 553 older adults in rural Arkansas and enrolled in a Medicaid waiver program for social and community-based pro-
grams. The overall response rate was 77 percent. The sample lived in three culturally
distinct, multi-county rural subregions of Arkansas—the Lower Mississippi Delta,
the Ozark Highlands, and the Coastal Plains. Multivariate analyses (ordinary least
squares and logistic regression), revealed a significant association between an
increased service use and caregiver unavailability, difficulties performing activities
of daily living, cognitive impairment, residing in the Ozark Highlands region as
compared to the Coastal Plains region, and the interaction effect of race and cogni-
tive impairment. Further results suggested some commonality, but also considerable
variation depending on the service. We discuss findings in the context of the current
reorganization of health care financing mechanisms. Block grants to states could
reduce the funding for aging programs, which in turn, might reduce the indepen-
dence of older Americans and increase nursing home utilization and out-of-pocket
costs for families.

INTRODUCTION

The number and proportion of Americans ages 65 and older (older adults) will
increase well into the twenty-first century (Wolinsky and Johnson 1991). The
number and proportion of older adults in rural regions is expected to increase at a
similar rate (see Bull 1993; Krout 1994). The 1990 U.S. census data revealed that
8.2 million older adults live in rural (or nonmetropolitan county) areas (26% of the
total elderly population) (Klout 1994). We use the term “rural” collectively “to refer
to a continuum of residential environments outside of cities and suburbs”
(Krout 1994, p. 4). Further, significant regional differences exist in the proportions
of rural older adults. For instance, in 1990 nearly one-half (43%) of the U.S. rural
older adult population lived in the South. Many southern older adults, especially
African Americans and those impoverished, have poor physical and mental health
and need expensive hospitalizations and nursing home care (Bull 1993; Coward,
McLaughlin, Duncan, and Bull 1994; Krout 1994).

Community-dwelling rural older adults also are disadvantaged when it comes to
in-home health and support services (Coward et al. 1994; Krout 1994; Magilvy,
Congdon, and Martinez 1994). Research suggests that this may stem from limited
access to services (Coward et al. 1994; Rabiner 1995). More specifically, home-
delivered meals and homemaker services are not common in rural regions
“because issues of time, distance, and isolation make their cost (and hence the
prices) prohibitive” (Coward et al. 1994, p. 30). Even though we know that rural
older adults as compared to urban older adults are less likely to receive in-home
health and support services, we do not know whether services or their use vary
across rural subregions. We use the term in-home health and support services to
refer to free services (personal emergency response system, home-delivered
meals, homemaking, and chores) provided to older adults outside of institutions
by an Arkansas Medicaid waiver program, established to preserve the indepen-
dence of older adults (Chappell 1994; Dwyer, Lee, and Coward 1990; Hooyman
and Kiyak 1996, p. 344). These four services support older adults who need help maintaining their homes or conducting personal activities of daily living (ADLs) because of physical or cognitive impairments and those who have become too “frail to perform these tasks but are not so impaired as to move to a congregate living situation” (Hooyman and Kiyak 1996, p. 344). In general, in-home health and support services are perceived as less costly than hospital and nursing home care and enable older adults to continue living at home while receiving care (Krout 1994).

However, the medical sociological literature lacks guides to policy formation and implementation for in-home health and support services, particularly empirical data on factors that impede service use by older adults in a Medicaid waiver program in the rural South (Bull 1993; Nelson 1994). The present study examines the relationships between rural older adults’ likelihood of receiving four in-home health and support services and sociodemographic, familial, and structural and physical condition factors, which we derived from Andersen’s (1968, 1995) sociobehavioral model (SBM) of service utilization, a conceptual framework that aims to “discover conditions that either facilitate or impede utilization” (Andersen 1995, p. 4). Medical sociologists have virtually ignored service utilization and few sociological publications have addressed it (see Pescosolido and Kronenfeld 1995).

The study sample consisted of older adults living in rural areas of Arkansas and enrolled in a Medicaid waiver program. The rural context of the present study is unique because we examine variations between rural regions, rather than examining rural-urban differences, the focus of much research on older adults (e.g., see Himes and Ruthrough 1994; Rabiner 1995).

Findings from the study could demonstrate the importance of certain structural and social factors that predict service use. Pescolosido and Kronenfeld (1995, p. 15) pointed out that studies implementing the SBM have neglected the importance of social factors and have promulgated, instead, the “nature and severity of health problems.” Moreover, rural communities could benefit from this study’s results because their budgets are shrinking and access to services is becoming increasingly difficult (Coward et al. 1994; Krout 1994).

Rural Context

The dissimilarities between rural and urban life, especially regarding beliefs, values, and lifestyles, have been classic objects of study in sociology. For instance, rural life guards important societal and familial values (Gerristen, Wolfsensperger, and Van Den Heuvel 1990). Receiving in-home health and support services may be incompatible with the social structure and culture of rural areas. Rural older adults and their families often value independence, which may serve as an impediment to service utilization because it leaves the impression that they are depending on an outsider from a government agency to maintain independence.
(Magilvy et al. 1994). However, the medical sociological literature has not established this proposition. In fact, the medical sociological literature lacks empirical data on the sociodemographic, familial, and structural and physical condition factors that impede service use in rural areas.

