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## Complementary and Alternative Medicine Use as Health Self-Management: Rural Older Adults With Diabetes

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### Abstract

**Objectives**—This study describes complementary and alternative medicine (CAM) use among rural older adults with diabetes, delineates the relationship of health self-management predictors to CAM therapy use, and furthers conceptual development of CAM use within a health self-management framework.

**Methods**—Survey interview data were collected from a random sample of 701 community dwelling African American, Native American, and White elders residing in two rural North Carolina counties. We summarize CAM use for general use and for diabetes care and use multiple logistic modeling to estimate the effects of health self-management predictors on use of CAM therapies.

**Results**—The majority of respondents used some form of CAM for general purpose, whereas far fewer used CAM for diabetes care. The most widely used CAM categories were food home remedies, other home remedies, and vitamins. The following health self-management predictors were related to the use of different categories of CAM therapies: personal characteristics (ethnicity), health status (number of health conditions), personal resources (education), and financial resources (economic status).

**Discussion**—CAM is a widely used component of health self-management among rural older adults with diabetes. Research on CAM use will benefit from theory that considers the specific behavior and cognitive characteristics of CAM therapies.

THE present analysis examines the use of complementary and alternative medicine (CAM) therapies among older rural adults with diagnosed diabetes. CAM therapies are widely used in the United States (Barnes, Powell-Griner, McFann, & Nahin, 2004; Eisenberg et al., 1998). The 2002 National Health Interview Survey showed that CAM therapies were used by 62% of the adult population in the previous 12 months (when “prayer for health” is included), with the percentage of older adults using at least one CAM therapy in the previous year ranging from 64.8% among those aged 60 to 69, to 68.8% among those aged 70 to 84, and 70.3% among those aged 85 years or older (Barnes et al.). However, there have been few analyses of CAM therapy use among older adults, and the reasons for CAM therapy use are poorly understood (Astin, 1998).

Although analyses have focused on personal characteristics related to the use of CAM therapies, there has been little conceptual development in research attempting to explain the use of CAM therapies (Sirois & Gick, 2002). Why particular personal characteristics, such as age, gender or educational attainment, might be related to CAM therapy use is generally a peripheral concern. The lack of conceptual development in CAM research is exemplified by the number of analyses that collapse any CAM use into a single dichotomous measure in which persons who report using any CAM (non-allopathic) therapy are compared to persons who indicate that they use only allopathic therapies. Therefore, research considers the basis of drinking a hot toddy, taking a vitamin, taking a garlic supplement, having acupuncture, or being treated by a homeopathic practitioner to be equivalent. Although CAM therapies can be categorized into similar groups (e.g., the use of herbs, the use of paid practitioners), creating a single measure that indicates the use of any CAM therapy versus the use of no CAM therapy is conceptually inappropriate. Another conceptual dimension of CAM use that is not addressed is whether a therapy is used to promote general health, prevent a specific illness or disease, treat a symptom, or treat a specific disease or injury.

Some scholars are attempting to build a conceptual understanding of CAM, although it is still underdeveloped at this point. Some conceptual development has been based on the health behavior model, which describes CAM therapies as health services in which utilization is the result of need, predisposing, and enabling factors (Sirois & Gick, 2002). Other conceptual development examines CAM use as the result of a cultural shift toward holistic health orientation or worldview (Astin, 1998; Sirois & Gick, 2002). As CAM includes a diverse set of health behaviors, within this holistic worldview framework, all CAM therapies (e.g., acupuncture and Reiki) are considered “new” and exotic. However, some CAM therapies are traditional rather than exotic. Acupuncture is traditional in China, as are folk remedies in most of the world. It is equally apparent that individuals use folk remedies because they were taught to use them in their traditional communities, not because they have a new or holistic health worldview.

We propose that the use of CAM therapies is best understood as a component of health self-management (Arcury, Quandt, McDonald, & Bell, 2000; Grzywacz et al., 2005; Quandt, Arcury, & Bell, 1998; Thorne, Paterson, Russell, & Schultz, 2002). The conceptual basis of health self-management is that individuals have agency in taking care of their health (Ory, DeFriese, & Duncker, 1998; World Health Organization, 1983). They make decisions of what to do and what not to do relative to their health. Some individuals may decide to do nothing or to maintain behaviors that are detrimental to their health. For example, they choose not to be physically active although they are able to be physically active. In terms of health behaviors, Leventhal and colleagues (Cameron & Leventhal 2003; Leventhal, Halm, Horowitz, Leventhal, & Ozakinci, 2004) have developed a model that may be useful for the further conceptual development of CAM use. They posit that people are active problem solvers who construct common-sense models of illness within which they evaluate options for health self-management.

Analyses have typically divided health self-management among four domains: self-care, informal support, formal support, and medical care (Quandt et al., 1998). Self-care is the way in which persons engage in behaviors to treat, prevent, or modify illness (Ory et al., 1998; Stoller, 1998; Woomert, 1998; World Health Organization, 1983). Self-care can involve individual action, use of equipment, or modification of the environment to meet health goals (Ory et al.). Informal support includes instrumental and emotional support from kin, friends, or acquaintances. Formal support includes tangible and informational assistance from persons paid to assist either one on one or through public or private programs. Finally, medical care includes tangible and informational assistance from health care providers. CAM therapies, because they are a diverse set of behaviors, fit into several of the four self-care domains. For

example, using home remedies, taking vitamins, or taking herbs are self-care behaviors. Self-help groups, commercial diets, and biofeedback are often based on formal services. Care provided by a chiropractor, acupuncturist, massage therapist, or allopathic physician is medical care.

