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Complementary and Alternative Medicine Use and Diabetes Self-Management Among Rural Older Adults

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Abstract

Complementary and alternative medicine (CAM) is a growing form of self-care and is related to other healthy behaviors. This study examines the relationship between CAM use and diabetes self-management. A survey of rural older African American, Native American, and White adults with diabetes was conducted. Data were collected on diabetes self-management domains and general and diabetes-specific CAM use. Some associations were observed, particularly for CAM use and following a healthy eating plan. CAM is part of the health maintenance strategy of rural older adults with diabetes. Further research should examine the health trajectory associated with CAM use in this population.

Keywords

complementary and alternative medicine; diabetes mellitus; self-management; African Americans; Native Americans

Complementary and alternative medicine (CAM) is a popular form of self-care in the United States. Recent data indicate that approximately 36% of adults have used some form of CAM in the previous year (Barnes, Powell-Griner, McFann, & Nahin, 2004), with a substantial amount of out-of-pocket expense (MacLennan, Wilson, & Taylor, 2002). Factors generally associated with CAM use include racial/ethnic minority status, female gender, middle age compared to younger or older ages, higher educational attainment and socioeconomic status, and poorer self-rated health, with some variation in other characteristics depending on the form of CAM being examined (Arcury et al., in press; Barnes et al., 2004; Eisenberg et al., 1998; Kessler et al., 2001). CAM is also generally associated with other healthy behaviors (Garrow & Egede, 2006; Gray, Tan, Pronk, & O'Connor, 2002; Robinson, Crane, Davidson, & Steiner, 2002), suggesting that CAM is one part of a holistic approach to self-care (Astin, 1998).

Diabetes is a growing public problem in the United States and worldwide. Diabetes is the sixth leading cause of death in the United States, and it increases the risk of major health complications, such as lower extremity amputation, end-stage renal disease, and blindness (Centers for Disease Control and Prevention [CDC], 2005). Total direct and indirect costs in the United States associated with diabetes are approximately $132 billion annually (CDC, 2005). Risk of diabetes and its complications is highest for older adults, ethnic minorities, and persons in rural communities (CDC, 2005).

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Adherence to a regimen involving both medical and lifestyle behaviors can substantially reduce the risk of developing diabetes complications. The domains of diabetes self-management generally consist of diet therapy, physical activity, blood glucose self-monitoring, self-foot inspection and care, and medication adherence (American Diabetes Association, 2006).

Although there is some data on the relationship between CAM use and healthy behaviors in the general population, there are limited data on the relationship between CAM use and diabetes self-management behaviors. Garrow and Egede (2006) recently showed that persons with diabetes who use CAM are more likely to receive pneumonia vaccination and are more likely to participate in conventional medical care than are those who did not use CAM. However, their analysis did not consider self-management practices specific to diabetes or the specific reasons for which CAM was used. The relationship between CAM use and diabetes self-management is important to consider, especially among rural older adults, who have limited access to conventional health care (Bell, Quandt, et al., 2005; Coon & Zulkowski, 2002; Dansky & Dirani, 1998).

The purpose of this article is to examine the relationship between CAM use and domains of diabetes self-management in an ethnically diverse sample of rural older adults.

METHODS

Study Description

The Evaluating Long-term Diabetes Self-management among Elder Rural Adults (ELDER) Study was a population-based cross-sectional survey that comprehensively assessed the self-management strategies of rural adults aged 65 years or older with diagnosed diabetes (Bell, Arcury, et al., 2005; Bell, Quandt, et al., 2005; Bell, Smith, et al., 2005; Grzywacz et al., 2006; Quandt 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 study was approved by the Institutional Review Board of Wake Forest University School of Medicine.

Participant Recruitment and Selection

The ELDER Study recruited a random sample of community-dwelling older adults with diabetes, stratified by gender and ethnicity (African Americans, Native Americans, and Whites). 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, ninth edition [ICD-9] 250) in 1998 to 2000. The study began in 2001, with recruitment of participants conducted from May to October 2002. An interviewer contacted each participant to confirm diabetes status and ethnicity and to assess eligibility (resident of study counties, age ≥65, English speaking, physically and mentally able to participate in survey) and willingness to participate in the study.