Arkansas is an excellent laboratory to generate knowledge to guide health policymakers and program planners in developing and evaluating in-home health and support services for older adults in the rural South (Krout 1994). Although 34 percent of older Arkansans resides in 11 metropolitan (urban) counties, the majority (66%) live in the 64 nonmetropolitan (rural) counties (Killian, Farmer, Miller, and Voth 1993). Arkansas mirrors the diversity of rural America in general and the rural South specifically (Holman, Farmer, Kirby, and Dixon 1994). Arkansas ranks sixth among states with 19.5 percent of its adult population ≥ 65 years of age; and sixteenth in proportion of minority older adults (12.2%) (Cockerham 1991, pp. 25-26; Coward, Vogel, Duncan, and Uttaro 1995). Arkansas also ranks fifth among states and second among Southern states, with 28 percent of older adults having incomes below poverty. More specifically, 30 percent (or 105,000) of older Arkansans have incomes below the poverty level, while 60 percent (or 203,000) have incomes 200 percent of the poverty level. Nearly one in four (22%) of the older adults who live below the poverty level reside in one of the three rural regions (Killian et al. 1993). Since Arkansas has a significant proportion of rural older adults who are impoverished, separating Arkansas into heterogeneous subregions according to a criterion discussed below enables us to make important comparisons.

The inclusion of different rural Arkansas regions in this research is certainly pertinent because of the great diversity between rural regions, especially within one state. In fact, there is no single rural America, but many rural Americas (Farmer, Clarke, and Miller 1993; Holman et al. 1994). Moreover, rural areas differ along socio-environmental parameters (Holman et al. 1994) and the health status of older adults differs significantly across rural regions (Coward et al. 1994; Krout 1994).

To examine the variations in rural Arkansas, we employ Fuguitt and Beale’s (1978, 1993) typology. This typology delineates the U.S. rural counties into 26 subregions, based on the State Economic Area system for the Census Bureau (Fuguitt and Beale 1993). Fuguitt and Beale delineated homogeneous subregions based on American economic and social history and culture (Fuguitt and Beale 1978, 1993; Holman et al. 1994). Arkansas has three distinct subregions, the Lower Mississippi Delta, Ozark Highlands, and Coastal Plain. The Mississippi Delta (Delta) region consists of 16 counties, with 15.5 percent of its population being older adults, many of whom are African Americans in extreme poverty; the Ozark Highlands (Ozark) region consists of 35 counties, with 18.6 percent of its population being older adults, many of whom are white and have incomes considerably higher than the poverty level; the Coastal Plain region contains 12 counties, with 16.3 percent of its population being older adults and a high proportion of
African Americans, but a notably lower poverty rate than the Delta (Holman et al. 1994). Nearly all (30 of 35) Ozark counties are “destination retirement” counties (Fuguitt and Beale 1993). Of the three Arkansas regions, only the Ozark region has experienced a net growth in the number of older adults from 1980-1990 (Fuguitt and Beale 1993). Conversely, the older adult population declined in the other two regions, especially the Delta (Fuguitt and Beale 1993).

Medicaid Waiver Program

Older adults, compared to any other age group, account for a greater total of Medicaid expenditures (Hooyman and Kiyak 1996, p. 529; Wolfe 1993), because Medicaid is the primary source of funding for nursing home care. To offer older adults more long-term care options and reduce expensive nursing home stays, Congress established in 1981, and updated in 1990, the Omnibus Budget Reconciliation Act. Under this act, the Home and Community-Based Care Program offers waivers as options to older adults who have physical or cognitive impairments, are eligible for Medicaid, and would require more costly care without waiver services (Hooyman and Kiyak 1996, p. 530). Medicaid assistance not only helps the older individual, especially those living alone but also helps defray costs to and burdens from families caring for disabled older adults. Medicaid provides home care to 17,000 older Arkansans through its home and community care services program, an effective approach demonstrated to help impoverished, older Arkansans remain in their homes. Arkansas Medicaid in-home health and support services cost about half as much as nursing home care (Sanderson 1995).

Conceptual Framework

The conceptual framework we used for this study is a modified version of Andersen’s (1968, 1995) SBM of health service utilization. While originally developed to study predictors of medical utilization, the framework also improves understanding the determinants of use of other types of services (Glasgow 1995; Logan and Spitzé 1994). Andersen’s SBM (or adapted versions of it) is the most widely used conceptual framework for studying in-home health and support services among the elderly (Parris-Stephens 1993; Penning 1995a, 1995b; Rabiner 1994; Wolinsky 1990; Wolinsky and Johnson 1991) and guiding the analyses. The SBM purports to examine specific illness behavior and overall use of health care services (Pescosolido and Kronenfeld 1995). The SBM views service utilization as a type of individual behavior that hinges on both personal factors and one’s social environment and community (Glasgow 1995). The SBM specifies and incorporates three classes of structural and predictor characteristics or factors (predisposing, enabling, and need) that are analytically distinct, though not imperatively mutually exclusive (Glasgow 1995). Regardless of its limitations due to its structural approach, the SBM allows the examination of “both the personal and
social resources of older adults as predictors of service use, rather than focusing on one or the other of these domains" (Parris-Stephens 1993, p. 264).

Predisposing Factors

Predisposing characteristics are an amalgamation of “social-psychological factors, socio-cultural characteristics, and basic socio-demographics” (Pescosolido and Kronenfeld 1995, p. 14) that precede an illness episode. In the present study, the gender, race/ethnicity, age, level of education, and marital status of respondents reflect predisposing characteristics. Collectively, predisposing factors have not been strong predictors of service use. A critical review of the literature on the use of in-home health and support services reveals inconsistencies in age, gender, race, marital status, and level of education as factors influencing service use (for reviews please see Calsyn and Roades 1993; Chappell 1994). For instance, from a cross-sectional study of a national sample of 5,151 older adults, Wolinsky and Johnson (1991) found that no associations between predisposing factors were associated with home-health service (meal delivery, homemaker, health aide, and visiting nurse services). Since many disagree over what effects to expect and empirical results have inconsistencies, we did not hypothesize any relationships between the predisposing factors and service use.