Individuals differ in their use of CAM therapies in the same ways that they differ in their use of any health self-management behavior. Factors related to the use of specific health self-management behaviors include, first and foremost, social history and ecology. Individuals cannot use therapies (e.g., acupuncture) until such therapies are introduced into their communities. In like manner, it is more difficult to use a therapy if there are no practitioners in a community and if there are structural barriers in traveling to a community with such a practitioner. The social structure of a community may prohibit the use of some therapies (e.g., chiropractors) and encourage the use of others (e.g., *curanderos* among Mexican immigrants; Gesler, 1988; Hunt, Arar, & Akana, 2000).

Personal characteristics such as gender, ethnicity, and culture affect the use of different therapies. Shared beliefs (culture) about what is right to do for health or what is possible to do for health often dictate health care behaviors. Women tend to have greater health knowledge and health concerns than do men (George, 2001). Women are often more regular users of CAM therapies, but not among older adults (Astin, Pelletier, Marie, & Haskell, 2000; Foster, Philips, Hamel, & Eisenberg, 2000; Najm, Reinsch, Hoehler, & Tobis, 2003). Members of an ethnic group share beliefs and common experiences that affect their willingness to use different forms of health care. For example, experiences with conventional health care by minority group members, such as discrimination, may lead to greater use of therapies that replace allopathic medical care.

Health status indicates the relative need for health care and the ability to engage in health self-management behaviors. Individuals can use CAM therapies and conventional therapies for prevention as well as treatment. However, people most often use CAM therapies, like most health self-management behaviors, to treat an illness (Barnes et al., 2004). Therefore, like with any self-management behavior, individuals with chronic health conditions may use more CAM therapies than healthier individuals (Astin et al., 2000; Clark, 2003). At the same time, level of disability may limit the use of some therapies that are beyond an individual's ability. This again argues that researchers should consider CAM therapies individually or in behaviorally related categories, rather than collapse them all into a single dichotomous measure.

Personal resources, such as education, marital status, family support, and social network, facilitate or impede the implementation of health self-management behaviors. For example, education has been related to the use of CAM therapies (Astin et al., 2000; McMahan & Lutz, 2004; Najm et al., 2003), although research has not specified the specific pathway of education to CAM therapies. Education may be an indicator of socioeconomic status, with those people having high educational attainment also having the economic resources to purchase CAM therapies. Education may also be an indicator of information access, which results in more knowledge about specific CAM therapies. At the same time, lack of education, as a socioeconomic status indicator, could result in less access to conventional medical care and greater use of home and folk remedies (Arcury, Quandt, Bell, & Vitolins, 2002; Najm et al., 2003). A large social network can provide information about the existence, and the perceived efficacy, of different CAM therapies.

Financial resources, such as economic status and health insurance status, affect individuals' relative access to conventional care and their ability to pay for CAM therapies (Astin et al., 2000; McMahan & Lutz, 2004; Najm et al., 2003). Many CAM therapies are not covered by most current health insurance plans, indicating that people with higher income will be better

able to include them in their health self-management. Astin and colleagues (2000) found fairly high levels of specific CAM therapy use (i.e., acupuncture, chiropractic) among older adults when these therapies were covered by health maintenance organization membership.

The present analysis has three aims. The first is to describe the CAM therapies used by rural older adults with diabetes. There have been few analyses of CAM use in rural communities. We would expect patterns of CAM therapy use to be specific for rural older adults. The social ecology and history of rural communities includes a lack of access to conventional health care, particularly specialty care (Ricketts, 1999). The same economies that limit the number of conventional specialty care providers in rural areas—sparse and scattered populations with low incomes—will also limit the number of providers of CAM therapies. Acupuncturists are more likely to be active in urban communities for the larger client base as opposed to in rural communities; stores selling herbal remedies are also more likely to be located in cities than in rural areas. On the other hand, some CAM providers, like chiropractors, are widely available in rural communities (Hawk & Long 1999; Lavsky-Shulan, 1985). Limiting this analysis to older adults with diabetes allows for some control of health status, as all of the participants will have the same chronic, progressive, debilitating disease.

The second aim of this analysis is to delineate the relationship of health self-management predictors (in terms of personal characteristics, health status, personal resources, and financial resources) to the use of CAM therapies among rural older adults with diabetes. The final aim of this analysis is to further conceptual development of CAM use among older adults within a health self-management framework.

## Methods

### Design

The ELDER (Evaluating Long-Term Diabetes Self-Management Among Elder Rural Adults) Study was a population-based cross-sectional survey that comprehensively assessed the self-management strategies of rural adults aged 65 and older with diagnosed diabetes (Bell, Arcury, et al., 2005; Quandt et al., 2005; Skelly et al., 2005). Participants were selected from two largely rural counties in central North Carolina with a high proportion of ethnic minorities and persons living below the poverty level. The Institutional Review Board of Wake Forest University School of Medicine approved the study.