Sampling and recruitment have been described previously (Bell, Quandt, et al., 2005). The final sample included 701 individuals. The overall response rate for eligible participants was 89% (701/787). A total of 679 participants were used for this analysis. Three participants who did not fit the ethnic categories were excluded, and the remainder were excluded because of missing data.

Study Measures

Face-to-face interviews were conducted by local, trained interviewers. Participation in the study involved a 1.5-hour interview. Interview data were recorded on paper forms, with data entered into EpiInfo (version 6.0; CDC, Atlanta, GA). The survey instrument included well-

established standardized scales as well as items developed and pilot tested by the investigators. The interview assessed concepts reflecting lifestyle behaviors, medication use, physical and mental health, and descriptions of social support and access to health care.

Predictor Variable

Although data were collected 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 seven major CAM categories in the past year for (a) general use and (b) diabetes care (Arcury et al., 2006). The seven major CAM categories include (a) food home remedies, (b) other home remedies, (c) vitamins or minerals, (d) herbs, (e) popular manufactured products, (f) CAM therapies, and (g) CAM practitioners. Categories were constructed to include therapies with similar behavioral and cognitive features, that is, the use of foods based on folk knowledge, the use of therapies that required learning or training, and the use of practitioners that required payment. For the regression models, five (food home remedy, other home remedy, vitamins/minerals, herbs, popular manufactured products) of the seven CAM categories were combined into one measure of consumed CAM products.

Outcome Variables

Five domains of diabetes self-management were considered as outcome measures. Each of these measures was drawn from the Summary of Diabetes Self-Care Activities (SDSCA) Scale (Toobert, Hampson, & Glasgow, 2000). The SDSCA is a well-validated instrument of assessing frequency of diabetes self-management behavior. The instrument consists of 11 items assessing the major domains of diabetes self-management. Respondents answer each item with a frequency-based response set representing the number of days in the past 7 days (0–7) that they participated in the particular self-management activity. Responses to the following questions were considered: (a) physical activity, “On how many of the last 7 days did you participate in at least 30 minutes of physical activity?” (persons who reported having exercised less than once per week on average in the past year were classified as 0 days of exercise); (b) blood glucose self-monitoring, “On how many of the last 7 days did you test your blood sugar?” (c) foot care, “On how many of the last 7 days did you check your feet?” (d) diet, “On how many of the last 7 days did you follow a healthful eating plan?” (d) medication adherence, “On how many of the last 7 days did you take your recommended insulin injections?”; and (e) “On how many of the last 7 days did you take your recommended number of diabetes pills?” For persons using both insulin and oral agents, we used the response to the insulin question. For those on neither medication, we indicated those persons as being in full compliance (i.e., 7 days).

The self-management outcomes were dichotomized to reflect to some extent the distribution of responses by participants and to reflect compliance with current medical recommendations. For physical activity, self-monitoring blood glucose, foot care, and diet adherence, recommendations vary but can be performed with some benefit on some days in a week (e.g., current physical activity recommendations are at least 3 days per week). These outcomes were dichotomized as 0 days versus >0 days. Daily use of diabetes medications reflects full compliance, and thus this outcome was dichotomized as <7 days versus 7 days.

Model Covariates

Demographic variables considered include ethnicity (African American, Native American, and White), gender, age (continuous), marital status (married, not married), living arrangements (living alone, living with others and unmarried, living with others and married), level of formal education (<high school, high school degree, some college), poverty status (receiving Medicaid, not receiving Medicaid and annual income <$25,000, and not receiving Medicaid

and annual income ≥$25,000). Health-related variables considered include self-rated health (excellent, very good, good versus fair or poor), body mass index (continuous), diabetes duration (continuous), hemoglobin A1c (continuous), diabetes medication (none, oral agents only, insulin with or without oral agents), number of prescription medications, and number of chronic conditions (>5 or ≤5). Quality of life was assessed using the physical and mental score subscale of the Short Form–12 (SF-12; Ware, Kosinski, & Keller, 1996, 1998). Higher scores for this measure indicate higher physical and mental functioning. The number of prescription medications was tallied. The number of long-term health conditions was the total number of conditions reported in response to questions about 11 specific conditions and to an open-ended question asking if the patients had any other long-term health condition. Diabetes was not counted as a condition.