Enabling Factors

Enabling factors pertain to access to services and social and economic resources that can affect service use (Bass, Looman, and Ehrlich 1992; Glasgow 1995). Traditionally, researchers have operationalized enabling characteristics with income and health insurance coverage (see Parris-Stephens 1993; Pescosolido and Kronenfeld 1995). However, since our study included older adults who are poor and depend on Medicaid, we did not assess respondents’ level of income and health insurance coverage. Instead, following recent studies (see Glasgow 1995; Logan and Spitze 1994; Wolinsky and Johnson 1991) we assessed the enabling component by the respondents’ living arrangements, family caregiver availability, and the three rural areas of residence in Arkansas. Our use of the three different rural areas of Arkansas, regarded as contextual variables, are indicators of the external environment, and have ignored them in other implementations of the SBM (cf. Glasgow 1995; Rabiner 1995). Given the considerable racial, ethnic, and cultural variations within rural areas of Arkansas, it is important to consider the rural variations when examining the utilization of in-home health and support services (Rabiner 1995).

Research has found evidence of both compensatory processes (where family support substitutes for formal care) and bridging (where the family members help link older adults to services) (Logan and Spitze 1994). The unavailability of family members serving as caregivers increases the use of in-home health and support services (Logan and Spitze 1994). An erroneous assertion holds that rural older
adults have access to a stronger family network. However, little empirical evidence supports this assertion. Stoller and Lee (1994) argue that rural older adults rely on their family members to meet their physical needs by default because formal services are unavailable or insufficient. It is likely that these family members are in a pivotal position to promote the use of services and provide a source of information and support to older adults. Additionally, family members may encourage their rural older family members to use services so that the former may be alleviated from responsibilities and burden (Rabiner 1995). Therefore, we expected to find that greater levels of family caregiver unavailability to be associated with higher levels of service use.

Need Factors

Need (for care) factors refer to the aspects of the illness or impairment for which services are sought (Bass et al. 1992). Research suggests need factors indicate a dimension of increasing dependence that often accompanies aging (see Glasgow 1995; Logan and Spitze 1994). We examined the professionally evaluated needs of older adults from the interviewers’ evaluations of physical and cognitive function using multi-item measures. Research has consistently found a significant positive relationship between levels of physical impairment and use of in-home health and support services (Glasgow 1995; Mauser and Miller 1994; Penning 1995b; Wolinsky and Johnson 1991). Likewise, research has found a significant, positive association between higher levels of cognitive impairment and use of in-home health and support services (Wolinsky and Johnson 1991). In addition, Wolinsky and Johnson (1991), in their national study of older adults, found significant interactions of race, need factors, and use of health and in-home health services, which supports the view that older adults’ demand for services is in response to health status and race/ethnicity. Missing from their findings, however, is a clear and consistent pattern among the interaction effects. They found that for African Americans, having greater levels of cognitive impairment and upper body limitations resulted in the use of more in-home health services. Therefore, the present study tested for similar interaction effects to determine if similar results emerged.

Studies that have implemented the SBM with samples of older adults reveal a consistent pattern. In general, the entire SBM accounts for modest portions of variance (i.e., 25-35%) in total service use (Parris-Stephens 1993; Pescosolido and Kronenfeld 1995). We did not intend to test, yet again, the explanatory efficacy of the SBM, but to rather examine the relative contributions of the predisposing, enabling, and need factors on overall service utilization. Examining the relative contributions of the three factors on overall service utilization is important because of inconsistent evidence on service utilization. Need for services has, for the most part, had the strongest correlation with overall service utilization, although predisposing and enabling factors do affect service use (Pesco-
solido and Kronenfeld 1995; Parris-Stephens 1993; Wolinsky and Johnson 1991). The predisposing, enabling, and need variables specified in the model could be translated into programmatic initiatives. For instance, predisposing variables help identify the target groups of impoverished older adults and suggest modifications in the in-home and support service delivery system to make it responsive to their needs (Fosu 1992).

RESEARCH QUESTIONS AND HYPOTHESES

Based on this literature review and guided by the SBM, we asked the following research questions:

1. What are the correlates of in-home health and support service utilization by older adults residing in different rural subregions?
2. Do the patterns and correlates vary depending on the particular type of service involved?
3. Does the importance of race as a correlate to overall and individual type of service use vary depending on the level of physical and cognitive impairment?

Hypothesis 1. Use of in-home health and support services will vary by rural subregion. We did not hypothesize a priori which region(s)—Mississippi Delta, Ozark Highland, and Coastal Plain—would be more or less likely to use services.

Hypothesis 2. The unavailability of informal (family) caregivers will be positively associated with a greater overall service use and with various types of service use.

Hypothesis 3. Higher levels of physical and cognitive impairment will be positively associated with service use.

Hypothesis 4. The combination of being African American and having higher levels of physical and cognitive impairment will be associated with overall service use and with various types of service use. We did not hypothesize a priori the direction of the interaction effects.

METHODS

Sample

The population consisted of all noninstitutionalized community-dwelling individuals who: (1) were 65 years of age or older; (2) resided in one of the 64 rural
counties in Arkansas; and (3) had an incomes up to 300 percent of the federal poverty level (the level of income below which individuals are eligible for Medicaid in a nursing home). The sampling frame consisted of all eligible persons on the Arkansas Department of Human Services, Division of Aging and Adult Services Eligibility list.

From this sampling frame, we selected participants using clustering sampling techniques to assure that the geographic and population distribution of participants corresponded to the three rural subregions (Fink 1995). We then drew random samples within the three rural subregions. Based on interviewers’ evaluations, we considered a total of 819 older adults eligible for the study. We completed a total of 631 interviews, yielding a response rate of 77 percent. We found no significant differences in terms of age, gender, and race/ethnicity between those who participated in the study and those who refused.