### Participant Recruitment and Selection

The ELDER Study recruited a random sample of community-dwelling older adults with diabetes, stratified by gender and ethnicity (African American, Native American, and White). The sampling frame was Medicare claims records. Inclusion criteria were residence in the two study counties and at least two outpatient claims for diabetes (International Classification of Diseases [ICD] –9 250) between 1998 and 2000. We selected random samples of men and women. An interviewer contacted each participant to confirm diabetes status and ethnicity, to assess eligibility (i.e., resident of study counties, aged 65 or older, English speaking, physically and mentally able to participate in the survey), and to verify willingness to participate in the study.

We have described sampling and recruitment in previous articles (Bell, Arcury, et al., 2005; Skelly et al. 2005). The final sample included 701 individuals. The overall response rate for eligible participants was 89% (701 out of 787). We excluded three participants from this analysis because they did not fit any of the three ethnic categories. The sample sizes for analyses vary due to missing data among interview items.

## Data Collection

We conducted participant in-home interviews from May 2002 through October 2002. Each interview took approximately 1.5 hours, during which the participant was asked about personal and health characteristics, diabetes self-care behaviors, as well as formal and informal support. An extensive set of items addressed CAM use, including the use of food home remedies and “other” home remedies (Stoller, Pollock, & Forester, 1994), vitamins, minerals, herbs, popular manufactured products (Stevenson, Britten, Barry, Bradley, & Barber, 2003), CAM therapies, and CAM practitioners. We based the food home remedy, other home remedy, and popular manufactured products items included in the questionnaire on earlier analyses of CAM use among rural adults (Arcury, Bernard, Jordan, & Cook, 1996; Arcury et al., 2002; Arcury, Preisser, Gesler, & Sherman, 2004). We first queried use of vitamins, minerals, and herbs for any use; if the participant indicated a positive response, we asked about the use of specific vitamins, minerals, or herbs. We asked participants if they had used each item for any purpose in the past year, and if they had used it specifically for diabetes. We did not include items asking whether participants used religious participation or prayer (as opposed to a religious or spiritual healer) as treatments or therapies. Earlier research had indicated near universal inclusion of religious participation and prayer in the health self-management of this population (Arcury et al., 1996, 2000).

## Measures

Although we collected data on the use of 64 CAM therapies, the number of participants using any specific therapy was often small. Therefore, we constructed dichotomous measures indicating whether participants used at least one therapy in each of eight major CAM categories for (a) general CAM use in the past year, and (b) CAM use for diabetes care in the past year. The eight major CAM categories were: (a) food home remedies, (b) other home remedies, (c) vitamins, (d) minerals, (e) herbs, (f) popular manufactured products, (g) CAM therapies, and (h) CAM practitioners. We constructed categories to include therapies with similar behavioral and cognitive features (e.g., the use of foods based on folk knowledge, the use of therapies that required learning or training, the use of practitioners that required payment).

Personal characteristics included ethnicity (African American, Native American, or White), gender, and age. We constructed four measures of health status. We calculated duration of diabetes by using current age minus the age of first diagnosis by a health care professional; we converted these figures into decades for analysis. Diabetes medication included three categories: no medication, oral agent only, and insulin with or without oral agent. Number of long-term health conditions was the total number of conditions reported in response to questions about 11 specific conditions (amputation; gastrointestinal condition; overweight or obese; arthritis, gout, or rheumatism; high cholesterol; asthma, bronchitis, emphysema, or brown lung; high blood pressure; heart disease or heart failure; eye conditions; thrombosis; neuropathy) and to an open-ended question asking if they had any other long-term health condition. We did not count diabetes as a condition.

Personal resource measures included marital status (currently vs not currently married), living arrangements (living alone, living with others and unmarried, or living with others and married), and education (less than high school, high school or equivalent, or at least some college). Paid supplemental health insurance was one financial resource measure. The *paid supplemental insurance group* reported at least one among Medicare Part B, health maintenance organization, prepaid health plan, and other health insurance; the *no paid insurance group* reported none of these. We did not consider benefits received through the Veterans Administration and Medicaid to be paid supplemental insurance. Another financial resource measure was the categorical variable, economic status, for which we combined information on Medicaid status and household income from all sources in 2001. The *Medicaid*



*group* included all participants who reported receiving Medicaid. The *no Medicaid, lower income group* included all others who reported an income of less than \$25,000. The *no Medicaid, higher income group* included all others reporting incomes of \$25,000 or more.

### Statistical Analysis

We summarized participant personal characteristics, health status, personal resources, and financial resources by using counts and percentages or means and standard deviations. The number and percentage of participants using each specific CAM therapy and the eight major CAM categories (food home remedies, other home remedies, vitamins, minerals, herbs, popular manufactured products, CAM therapies, and CAM practitioners) for general CAM use and CAM use for diabetes care are listed in Table 2. We estimated the relationships of personal characteristics, health status, personal resources, and financial resources to the eight major CAM categories of CAM for general use and CAM use for diabetes care by using multiple logistic modeling. Table 1 shows the covariates included in the models. If an Ethnicity  $\times$  Gender effect was statistically significant at  $\alpha = .05$ , we included it in the model. We report effects of the variables by using adjusted odds ratios (ORs) and corresponding 95% confidence intervals.