Statistical Analysis

Data were analyzed using SAS Statistical Software (version 8.02; SAS Institute, Inc., Cary, NC). Demographic and health characteristics were summarized using counts and percentages or means and standard deviations (Table 1). Bivariate associations between categories of general CAM use (Table 2) and diabetes-related CAM use (Table 3) and domains of diabetes self-management were evaluated for statistical significance using chi-square. Fisher's exact test was used when necessary because of low expected cell counts.

Multiple logistic regression models were used to evaluate the independent associations between general and diabetes-specific CAM use and each dichotomous self-management outcome adjusting for gender, ethnicity, education, living arrangement, poverty status, self-rated health, SF-12 physical and mental component score, number of chronic conditions, and number of prescription medications. For each outcome, a Gender × Ethnicity interaction term was evaluated in the model with all other covariates. If this term was statistically significant ($p<.05$), then it was retained in the model. If the interaction was not significant, then it was dropped from the model. Logistic regression results for the three categories of general and diabetes-specific CAM use (after adjusting for all model covariates) were presented as estimated odds ratios and corresponding 95% confidence intervals for each outcome.

RESULTS

Table 1 shows the demographic and health characteristics of the sample. By design, the sample was approximately equally distributed among the three ethnic groups and among men and women. About two thirds of the sample had less than a high school education, and about 80% were either receiving Medicaid or had incomes less than $25,000/year. Less than half reported their health as excellent, very good, or good, reflective of the higher levels of chronic health conditions and use of prescription medications. The mean body mass index was near the level considered as obese.

Table 2 displays bivariate associations between general CAM use and domains of diabetes self-management. For general CAM use, following a healthy eating plan was positively associated with use of vitamins/minerals (40.0% vs. 27.0%, $p< .001$), herbs (50.0% vs. 32.5%, $p< .05$), popular manufactured products (51.3% vs. 32.7%, $p< .05$), and CAM therapies (49.2% vs. 31.7%, $p< .01$). No other associations were observed, except for foot inspection being positively associated with use of other home remedies (80.7% vs. 73.1%, $p < .05$).

Table 3 shows associations for CAM use specific for diabetes treatment. Following a healthy eating plan was positively associated with use of other home remedies (47.8% vs. 32.1%, $p < .01$), popular manufactured products (71.4% vs. 33.3%, $p < .05$), CAM therapies (58.8% vs. 32.8%, $p < .05$), and CAM practitioners (80.0% vs. 33.3%, $p < .05$). Self-monitoring blood glucose was positively associated with the use of food home remedies (90.0% vs. 74.2%, $p < .$

01) and vitamins/minerals (91.3% vs. 75.0%, $p < .05$). Foot inspection was positively associated with use of food home remedies (92.4% vs. 75.3%, $p < .001$), other home remedies (87.1% vs. 76.3%, $p < .05$), and vitamins/minerals (91.1% vs. 76.4, $p < .05$). Medication adherence was positively associated with use of vitamins/ minerals (100% vs. 91.9%, $p < .05$). There was no association observed between physical activity and any form of CAM use, either for general or diabetes-specific treatment.

Table 4 shows the results of logistic regression between CAM for general and diabetes-specific use and three of the five categories of diabetes self-management. Consuming CAM products for diabetes-related care was associated with foot inspection (odds ratio [OR] = 2.4, 95% confidence interval [CI] = 1.4–4.2). All categories of CAM use, with the exception of CAM practitioners for general use, were associated with following a healthful eating plan. For CAM products consumed for general use, the OR was 1.8 (95% CI = 1.1–3.1), whereas the OR for use of CAM therapies was 2.0 (95% CI = 1.1–3.5). For diabetes-related use, the ORs were consumed, 1.8 (95% CI = 1.2–2.7); therapies, 2.9 (95% CI 1.0–8.2); and practitioners, 9.6 (95% CI = 1.9–48.3). None of the CAM categories were associated with medication adherence.