Registered nurses (RNs) evaluated participants through home visits. The RNs employed a long-term care assessment form and informed the recipients or their legal representatives of any feasible alternatives available under the waiver. The form included: (1) demographic information, (2) current diagnoses, (3) functional abilities, (4) disabling conditions (both physical and cognitive), (5) living arrangements, and (6) informal caregiver availability. Prior to data collection, we conducted a pilot test with a revised interview schedule on a subsample of 33 older adults, who did not participate in the larger study. Not only did the RNs make the professional assessments of the participants, but they also played the role of case manager by making the final decision, on whether the older adult would receive in-home health and support services. There was no significant difference in the availability of these services across the three rural subregions.

We had complete data for 553 participants (88% of the 631 participants who completed interviews) and only included them in the analyses. Even though the total proportion of missing data (12%) was more than ideal, we found no significant differences between participants who completed the interviews and those having complete data on age, gender, and race/ethnicity. We do not know differences on other variables, such as physical and cognitive status. The generalizability of the study sample to older Americans who have different economic backgrounds and reside in urban areas and other geographical locations is unknown. However, the study sample yields one of the few population-based samples available of a select sample of older adults who are eligible for a Medicaid waiver program and reside in rural areas of one of the poorest states in the United States (Cockerham 1991). In this study, for the multi-items scales, where variances differed substantially, individual variables were first standardized to unit variance prior to creation of the indexes (Kosloski and Montgomery 1995). Summary scores were derived by adding together the individual items (Penning 1995a).
MEASURES

In-home Health and Support Services

RNs reported whether or not the care recipients received services—personal emergency response system, home-delivered meals, homemaking, and chores—in their household 12 months before the interview. They scored responses to each item dichotomously as 1 (received) or 0 (did not receive). As a methodological note, we have no conclusive verification that receipt of service translated into utilization. However, this study followed a similar and recent one (Penning 1995a) that used receipt of home-health services as a proxy for utilization. A vast majority (87%) received homemaking services, while more than one-half (52%) received a personal emergency response system (PRS), one-third received home-delivered meals, and less than one-in-four received chore services (19%).

The overall number of services ranged from zero to four with a mean of 2.1 (standard deviation [SD] = 1.01). Unlike most of the previous research on service utilization, the distribution of the total number of services used did not significantly depart from normality (skewness = -.016; kurtosis = -.599). Nearly all (94%) of the respondents received one or more of the services, with 62 percent receiving two or three services, and 34 percent using more than three services.

Predisposing Characteristics

We measured gender, race/ethnicity, and marital status with binary variables (gender [1 = female, 0 = male], race [1 = African American, 0 = White/Caucasian], and marital status [1 = not married, 0 = married]). We represented age (measured by single years) and education (number of years completed) as continuous measures. The study sample was 74 percent female, 27 percent African American, and 72 percent not married. Their ages ranged from 65 to 107, with a mean of 77.8 years (SD = 7.4). Years of education ranged from zero to 17 years, with a mean of 7.1 years (SD = 3.4).

Enabling Characteristics

Enabling characteristics included living arrangement, rural area of residence, and availability of family caregivers. We asked respondents whether they lived alone (1 = yes; 0 = no) and whether they lived in a household that consisted of family members other than their spouse (multigenerational family context) (1 = yes; 0 = no). Approximately one-half (48%) lived alone while 16 percent lived in a multigenerational context.

We represented rural area of residence by two dummy variables for Delta region and Coastal Plains region status (each coded 0 and 1), with Ozark region used as the omitted, or referent, category. Nearly one-half (44%) of the respondents
resided in the Delta region, while 31 percent lived in the Coastal Plain region, and one-fourth in the Ozarks Highlands region. We assessed the unavailability of family caregivers by how often (1 = never; 2 = some of the time; and 3 = all the time) help/assistance was unavailable for: cooking/fixing meals, shopping, cleaning, using transportation, bathing, dressing, toileting, and moving in/out of bed/chairs. Principal components factor analysis demonstrated that these items formed one factor. We then combined these variables to form a composite index with high scores representing a greater likelihood that family caregivers were unavailable. Index scores ranged from 8-24, with a mean score = 12.6 (SD = 6.0). The internal consistency of this index is excellent (Cronbach’s alpha = .96).

Need Characteristics

RNs used multi-item measures to assess the need for assistance with activities of daily living (ADLs) and instrumental activities of daily living (IADLs). We used adapted versions of an ADL instrument (Katz, Ford, Moskowitz, Jackson, and Jaffe 1963) and IADL instrument (Lawton and Brody 1969), following results of principal components factor analysis. These results yielded two distinct factors, consistent with the original instruments, and each comprised four items: (1) IADL index, assistance needed with cooking/fixing meals, shopping, cleaning, and using transportation; (2) ADL index, assistance needed with bathing, dressing, toileting, and moving in/out of bed/chairs. We coded the items, where 1 = no help needed, 2 = some help needed, and 3 = cannot perform. We combined the four items representing IADL and ADL assistance into separate, composite indexes ranging from 4 to 12. The IADL index had a mean score of 7.8 (SD = 1.0), while the ADL index had a mean score of 7.6 (SD = 2.2). High scores represented a greater need for assistance. The Cronbach’s alpha is .89 for the IADL index and .85 for the ADL index.