### Results

Participants included African American (220 persons or 31.6%), Native American (180 persons or 25.8%), and White (297 persons or 42.6%) older adults (Table 1). About half of the sample was women, and their average age was 74.1 years old. The average duration of diabetes among participants was 12.5 years. The most common conventional diabetes treatment was an oral agent only (60.3%), followed by insulin (27.6%); 12.2% of participants used neither an oral agent nor insulin. Participants took on average 6.5 prescription medications and had an average of 4.7 long-term health conditions in addition to diabetes. Half of the participants were married. Approximately one third (30.7%) of the participants lived alone, and 20.1% were unmarried but living with others. About two thirds (65.0%) of the participants had less than a high school education. Most (91.1%) had some insurance that supplemented Medicare. Over one-third received Medicaid, although 45.6% had annual incomes of less than \$25,000 and did not receive Medicaid; 19.2% had annual incomes of at least \$25,000 per year.

General CAM use and CAM use for diabetes care are important health self-management behaviors among these rural older adults with diabetes (Table 2). The most widely used general CAM use therapies were in the categories other home remedies (used by 56.8% of the participants) and food home remedies (52.3%), followed by vitamins (44.8%), minerals (17.3%), CAM therapies (9.9%), CAM practitioners (8.4%), popular manufactured products (6.1%), and herbs (5.8%). Common food home remedies were vinegar (30.1%), lemon (27.2%), and honey (21.3%). Common other home remedies included liniments (26.3%), salves (25.8%), Epsom salts (19.2%), and Vicks VapoRub<sup>®</sup> (often taken orally for colds; 17.6%). Kerosene and turpentine (3.5%) were used topically on wounds and orally for colds. WD-40<sup>®</sup> (3.2%) was used to relieve joint pain.

The most widely used CAM therapies for diabetes care were in the categories food home remedies (used by 11.9% of the participants) and other home remedies (10.5%), followed by vitamins (5.7%), CAM therapies (2.5%), minerals (2.4%), herbs (2.4%), CAM practitioners (1.5%), and popular manufactured products (1.1%). The most widely used specific CAM therapies for diabetes care were salves (6.8%), vinegar (5.5%), and lemon (5.3%).

General CAM use and CAM use for diabetes care have distinct patterns of associations with personal characteristics, health status, personal resources, and financial resources variables. Ethnicity was the most important personal characteristic differentiating general CAM use (Table 3). Compared with Whites, African Americans and Native Americans had greater odds

of using food home remedies (ORs = 1.81 and 1.76, respectively) and other home remedies (ORs = 2.32 and 2.30, respectively). The odds of African Americans using home remedies as compared with Native Americans did not differ significantly. African Americans had lower odds of using vitamins than did Whites (OR = 0.50). Women had greater odds of using minerals than did men (OR = 2.10).

For each additional long-term health condition, the odds of using food home remedies increased by a factor of 1.10, the odds of using other home remedies increased by 1.27, and the odds of using a CAM therapy increased by a factor of 1.16. Each additional prescription medicine reduced the odds of using a food home remedy by a factor of 0.95. Participants with a high school education had greater odds than those with less than a high school education of using vitamins (1.73), minerals (1.81), and CAM therapies (2.27). Participants with at least some college had greater odds than those with less than a high school education of using minerals (2.52). Participants with at least some college had greater odds of using popular manufactured products than those with less than a high school education (3.30) or those with a high school education (3.92). Popular manufactured products use is affected by economic status such that participants with an annual income greater than \$25,000 had greater odds of using popular manufactured products than those who received Medicaid (5.78) and those who did not receive Medicaid but had an annual income below \$25,000 (4.49). Use of CAM professionals was not related to any of the predictors.

Because of the limited use of CAM therapies for diabetes care, there were only sufficient numbers of users of food home remedies and other home remedies for multivariate analysis. Differences in food home remedy and other home remedy use for diabetes care were associated with ethnicity and health status (Table 4). Compared with Whites, African Americans and Native Americans had greater odds of using food home remedies (2.37 and 2.21, respectively) and other home remedies (2.88 and 4.20, respectively) for diabetes care. The odds of African Americans using home remedies as compared with Native Americans did not differ significantly. For each decade increase in the duration of diabetes, the odds of using other home remedies for diabetes care increased by a factor of 1.31. For each additional long-term condition, the odds of using other home remedies for diabetes care increased by a factor of 1.21.

## Discussion

Many of the rural older adults with diabetes that we studied included specific types and categories of CAM therapies in their health self-management. These therapies were largely limited to home remedies, vitamins, and minerals. Few (less than one in ten) of these rural older adults used herbs, popular manufactured products, CAM therapies, or CAM practitioners. Far more used CAM therapies for general use than they did for treating diabetes. The personal characteristic ethnicity was predictive in the use of home remedies and vitamins—African Americans and Native Americans used home remedies more than Whites, whereas Whites used vitamins more than African Americans. Health status, in terms of more health conditions, was also related to greater home remedy use. Greater personal resources (education) were related to greater use of vitamins, minerals, popular manufactured products, and CAM therapies. Greater financial resources were related to greater use of popular manufactured products.