CONCLUSIONS

Diabetes is a common chronic health condition among older adults that requires, in addition to medical management, extensive effort on the part of the person with diabetes to successfully manage the condition to avoid its deadly complications. Understanding the factors that influence or are related to diabetes self-management behaviors is critical to addressing the specific needs of diabetes patients. CAM use is one form of self-care that may be related to diabetes self-management behaviors. Previous studies have shown that persons with diabetes are more likely to use CAM than their counterparts without diabetes are (Bell et al., in press; Egede, Ye, Zheng, & Silverstein, 2002). However, to date, there is limited understanding of the relationship between CAM use and diabetes self-management behaviors.

In the present study, some domains of diabetes self-management were positively related to general and diabetes-related CAM use. The most consistent association was observed for CAM use and following a healthful eating plan. Previous studies have shown that CAM use is associated with preventive health behaviors and may be part of a broader lifestyle (Astin, 1998). For example, Robinson and colleagues (2002) showed that participants at a health fair who used herbs or supplements were 1.5 times more likely to eat a low-fat diet compared to nonusers. Similarly, Gray and colleagues (2002) observed that members of a Minnesota health maintenance organization who used CAM were more likely to be regular exercisers, eat more vegetables, have a lower fat diet, and consume less alcohol. However, these associations have not been demonstrated in persons with diabetes.

The present study is unique for several reasons. First, we examined the relationship between CAM use and health behaviors specific to managing a chronic disease. This is, to our knowledge, the first study to delineate the association of CAM use and diabetes self-management behaviors. Garrow and Egede (2006), in an analysis of data from the 2002 National Health Interview Survey, showed that CAM use was positively associated with receipt of pneumonia but not influenza vaccination and was positively associated with receipt of conventional medical care. This study did not include the diabetes-specific behaviors that are considered in the present study.

A second unique aspect of this study is the rural, multiethnic study sample. This population is at very high risk for diabetes and its complications, so it is important to fully understand factors that might influence these outcomes. Our previous work has shown differences in CAM use

across ethnic groups (Arcury et al., 2006), so these findings suggest that the underlying influences of CAM use are common across this population.

A third unique aspect of this study is the examination of the relationship between CAM use and diabetes self-management, with CAM use considered for both general use and diabetes-specific use. This represents use of CAM for both primary and secondary disease prevention. More variation was observed between self-management and diabetes-specific CAM use compared to general use. It is likely that this indicates that the diagnosis of diabetes represents an increased awareness of personal health and a need to address diabetes care through a variety of methods. Also, because there are considerable costs associated with diabetes management, it is possible that the use of CAM may reflect a need to pursue low-cost means to manage diabetes (Pagan & Pauly, 2004). Further investigation is needed to more fully elucidate this relationship.

This study has a number of limitations that must be considered in light of the study findings. First, these data are cross-sectional, which limits the ability to attribute causality to these relationships and limits our ability to determine the health impacts of these associations. Second, these data are self-reported and may be influenced by reporting biases. Third, although the sample size for the study is large, some associations resulted in sample sizes that were too small to adequately analyze. For example, the numbers of participants using some CAM products, such as herbs and popularly manufactured projects, were low (<50), particularly for diabetes-related care (<20). Fourth, our sampling frame was limited to those residents who had two diabetes claims in the 2-year period indicated. Finally, this study may have limited generalizability, given that the sample was drawn from two rural communities in central North Carolina.

Despite these limitations, this study provides some evidence that CAM use may be associated with diabetes self-management, particularly with regard to following a healthful eating plan. Further research should address the full spectrum of CAM use among persons with diabetes, including the health trajectory of persons who use CAM to manage their diabetes and overall health. Health care professionals should also be aware of the interrelationship between CAM use and self-management among their diabetes patients. This is particularly true for factors in which there are physiologic implications, such as medication interaction with CAM therapies such as herbs. Health care providers would also benefit from understanding the motivations for their patients' using CAM and their beliefs regarding the efficacy of these therapies. Furthermore, high levels of CAM use are likely to signal a patient that is highly motivated to personally manage his or her health, so particular attention should be paid to educating and monitoring these patients.