We employed the Mental Status Questionnaire (MSQ) (Kahn, Goldfarb, Pollack, and Peck 1960) to assess the level of cognitive impairment. The MSQ contains 10 items that focus on orientation of time, place, and person, asking for age, date of birth (month, day, and year), current date (month and year), the current and previous president, and present street address and location. The MSQ is scored in terms of errors made, with omissions counted as errors. Increasing numbers of errors are associated with more severe chronic cognitive impairment ratings. Each question receives equivalent weighting (one point) for a sum of 10 points (Pearson, Cherrier, and Teri 1989). The reliability and validity of the MSQ are well documented (see Fillenbaum 1980; Fillenbaum, Heyman, Williams, Prosnitz, and Burchett 1990; Gatz, Reynolds, Nikolic, Lowe, Karel, and Pedersen 1995; Zarit, Miller, and Kahn 1978). The range of scores for this sample was 0 to 10, with a mean of 3.4 (SD = 3.5). The internal consistency of the MSQ is quite good (Kuder-Richardson, KR²₀ = .91; analogous to the Cronbach’s alpha, but used when items are measured dichotomously; see Kaplan 1987).
ANALYSES

We perform three stages of data analysis. First, we used hierarchical regression analyses (ordinary least squares) to examine the relative contributions of predisposing, enabling, and need characteristics. This procedure allows for the “shared variance between being assigned to the variable category (i.e., predisposing, enabling, etc.) that occurs early in the model” (Calsyn, Roades, and Klinkenberg 1995, p. 38). Consistent with previous research (see e.g., Penning 1995a; Wolinsky and Johnson 1991), we inserted predisposing variables into the analyses first, followed by enabling variables and, lastly, need variables. Moreover, we justified the ordering of variables based on assumptions about time precedence between variables (e.g., predisposing variables as a group occur before other factors) (Calsyn et al. 1995). We realized, however, that some of the need variables may have preceded some of the enabling variables (e.g., living arrangement and caregiver unavailability). Therefore, we presented the full model for which we made no assumptions about the ordering of the predisposing, enabling, and need variables (see columns 3 and 4 in Table 1) (Calsyn et al. 1995). Second, because the receipt of particular types of services were dichotomous measures, and the independent variables were a combination of categorical and continuous measures, we employed logistic regression analysis.

Third, we examined interactions involving race/ethnicity and cognitive impairment and race/ethnicity and difficulties performing ADLs and IADLs with product terms created by multiplying cognitive impairment and difficulties performing ADLs and IADLs by the dummy variable (African American) representing race/ethnicity. We entered these interaction terms into the analyses in a separate step. Thus, we introduced the interaction terms into the analyses to account for variance above and beyond that for which the original predictors accounted (Couente and Glandon 1991). If significant interactions did, in fact, emerge, we redid the analyses including only significant interaction terms (Penning 1995b). Thus, the final stage of analyses consisted of a simultaneously entered single regression (OLS and logistic) equation with all predisposing, enabling, and need characteristics and all significant product terms. Dropping nonsignificant interactions reduced potential intricacies of collinearity inherent with interaction terms (Bass et al. 1992). We evaluated the contribution of each term on the basis of increments in the amount of variance explained and evaluated using a hierarchical $F$ test (Penning 1995a).

For interpreting the logistic regression results, we reported the exponentiated regression coefficients. These coefficients represented the effect of a change in the odds of receiving an in-home or support service given a one-unit increase in the independent variable, adjusting for all other variables in the model. We interpreted ratios involving ordinal- or interval-level independent variables as the odds of accepting a service with each unit increase in the independent variable (Coward et al. 1995; Logan and Spitze 1994). For missing data, we used a listwise deletion procedure. Further, we employed standardized statistical techniques to assess the
assumptions of the OLS and logistic techniques. No violations of assumptions occurred.

RESULTS

Total Number of Services Received:
OLS Regression Results

Table 1 describes the results of the regression of the total number of in-home and support services received on predisposing, enabling, and need factors, as well as two interactions involving cognitive impairment, difficulties performing ADLs, and race/ethnicity. Enabling factors accounted for the most variance (15%), followed by need factors (9%), and predisposing factors (4%).

In terms of predisposing factors, age was negatively associated with total number of services received. However, when we added the enabling factors to the equation, age no longer had a negative significant effect. Further, when we incorporated the enabling factors into the model, we found living alone and high levels of the unavailability of family caregivers to be statistically significant and associated with more extensive in-home health and support service use. These enabling variables increased the amount of variance explained by 15 percent (to 19%).

Health-related need had the strongest associations with total number of services received. Those with greater physical disability (in terms of basic ADLs) and lower levels of cognitive impairment, adjusting for the effects of predisposing and enabling characteristics, had greater receipt of services. The need characteristics caused living alone to lose its significance, left the family caregiver unavailability index unchanged, and produced a negative association between the Coastal Plains region dummy variable and total number of services. Also, the interaction between cognitive impairment and race/ethnicity emerged as significant, while the interaction between ADL difficulties and race/ethnicity did not. Specifically, the results point to the significant negative interaction between being African American and having cognitive impairment. For African-American respondents, having higher levels of cognitive impairment was associated with fewer total number of services. The inclusion of these interaction terms into the equation increased the variance explained nominally by 0.6 percent (to 28.2%).

Variation by Type of Service

To conserve space and for clarity to the reader, we present only the significant odds ratios for the four separate logistic regression models (the logistic regression coefficient and standard error for each independent variable are available upon request from the authors). The results suggested some commonality but, also considerable variation depending on the service.
Table 1. Ordinary Least Squares Regression of Number of In-Home Health and Support Services on Predisposing, Enabling, and Need Factors