These findings reflect and expand upon current knowledge of CAM use among older adults. The more frequent use of CAM therapies by those with diabetes for general purposes rather than for treating diabetes has been reported by others (Egede, Ye, Zheng, & Silverstein, 2002; Yeh, Eisenberg, Davis, & Phillips, 2002). However, the reported levels of CAM therapy use among participants in the present analysis were much greater than were those reported by other studies. Egede and colleagues found that only 8% of individuals with diabetes reported

using a CAM therapy. Yeh and colleagues found that 57% of participants reported using at least one CAM therapy; however, 28% of these used solitary prayer/spiritual practices (a category of CAM therapies not considered in the present study), whereas 7% reported using herbal remedies, 6% commercial diets, and 3% folk remedies. Comparatively, 5.8% of participants in the current study reported using herbs and 0.4% reported using a commercial diet. Assuming that “folk remedies” and home remedies are comparable, the use of these remedies was about 20 times greater in the present study than in the data reported by Yeh and colleagues. Comparison between these studies is difficult due to several important methodological differences. The present analysis included a large sample of older adults with diabetes and included a high proportion of minority group members. It used primary data collected via personal interviews with a questionnaire that included a broad range of CAM therapies. The other studies conducted secondary analyses of national survey data collected from the general U.S. population. The number of persons with diabetes and using CAM in both data sets was small (less than 100), the number of ethnic minority participants was small, the age range included all adults, and the range of CAM therapies included was limited.

Like in other studies of CAM use among older adults, gender was not found to be an important factor in differentiating the use of CAM therapies (Astin et al., 2000; Foster et al., 2000; Najm et al., 2003). There are limited data on ethnic and racial differences in CAM use. Although some analyses of national data show greater CAM use among Whites than among minority group members (Bausell, Lee, & Berman, 2001; Ni, Simile, & Hardy, 2002), others show that CAM use is similar across ethnic groups (Barnes et al., 2004). Ethnicity was found to be a major determinant of CAM use in the present analysis, particularly in the use of home remedies. These ethnic differences in home remedy use may represent cultural differences between minorities and Whites in these counties. However, although culture may account for different levels of home remedy use, there is also cultural overlap among Whites and minority group members, because more than 40% of White men and women used these remedies (compared with more than 70% of African American and Native American women, about 65% of Native American men, and 55% of African American men). In the Appalachian region of North Carolina, which is a predominantly White rural region of the state, about 45% of all adult respondents reported using home remedies (Arcury et al., 2004). The greater use of home remedies among minority than White older adults may also be a vestige of less access by minorities to conventional medical care due to poverty and discrimination.

The use of CAM therapies among the rural older adults in this study was related to poor health status (number of long-term conditions). Other researchers have found that poorer health increases the use of CAM among older adults (Astin et al., 2000; Foster et al., 2000). Like in other studies (Astin et al., 2000; McMahan & Lutz, 2004; Najm et al., 2003), personal resources (education) and financial resources (economic status) were related to the use of CAM therapies among the rural older adults who participated in this study. The results of this study expand upon these earlier findings by considering specific CAM categories (as opposed to the use of any CAM therapy vs the use of no CAM therapy) that are related to poor health status, personal resources, and financial resources. Greater number of long-term health conditions was related to the use of home remedies. Greater personal and financial resources were related to the use of those CAM therapies that require learning and purchase: vitamins, minerals, popular manufactured products, and CAM therapies.

This analysis of CAM therapy use among rural older adults with diabetes adds an understanding of the place of CAM in health self-management practices for behavior, measurement, and theory. Behaviorally, this analysis shows that older adults are selective and specific in their use of CAM therapies. They do not use all CAM therapies that might be available to them in managing their health, and they do not apply the CAM therapies that they do use to every illness or disease. They select specific therapies for specific needs. Therefore, they do not apply all



of the CAM therapies that they know to help manage their diabetes. They apply those CAM therapies that are appropriate to help manage their diabetes, but most CAM therapies are not appropriate for managing diabetes. It appears that these rural older adults are using CAM therapies for health promotion (tonics) or for treating symptoms (e.g., a headache, a sore throat, a cut), but not for treating a chronic condition. For treating diabetes, these participants are to a very large extent using conventional medical care (Bell, Quandt, et al., 2005).

CAM use among these rural older adults is largely a form of self-care. They are using home remedies and vitamins. Few of these rural older adults are using specialized CAM therapies beyond relaxation and self-help groups, such as imagery, biofeedback, or commercial diets. They are not using paid practitioners other than chiropractors, and they are not using chiropractors to care for their diabetes. These rural older adults are using community knowledge rather than exotic knowledge as the basis for including CAM therapies into health self-management (Cavender & Beck, 1995). The reasons for this limited array of CAM use may include a sense of independence and value of traditional behaviors among rural older adults, a historical lack of access to formal health care, and cost (Quandt & Arcury, 2001). The Self-Regulatory Model or Common Sense Model approach to delineating the reasons underlying health behaviors developed by Leventhal and colleagues (Cameron & Leventhal, 2003; Leventhal et al., 2004; Vileikyte, Rubin, & Leventhal, 2004) may be useful for the further conceptual development of CAM use.