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Biography

Biographical Data. Ronny A. Bell, PhD, MS, is an associate professor in the Department of Epidemiology and Prevention, Division of Public Health Sciences, Wake Forest University School of Medicine. His research is focused on chronic disease epidemiology in ethnic minority populations. Jeanette M. Stafford, MS, is a biostatistician III in the Department of Biostatistical Sciences, Division of Public Health Sciences, Wake Forest University School of Medicine. Thomas A. Arcury, PhD, is a professor and research director in the Department of Family and Community Medicine at Wake Forest University School of Medicine. His research is focused on improving the health of underserved, particularly rural and minority, populations. Beverly M. Snively, PhD, is an associate professor in the Department of Biostatistical Sciences, Division of Public Health Sciences, Wake Forest University School of Medicine. Her research activity is focused on analysis of data from genetic and epidemiologic studies. Her methodologic interests are in the development of statistical models for inference using profile likelihood functions with data from multiple sources. Shannon L. Smith, MA, is a research associate in the Department of Epidemiology and Prevention, Division of Public Health Sciences, Wake Forest University School of Medicine. Joseph G. Grzywacz, PhD, is an assistant professor in the Department of Family and Community Medicine at Wake Forest University School of Medicine. His research focuses primarily on the health-related implications of the work-family interface, socioeconomic and racial disparities in health, and the organization of work. Sara A. Quandt, PhD, is a professor in the Department of Epidemiology and Prevention, Division of Public Health Sciences, Wake Forest University School of Medicine. Her research focuses are social gerontology and rural health.

TABLE 1

Demographic and Health Characteristics (*n* [%] or *M* ± *SD*) of Older African American, Native American, and White Older Adults (≥65 years) in the ELDER Diabetes Study, 2002 Overall

Characteristic	Overall (*n* = 679)
Personal	
Ethnicity	
African American	216 (31.8)
Native American	172 (25.3)
White	291 (42.9)
Female	334 (49.2)
Age (years)	74.1 ± 5.41
Living arrangements	
Living alone	209 (30.8)
Living with others and unmarried	138 (20.3)
Living with others and married	332 (48.9)
Formal education (*n* = 678)	
Less than high school	438 (64.6)
High school diploma/GED	142 (20.9)
Some college	98 (14.5)
Poverty status (*n* = 650)	
Medicaid	230 (35.4)
No Medicaid and income <$25,000	298 (45.9)
No Medicaid and income ≥$25,000	122 (18.8)
Health	
Self-rated health (excellent, very good, good)	307 (45.2)
Body mass index (kg/m^2) (*n* = 649)	29.7 ± 5.89
Diabetes duration (years)	12.4 ± 11.00
Hemoglobin A1c (%) (*n* = 674)	6.8 ± 1.32
Diabetes medication	
No medication	84 (12.4)
Oral agent only	411 (60.5)
Insulin with or without oral agents	184 (27.1)
Number of chronic conditions >5 PCS score (*n* = 647)	355 (52.7)
Number of chronic conditions >5	211 (31.1)
PCS score (*n* = 647)	35.1 ± 11.35
MCS score (*n* = 647)	50.5 ± 10.80

Note. ELDER = Evaluating Long-term Diabetes Self-management among Elder Rural Adults; GED = general equivalency diploma; PCS = physical score subscale; MCS = mental score subscale.

TABLE 2

Bivariate Associations Between General CAM Use in the Past Year and Participation in Diabetes Self-Management in the Past Week (Count [%]) in the ELDER Study