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<td>-.086</td>
<td>-.031</td>
</tr>
<tr>
<td>Lives Alone</td>
<td>.317</td>
<td>.157</td>
<td>.198</td>
<td>.098</td>
</tr>
<tr>
<td>Caregiver Unavailability</td>
<td>.056</td>
<td>.331</td>
<td>.050</td>
<td>.297</td>
</tr>
<tr>
<td>Delta Region</td>
<td>-.069</td>
<td>-.029</td>
<td>-.121</td>
<td>-.051</td>
</tr>
<tr>
<td>Coastal Plains Region</td>
<td>-.209</td>
<td>-.083</td>
<td>-.242</td>
<td>-.097</td>
</tr>
<tr>
<td>Need Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADL Difficulties</td>
<td></td>
<td></td>
<td>.125</td>
<td>.267</td>
</tr>
<tr>
<td>IADL Difficulties</td>
<td></td>
<td></td>
<td>-.021</td>
<td>-.022</td>
</tr>
<tr>
<td>Cognitive Impairment</td>
<td></td>
<td></td>
<td>-.087</td>
<td>-.296</td>
</tr>
<tr>
<td>Interactions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive Impairment X African American</td>
<td></td>
<td></td>
<td>-.074</td>
<td>-.183</td>
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<tr>
<td>ADL Difficulties X African American</td>
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<td></td>
<td>-.056</td>
<td>.196</td>
</tr>
<tr>
<td>Intercept</td>
<td>2.831</td>
<td>.041</td>
<td>1.766</td>
<td>.187</td>
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<tr>
<td>$R^2$ (Adjusted)</td>
<td>3.534</td>
<td></td>
<td>7.815</td>
<td></td>
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</tbody>
</table>

Notes: ADL = Activities of Daily Living; IADL = Instrumental Activities of Daily Living. Ozark Highlands Region is the referent category.  
* p < .05; ** p < .01; *** p < .001.
Only two significant effects across services emerged. Higher age were negatively associated with a 4 percent decrease \( p < .01 \) in the likelihood of receiving meals. Additionally, being African American was associated with a 51 percent decrease \( p < .01 \) in the likelihood of receiving PRS.

Among the enabling factors, living alone was strongly correlated with receipt of PRS and increased the odds of receiving a PRS by 377 percent \( p < .001 \). Each one-unit increment in the caregiver unavailability index was associated with (1) an 11 percent increase \( p < .01 \) in the odds of receiving chore services; (2) a 6 percent increase \( p < .05 \) in the odds of receiving homemaking services; and (3) a 5 percent increase \( p < .01 \) in the odds of receiving meals. In addition, some evidence emerged for variations across the three rural subregions by types of service. Residence in the Delta region was associated with: (1) a 147 percent increase \( p < .05 \) in the odds of receiving chore services; (2) a 57 percent increase \( p < .05 \) in the odds of receiving a PRS; and (3) a 55 percent decrease \( p < .01 \) in the likelihood of receiving homemaking services. Residence in the Coastal Plains region was associated with: (1) a 235 percent increase \( p < .001 \) in the odds of receiving homemaking services; (2) a 87 percent decrease \( p < .001 \) in the likelihood of receiving chore services; (3) a 55 percent decrease \( p < .01 \) in the likelihood of receiving a PRS; and (4) a 45 percent decrease \( p < .05 \) in the odds of receiving home-delivered meals.

For need characteristics, older adults’ need for assistance to perform ADLs rather than IADLs appeared to matter more in the likelihood of receiving services. In other words, each one-unit increment in the ADL difficulties index was associated with: (1) a 39 percent increase \( p < .01 \) in the likelihood of receiving chore services; (2) a 13 percent increase \( p < .01 \) in the odds of receiving a PRS; and (3) a 9 percent increase \( p < .05 \) in the likelihood of receiving meals. Cognitive impairment was significant with three services (PRS, homemaking, and chore). Specifically, each one-unit increment in the cognitive impairment measure was associated with: (1) a 21 percent decrease \( p < .001 \) in the odds of receiving chore services; (2) a 13 percent decrease \( p < .001 \) in the odds of receiving a PRS; and (3) a 9 percent decrease \( p < .05 \) in the odds of receiving homemaking services.

Interaction Effects

Cognitive impairment and race/ethnicity and ADL difficulties and race/ethnicity receipt of a PRS were significant (see Table 2). The two interaction effects resulted in a significant improvement (chi-square = 7.37, df = 2, \( p < .05 \)) in model fit from the model without the interaction effect (model chi-square = 145.293, df = 13 to model chi-square = 152.662, df = 15). The results in Table 2 suggested that the impact of being African American on the odds of receiving a PRS changes at each level of the ADL difficulties and cognitive impairment indexes. However, it is difficult to get an instinctive sense for these relationships by focusing solely on the information presented in Table 2 (Krause 1995).
Table 2. Logistic Regression of Use of Personal Emergency Response System Service on Predisposing, Enabling, and Need Factors Including Interactions with Cognitive Impairment Level

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE</th>
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<tr>
<td>Predisposing Variables</td>
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<tr>
<td>Female</td>
<td>.258</td>
<td>.260</td>
</tr>
<tr>
<td>African American</td>
<td>-1.958</td>
<td>.764*</td>
</tr>
<tr>
<td>Not Married</td>
<td>-2.06</td>
<td>.324</td>
</tr>
<tr>
<td>Age</td>
<td>-0.005</td>
<td>.014</td>
</tr>
<tr>
<td>Education</td>
<td>.048</td>
<td>.033</td>
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<td>Enabling Variables</td>
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<td>Multigenerational Family Context</td>
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<td>.328</td>
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<tr>
<td>Lives Alone</td>
<td>1.574</td>
<td>.326**</td>
</tr>
<tr>
<td>Caregiver Unavailability</td>
<td>.027</td>
<td>.019</td>
</tr>
<tr>
<td>Delta Region</td>
<td>.516</td>
<td>.238</td>
</tr>
<tr>
<td>Coastal Plains Region</td>
<td>-0.844</td>
<td>.267**</td>
</tr>
<tr>
<td>Need Variables</td>
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<td></td>
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<tr>
<td>ADL Difficulties</td>
<td>.076</td>
<td>.049</td>
</tr>
<tr>
<td>IADL Difficulties</td>
<td>.115</td>
<td>.088</td>
</tr>
<tr>
<td>Cognitive Impairment</td>
<td>-1.09</td>
<td>.038*</td>
</tr>
<tr>
<td>Interactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive Impairment X African American</td>
<td>-1.184</td>
<td>.089*</td>
</tr>
<tr>
<td>ADL Difficulties X African American</td>
<td>.254</td>
<td>.111*</td>
</tr>
<tr>
<td>Intercept</td>
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<td>1.264</td>
</tr>
<tr>
<td>Model Chi-square</td>
<td></td>
<td>152.662***</td>
</tr>
</tbody>
</table>

Notes: ADL = Activities of Daily Living; IADL = Instrumental Activities of Daily Living. Ozark Highlands Region is the referent category. *p < .05; **p < .01; ***p < .001.