It is extremely important to base the measurement of CAM therapies used in health self-management research on specific therapies, or at least on categories of CAM therapies that are behaviorally and cognitively similar. Overall measures of CAM use in which individuals are placed in groups based on whether they use any CAM therapy or no CAM therapy hides importance differences. First, CAM therapies are not all alike in terms of the individual's behaviors or cognition. Using an herb in pill form, which is behaviorally and cognitively akin to taking a prescription allopathic drug, is very different from using acupuncture or yoga, both of which require learning new behaviors and new philosophies. Second, what constitutes a CAM therapy is often a matter of continuing debate and refinement. The point at which a therapy crosses the disciplinary line from complementary to conventional is becoming more blurry as allopathic physicians advise patients to use herbs, provide therapies such as acupuncture, or become members of holistic practices that include practitioners trained in very different therapies. Finally, a list of specific therapies, CAM or otherwise, included in a questionnaire may not include those therapies that an individual is using. Therefore, an individual can be classified as a non-CAM user in comparisons of CAM users versus nonusers, when in fact they are using a range of alternative therapies that are beyond the list on a questionnaire or the skills of an interviewer to elicit. The gross measurement of CAM use may hide some very real social differences in CAM therapy use or may create spurious associations. By measuring CAM therapies in eight groups that appear to have a basis in behavior and cognition, we have been able to show differences in use by personal characteristic, health status, personal resources, and financial resources.

Theories for the use of different CAM therapies must be based on the characteristics of specific therapies. The use of CAM therapies with different behavioral and cognitive characteristics cannot be understood or theorized in the same way. Theories addressing the use of CAM therapies that require learning new philosophies or techniques—such as yoga, acupuncture or biofeedback—must consider factors that influence human learning (e.g., social cognitive theory [Bandura, 1986]). Cultural theories (e.g., Kleinman, 1980; Rubel & Haas, 1995) are important for understanding the use of traditional therapies (e.g., home and folk remedies and healers), as well as changes in health beliefs toward a holistic health worldview. Finally, the use of CAM therapies that are dependent on having financial resources must be understood in terms of social and economic structure and barriers (House & Williams, 2000).

This study has a number of strengths, including a rural, ethnically diverse sample; the use of a questionnaire with an extensive list of CAM therapies; a large sample size; and a high response rate. It is limited by its cross-sectional design. The use of a specific type of CAM is limited to the previous year. This study involves reliance on self-report data, which are subject to recall bias. Finally, the sample was limited to two rural counties in the southeast, limiting its generalizability outside of the rural southeast.

This study documents that rural older adults include CAM as a part of their health self-management, and that the array of CAM therapies used by these older adults is limited for general use and for diabetes care. Home remedies, which are seldom measured in research on CAM therapy use, are the most widely used CAM among these rural older adults with diabetes. The types of CAM used by these rural adults indicate that CAM use is largely a component of self-care and seldom extends into more formal areas of health self-management. The personal characteristic ethnicity is a major factor in the use of home remedies, whereas health status, personal resources, and financial resources are major factors in the use of those CAM therapies that require learning and expenditures. The focus on eight CAM therapy categories rather than on a dichotomous measure of any CAM use is important to understanding CAM as a component of health self-management. Further research on CAM therapy use will benefit from the use of theory that addresses the specific behavioral and cognitive characteristics associated with CAM therapies.

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**Table 1**  
Personal Characteristics of ELDER Participants, Overall Sample

Participant Personal Characteristics	Count (%) or $M \pm SD$ ( $n = 697$ )
Ethnicity	
African American	220 (31.6)
Native American	180 (25.8)
White	297 (42.6)
Female	342 (49.1)
Age (years)	74.1 $\pm$ 5.42
Diabetes duration (years)	12.5 $\pm$ 11.0
Diabetes medication	
No medication	85 (12.2)
Oral agent only	420 (60.3)
Insulin with or without oral agents	192 (27.6)
No. of prescription medications ( $n = 692$ )	6.5 $\pm$ 4.2
No. of chronic conditions	4.7 $\pm$ 2.2
Married	350 (50.2)
Living arrangements	
Living alone	214 (30.7)
Living with others and unmarried	140 (20.1)
Living with others and married	343 (49.2)
Formal education	
< High school	452 (65.0)
High school diploma or GED	145 (20.8)
Some college	99 (14.2)
Supplemental insurance	
Medicare Part B, HMO, or other	635 (91.1)
Economic status	
On Medicaid	235 (35.2)
No Medicaid, income < \$25,000	304 (45.6)
No Medicaid, income $\geq$ \$25,000	128 (19.2)

*Note:* ELDER = Evaluating Long-term Diabetes self-management among Elder Rural adults.



**Table 2**  
 Number and Percent Using Specific CAM Remedies for General Use and Diabetes Care in the Past Year, the ELDER Study, North Carolina, 2002