Due to this difficulty of interpreting interaction terms obtained through logistic regression, we converted the parameter estimates (i.e., predicted log odds) for these terms into predicted odds ratios. The odds ratios in Table 3 perhaps provide the most direct way of representing these interaction effects. Following procedures of Penning (1995a), we calculated predictions for comparatively low (MSQ cognitive impairment score = 1, 33rd percentile), moderate (impairment score = 2, 50th percentile), and high (impairment score = 6, 75th percentile) levels of cognitive impairment. Similarly, we also calculated low (ADL difficulties score = 7, 33rd percentile), moderate (ADL difficulties score = 8, 50th percentile), and high (ADL difficulties score = 9, 75th percentile) levels of difficulties performing ADLs (see Table 3).

In general, being white and particularly with moderate to high cognitive impairment, was associated with a greater likelihood of receiving PRS. Alternatively,
Table 3. Odds Ratios for Interaction Terms From Logistic Regression Analyses

<table>
<thead>
<tr>
<th></th>
<th>Low Level of Cognitive Impairment</th>
<th>Moderate Level of Cognitive Impairment</th>
<th>High Level of Cognitive Impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Emergency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response System Service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 = White</td>
<td>.97</td>
<td>1.47</td>
<td>2.50</td>
</tr>
<tr>
<td>1 = African American</td>
<td>.77</td>
<td>.42</td>
<td>.55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Low Level of ADL Assistance</th>
<th>Moderate Level of ADL Assistance</th>
<th>High Level of ADL Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Emergency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response System Service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 = White</td>
<td>2.61</td>
<td>1.40</td>
<td>.76</td>
</tr>
<tr>
<td>1 = African American</td>
<td>.25</td>
<td>.69</td>
<td>5.50</td>
</tr>
</tbody>
</table>

moderate and high cognitive impairment in African Americans was associated with a decrement in the odds of receiving PRS. In addition, white respondents with low and moderate requirements for ADL assistance were associated with greater odds of receiving PRS. Conversely, African Americans having high requirements for ADL assistance was associated with greater odds of receiving PRS.

**DISCUSSION AND CONCLUSIONS**

The present study presented new information regarding social factors that past sociological research has ignored, namely, the factors associated with rural older adults' propensity to use in-home health and support services. Similar to past research (see Glasgow 1995; Rabiner 1995; Wolinsky and Johnson 1991), multivariate results confirmed the importance of some aspects of the SBM and provided some support for enabling and need variables, but not the predisposing variables. For example, only race and age displayed a significant effect on a particular type of service: African Americans were significantly less likely to use PRS and younger respondents were more likely to receive meals.

Regarding the enabling and need factors, a greater total number of in-home health and support service was significantly associated with the greater unavailability of family caregivers, living in the Coastal Plains region as compared to the Ozark region, greater physical ADL disability, lower cognitive impairment, and white respondents with lower cognitive impairment. In general, these findings
support past research (Himes and Rutrough 1994; Penning 1995a, 1995b; Rabiner 1995; Wolinsky and Johnson 1991) except for one notable difference. The enabling factors, in comparison with predisposing and enabling factors, accounted for more variance explained in total service use. Previous research (see Pesco-
osido and Kronenfeld 1995) reported that the need-for-care items were the chief determinants of service utilization. Wolinsky and Johnson (1991, p. S355) reported that "if need characteristics are the principal determinants of health services utilization, then the system may be characterized as being equitable." Our inclusion of the rural subregions, the unavailability of family caregivers (proxy for social support), and living arrangements may help policymakers know whether older adults would benefit from in-home health and support services (Logan and Spitze 1994).

We conducted separate logistic regression models looking at the receipt of the four services. We found the factors that were correlated with service use differed, somewhat, depending on the service. For instance, as compared to respondents in the Ozarks, those in the Coastal Plains region were less likely to receive PRS, meals, and chore services, but more likely to receive homemaking services. Those living in the Delta region, as compared to those living in the Coastal Plains region, were less likely to receive homemaking services, but more likely to receive PRS and chore services. Similarly, respondents with higher levels of cognitive impairment were less likely to receive a PRS. To develop and implement equitable delivery of in-home health and support services for rural older adults, policymakers and program planners must consider that correlates of service use vary somewhat depending on the service, and exercise caution when interpreting results based on aggregated measures to avoid making erroneous and improper conclusions (Penning 1995a).

The SBM has had a rich sociological heritage and has been a useful framework for estimating the correlates of service use, but it has some weaknesses (Glasgow 1995; Pescosolido and Kronenfeld 1995). For instance, even though the three domains of correlates are analytically distinct, they are not mutually exclusive (Glasgow 1995). Users of the SBM have placed the level of education, marital status, social support, and familial support in either the predisposing and enabling factors (Glasgow 1995; Himes and Rutrough 1994; Wolinsky and Johnson 1991). Such inconsistency creates "conceptual ambiguity and contributes to a lack of operational clarity when using the model as a guide to empirical analysis" (Glasgow 1995, p. 240). Findings from our study also lend some credibility to past research (Glasgow 1995; Logan and Spitze 1994; Penning 1995a), which demonstrated that factors influencing service use differed by service. Specifically, our findings agreed with Logan and Spitze's (1994) discussion of a task specific model of service use that proposed that the relative strength of predictors varies across service types (see also, Glasgow 1995). The SBM should broaden its scope to consider the reality that "the experience of illness is embedded in its social life and rhythms, that it is constrained by social structure, and that it is created in nego-
tiation with others” (Pescosolido 1991, p. 166). As Pescosolido and Kronenfeld (1995, p. 18) cogently describe, one “must push the limits of theory, methods, and analyses to fit challenges posed by problems in utilization research as well as the more general issues.”

Limitations of this study deserve mention. First, we evaluated relationships, not causal influences. In addition, we used a cross-sectional design, indicating hypothetical relationships to use of services. Future research should employ panel study designs to disentangle competing causal processes and to incorporate prior levels of utilization into the SBM. This seems a logical step because the SBM suggests, in its most recent re-developments, “that there is some sort of causal time-ordered process with roots in the community” (Pescosolido and Kronenfeld 1995, p. 18). We also should point out that the study consisted of a select sample of older adults. We do not know the extent to which the findings reflect the uniqueness of impoverished older adults living in heterogeneous rural regions of the South. Notwithstanding, this study provided new information on the use of in-home health and support services by assessing the relationship between three different rural regions of a single Southern state and the use of a variety of in-home health and support services. Future research should examine correlates of use of these services in urban areas and other geographical regions and on older adults with different economic backgrounds.

The findings call into question the effectiveness of the current screening device used by Medicaid. Currently, impairment in ADLs primarily determines eligibility for services under the Medicaid waiver program. Similar to Wolinsky and Johnson’s (1991) conclusions, we maintain that using ADL impairments as a primary measure discriminates against cognitively impaired older adults. Cognitively impaired older adults will be disadvantaged because of “the domino effect of how, for some diseases, cognitive limitations may be first to appear, followed by difficulties with IADLs and, ultimately, by difficulties in ADLs. As a result, the traditional ADL and IADL measures are not sufficiently sensitive to detect early stages of cognitive decline” (Wolinsky and Johnson, 1991, p. S355). Similarly, however, but somewhat differently, the results consistently found an association between high cognitive impairment and a lower total number of services and a lower likelihood of receiving three of the four services. Respondents who required more ADL assistance were more likely to receive a greater total number of services and less likely to receive three of the four services. Assistance with IADLs had no associations. Therefore, if Medicaid continues to employ ADLs and IADLs as primary screening instruments, health care costs may increase from treatment that is deferred until eligibility is consequently acquired (Wolinsky and Johnson 1991). Moreover, if the receipt of in-home health and support services is delayed until the “second (or third) domino falls, the potential for a return to prior functioning levels will likely be diminished as well” (Wolinsky and Johnson 1991, p. S355).
The information about the factors associated with the use of PRS is unique and timely. A PRS is a health care apparatus that reduces a sense of isolation, produces social reassurance, and is cost effective in reducing the need for nursing home care (Hooyman and Kiyak 1996, p. 345). The PRS is becoming more widely available, with advances in computer technology, even in rural areas. Such advances in computer technology could assist rural older adults who choose to live independently (Hooyman and Kiyak 1996, p. 345). However, the study’s findings on PRS suggest that older adults received it disproportionately across certain racial, physical, and cognitive statuses. We found that both moderate and high cognitive impairment in African Americans were associated with reduced odds of receiving PRS. Moreover, being African American and requiring more assistance with ADLs was associated with greater odds of receiving PRS service. These findings support past research (Wolinsky and Johnson 1991) documenting that older minority adults’ use of health services is influenced by and sensitive to need characteristics. The existence of such influences and sensitivities was incongruent with a conclusion that in-home health and support services were equitable. In light of these findings, programmatic interventions should be developed for African Americans in the South. In instances where culturally compatible services have been developed, minority clients have used services more often when compared with nonminorities (Wood and Wan 1993). The interviewers may not have explained the importance of PRS as well with the African-American participants. Some educational and technological barriers may keep African Americans from receiving appropriate information about PRS. Resource guides may be needed to identify how a PRS can help individuals with physical impairments. The interviewers may have perceived, albeit erroneously, that African-American older adults have greater access to family members who can provide assistance.

To meet the needs of a growing older adult population and reduce use of expensive nursing homes, policymakers should consider expanding Medicaid coverage long-term care especially in rural regions (Rabiner 1995). With their cost containment goals, most states have restricted the number of individuals who can receive services and the extensiveness of services provided (Hooyman and Kiyak 1996, p. 530). Medicaid has denied many eligible individuals from receiving services, and the program has recently seen its budget constrained relative to the extent of need (Hooyman and Kiyak 1996, p. 530). Current proposals before Congress have serious implications for society and American families, especially those families caring for older adults. Most proposals call for a significant reduction in allocated Medicaid dollars and the organizational shift from the federal level to the state level by implementing block grants. Block grants could reduce the funding for aging programs. If block grants become legislation, there may be little consistency across regions and contiguous states.

With lack of funding for services, older adults may be less likely to live independently and more likely to enter a nursing home. Family caregivers are requesting more support, but the current federal administration is expecting families to
render even more care as a cost-effective alternative to public support of services (Hooyman and Kiyak 1996, p. 552). As the twenty-first century approaches, who will provide what care for older adults?

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REFERENCES

Andersen, Ronald. 1968. A Behavioral Model of Families’ Use of Health Services, Research Series No. 25. Chicago: Center for Health Administration Studies, University of Chicago.