CAM Remedies	General Use		Diabetes Care	
	n	(%)	n	(%)
Food home remedy	354	(52.3)	80	(11.9)
Honey	144	(21.3)	16	(2.4)
Lemon	184	(27.2)	36	(5.3)
Vinegar	204	(30.1)	37	(5.5)
Garlic	94	(13.9)	20	(3.0)
Baking soda	99	(14.7)	13	(1.9)
Yeast	8	(1.2)	1	(0.2)
Green or other special teas	50	(7.4)	13	(1.9)
Whiskey	28	(4.1)	3	(0.4)
Other home remedy	385	(56.8)	71	(10.5)
Tobacco	40	(5.9)	0	(0.0)
Epsom salts	130	(19.2)	20	(3.0)
Vic's VapoRub	119	(17.6)	4	(0.6)
Liniments	178	(26.3)	14	(2.1)
Salves	175	(25.8)	46	(6.8)
Kerosene or turpentine	24	(3.5)	5	(0.7)
WD-40	22	(3.2)	4	(0.6)
Motor Oil	1	(0.2)	0	(0.0)
Vitamins, total	303	(44.8)	38	(5.7)
Multivitamins	232	(34.3)	22	(3.3)
Other vitamins, total	138	(20.4)	18	(2.7)
Vitamin A	13	(1.9)	3	(0.4)
Vitamin B6	11	(1.6)	3	(0.4)
Vitamin B12	40	(5.9)	4	(0.6)
Vitamin C	59	(8.7)	6	(0.9)
Vitamin E	80	(11.8)	12	(1.8)
Folic acid	14	(2.1)	3	(0.4)
Other	18	(2.7)	1	(0.2)
Minerals, total	117	(17.3)	16	(2.4)
Selenium	4	(0.6)	1	(0.2)
Calcium	82	(12.1)	5	(0.7)
Magnesium	16	(2.4)	0	(0.0)
Chromium	3	(0.4)	3	(0.4)
Zinc	15	(2.2)	4	(0.6)
Other	28	(4.1)	5	(0.7)
Herbs, total	39	(5.8)	16	(2.4)
Echinacea	1	(0.2)	0	(0.0)
Ginkgo biloba	10	(1.5)	3	(0.4)
Ginseng	12	(1.8)	3	(0.4)
Golden seal	2	(0.3)	2	(0.3)
St. John's wort	2	(0.3)	1	(0.2)
Valerian	1	(0.2)	0	(0.0)
Other	25	(3.7)	10	(1.5)
Popular manufactured products	41	(6.1)	7	(1.1)
Lecithin	2	(0.3)	0	(0.0)
Flax seed, fish, Omega-3 oils	27	(4.0)	3	(0.5)
Coenzyme Q10	2	(0.3)	1	(0.2)
Chondroitin	5	(0.7)	0	(0.0)
Glucosamine sulfate	10	(1.5)	2	(0.3)
Amino acids	3	(0.4)	1	(0.2)
Shark cartilage	1	(0.2)	1	(0.2)
CAM therapies	67	(9.9)	17	(2.5)
Relaxation	31	(4.6)	8	(1.2)
Imagery	9	(1.3)	1	(0.2)
Aromatherapy	5	(0.7)	0	(0.0)
Biofeedback	1	(0.2)	0	(0.0)
Energy healing	2	(0.3)	1	(0.2)
Commercial diet	3	(0.4)	0	(0.0)
Lifestyle diet (includes vegetarianism)	2	(0.3)	1	(0.2)
Megavitamins	6	(0.9)	2	(0.3)
Magnetism	0	(0.0)	0	(0.0)
Self-help groups	3	(0.4)	3	(0.4)
Other	22	(3.3)	3	(0.4)
CAM practitioners	57	(8.4)	10	(1.5)
Chiropractor	32	(4.7)	0	(0.0)
Herbalist	3	(0.4)	0	(0.0)
Homeopath	0	(0.0)	0	(0.0)
Acupuncturist	3	(0.4)	0	(0.0)
Naturopath	0	(0.0)	0	(0.0)

CAM Remedies	General Use		Diabetes Care	
	n	(%)	n	(%)
Massage therapist	8	(1.2)	0	(0.0)
Religious or spiritual healer	16	(2.4)	10	(1.5)
Native American traditional healer	0	(0.0)	0	(0.0)
Root doctor	0	(0.0)	0	(0.0)
Doctor trained in Oriental medicine	0	(0.0)	0	(0.0)
Doctor trained in traditional Chinese medicine	0	(0.0)	0	(0.0)
Hypnotist	0	(0.0)	0	(0.0)
Other	2	(0.3)	0	(0.0)

Notes: CAM = complementary and alternative medicine; ELDER = Evaluating Long-term Diabetes self-management among Elder Rural adults.

**Table 3** Multiple Logistic Regression Models CAM for General Use, the ELDER Study, North Carolina, 2002

Variable	Food Home Remedies		Other Home Remedies		Vitamins		Minerals		Popular Manufactured Products		CAM Therapies		CAM Practitioners	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Female vs male	1.30**	0.90, 1.88	1.24***	0.85, 1.81	1.23**	0.85, 1.78	2.10**	1.28, 3.44	1.21	0.55, 2.67	0.73	0.40, 1.32	0.53	0.27, 1.03
Ethnicity														
African American vs White	1.81**	1.20, 2.71	2.32***	1.53, 3.54	0.50***	0.33, 0.75	0.85	0.48, 1.49	1.22	0.49, 3.01	0.76	0.38, 1.51	0.50	0.22, 1.10
Native American vs White	1.76*	1.14, 2.71	2.30***	1.46, 3.62	0.75	0.48, 1.15	1.19	0.67, 2.01	1.44	0.55, 3.74	0.97	0.48, 1.94	0.84	0.40, 1.75
Native American vs African American	0.97	0.63, 1.50	0.99	0.62, 1.57	1.50	0.96, 2.36	1.40	0.76, 2.59	1.18	0.44, 3.19	1.27	0.61, 2.65	1.69	0.71, 4.01
Diabetes duration (decades)	0.91	0.77, 1.07	0.95	0.81, 1.13	1.07	0.91, 1.26	0.87	0.69, 1.09	0.94	0.66, 1.35	1.07	0.82, 1.38	1.01	0.76, 1.36
No. of prescription medicines	0.95*	0.90, 0.99	0.97***	0.92, 1.03	1.03	0.98, 1.09	1.01	0.94, 1.07	1.01	0.91, 1.12	0.96	0.88, 1.04	1.02	0.94, 1.10
No. of long-term conditions	1.10*	1.01, 1.20	1.27***	1.15, 1.39	1.07	0.98, 1.17	1.06*	0.94, 1.18	1.05**	0.87, 1.26	1.16*	1.01, 1.33	1.12	0.97, 1.30
Education														
High school vs < high school	0.89	0.58, 1.37	0.82	0.52, 1.27	1.73*	1.12, 2.67	1.81*	1.04, 3.14	0.84	0.29, 2.42	2.27*	1.20, 4.32	0.76	0.35, 1.66
Some college vs < high school	0.80	0.48, 1.36	0.96	0.56, 1.64	1.66	0.98, 2.81	2.52*	1.34, 4.74	3.30*	1.31, 8.35	1.18	0.49, 2.85	0.53	0.20, 1.36
Some college vs high school	0.90	0.52, 1.57	1.17	0.66, 2.08	0.96	0.54, 1.68	1.39	0.74, 2.63	3.92***	1.43, 10.75	0.51	0.21, 1.22	0.69	0.25, 1.90
Economic status														
No Medicaid, < \$25,000/year vs Medicaid	1.10	0.74, 1.63	0.91	0.60, 1.37	1.38	0.92, 2.07	1.32	0.76, 2.30	1.29	0.45, 3.65	0.77	0.40, 1.48	1.38	0.66, 2.88
No Medicaid, > \$25,000/year vs Medicaid	1.01	0.57, 1.80	0.65	0.36, 1.18	1.64	0.91, 2.94	1.89	0.88, 4.04	5.78**	1.77, 18.87	0.91	0.37, 2.21	1.79	0.68, 4.73
No Medicaid, > \$25,000/year vs no Medicaid, < \$25,000/year	0.92	0.57, 1.49	0.72	0.44, 1.18	1.19	0.73, 1.94	1.43	0.78, 2.62	4.49***	1.84, 10.95	1.18	0.56, 2.50	1.30	0.59, 2.86

Notes: CAM = complementary and alternative medicine; ELDER = Evaluating Long-term Diabetes self-management among Elder Rural adults. The Analysis controlled for all variables listed and living arrangements (living with others and unmarried vs living alone; living with others and married vs living alone; living with others and unmarried vs living with others and married); supplemental insurance; and diabetes medication (oral only vs none; insulin vs none; oral only vs insulin). The odds ratios for these predictors were not statistically significant for any of the outcomes.

\*  $p < 0.05$   
 \*\*  $p < 0.01$   
 \*\*\*  $p < .001$ .

**Table 4**  
Multiple Logistic Regression Models of CAM Diabetes Care, the ELDER Study, North Carolina, 2002

Variable	Food Home Remedies		Other Home Remedies	
	OR	95% CI	OR	95% CI
Female vs male	1.62 <sup>*</sup>	0.92, 2.89	1.18 <sup>**</sup>	0.64, 2.19
Ethnicity				
African American vs White	2.37 <sup>*</sup>	1.21, 4.65	2.88 <sup>**</sup>	1.33, 6.24
Native American vs White	2.21 <sup>*</sup>	1.10, 4.41	4.20 <sup>***</sup>	1.96, 8.98
Native American vs African American	0.93	0.52, 1.67	1.46	0.77, 2.75
Diabetes duration (decades)	0.90	0.70, 1.17	1.31 <sup>*</sup>	1.03, 1.68
No. of prescription medicines	1.02	0.95, 1.11	1.05	0.97, 1.14
No. of long-term conditions	1.06	0.93, 1.21	1.21 <sup>**</sup>	1.06, 1.40
Education				
High school vs < high school	0.67	0.33, 1.36	0.55	0.24, 1.26
Some college vs < high school	0.32	0.09, 1.13	0.95	0.37, 2.42
Some college vs high school	0.48	0.12, 1.82	1.74	0.59, 5.20
Economic Status				
No Medicaid, < \$25,000/year vs Medicaid	0.81	0.45, 1.44	1.37	0.72, 2.59
No Medicaid, > \$25,000/year vs Medicaid	0.53	0.19, 1.51	1.62	0.60, 4.38
No Medicaid, > \$25,000/year vs no Medicaid, < \$25,000/year	0.66	0.25, 1.75	1.18	0.48, 2.91

*Notes:* The analysis controlled for all variables listed and living arrangements (living with others and unmarried vs living alone; living with others and married vs living alone; living with others and unmarried vs living with others and married); supplemental insurance; and diabetes medication (oral only vs none; insulin vs none; oral only vs insulin). The odds ratios for these predictors were not statistically significant for any of the outcomes.

\*  
 $p < .05$

\*\*  
 $p < .01$

\*\*\*  
 $p < .001$ .