		Physically Active >0 Days		Self-Monitoring Blood Glucose >0 Days		Foot Inspection >0 Days		Following Healthful Eating Plan >0 Days		Medication Adherence 7 Days	
CAM Category	**N**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**
Food home remedy											
Yes	354	118	33.5	275	77.7	279	79.3	118	33.6	326	92.1
No	324	86	26.8	241	74.4	238	75.3	106	33.5	301	92.9
Other home remedy											
Yes	385	116	30.4	301	78.2	309	80.7*	133	35.0	352	91.4
No	294	88	30.1	216	73.5	209	73.1	91	31.6	276	93.9
Vitamins/minerals											
Yes	341	104	30.7	270	79.2	269	80.1	134	40.0***	318	93.3
No	338	100	29.9	247	73.1	249	74.8	90	27.0	310	91.7
Herbs											
Yes	39	15	38.5	30	76.9	31	79.5	19	50.0*	37	94.9[a]
No	640	189	29.8	487	76.1	487	77.3	205	32.5	591	92.3
Popular manufactured products											
Yes	41	16	39.0	33	80.5	33	80.5	20	51.3*	39	95.1[a]
No	630	186	29.8	478	75.9	478	77.0	203	32.7	583	92.5
CAM therapies											
Yes	67	20	30.3	55	82.1	55	83.3	32	49.2**	63	94.0
No	611	184	30.3	461	75.5	462	76.7	191	31.7	564	92.3
CAM practitioners											
Yes	57	19	33.3	47	82.5	45	80.4	20	35.7	51	89.5[a]
No	619	185	30.1	467	75.4	470	77.1	204	33.5	574	92.7

Note. CAM = complementary and alternative medicine; ELDER = Evaluating Long-term Diabetes Self-management among Elder Rural Adults; N = maximum row denominator; number may vary slightly because of missing data.

[a] Fisher's exact test used because of low expected cell counts.

* $.01 < p \leq .05$

** $.001 < p \leq .01$

*** $p \leq .001$, for chi-square tests of association between CAM categories and self-management domains.

TABLE 3

Bivariate Associations Between Diabetes-Related Complementary and Alternative Medicine (CAM) Use in the Past Year and Participation in Diabetes Self-Management in the Past Week in the ELDER Study

		Physically Active >0 Days		Self-Monitoring Blood Glucose >0 Days		Foot Inspection >0 Days		Following Healthful Eating Plan >0 Days		Medication Adherence 7 Days	
CAM Category	**N**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**
Food home remedy											
Yes	80	25	31.3	72	90.0**	73	92.4***	34	43.0	74	92.5
No	592	177	30.2	439	74.2	439	75.3	189	32.5	548	92.6
Other home remedy											
Yes	71	23	32.4	57	80.3	61	87.1*	33	47.8**	64	90.1
No	605	181	30.2	457	75.5	455	76.3	191	32.1	561	92.7
Vitamins/minerals											
Yes	46	14	30.4	42	91.3*	41	91.1*	19	41.3	46	100.0a,*
No	632	190	30.3	474	75.0	476	76.4	205	33.0	581	91.9
Herbs											
Yes	16	6	37.5a	12	75.0a	15	93.8a	9	56.3	15	93.8a
No	661	198	30.2	503	76.1	501	77.0	215	33.1	611	92.4
Popular manufactured products											
Yes	7	1	14.3a	6	85.7a	7	100.0a	5	71.4a,*	7	100.0a
No	662	199	30.3	503	76.0	502	76.9	217	33.3	613	92.6
CAM therapies											
Yes	17	7	41.2	13	76.5a	14	82.4a	10	58.8*	16	94.1a
No	660	197	30.1	503	76.2	502	77.2	213	32.8	610	92.4
CAM practitioners											
Yes	10	3	30.0a	8	80.0a	9	90.0a	8	80.0a,**	8	80.0a
No	666	201	30.4	506	76.0	506	77.1	216	33.0	617	92.6

Note. CAM = complementary and alternative medicine; ELDER = Evaluating Long-term Diabetes Self-management among Elder Rural Adults; N = maximum row denominator; number may vary slightly because of missing data.

[a]Fisher's exact test used because of low expected cell counts.

*$.01 < p \leq .05$

** $.001 < p \leq .01$

*** $p \leq .001$, for chi-square tests of association between CAM categories and self-management domains.

TABLE 4

Logistic Regression Results[a] (Adjusted Odds Ratio [95% CI]) for Associations Between CAM for General Use and Diabetes Care in the Past Year and Participation in Selected Diabetes Self-Management Behaviors in the Past Week (N) in the ELDER Study

	CAM for General Use			CAM for Diabetes Care		
Self-Management behavior[b]	**Consumed[c]**	**Therapies**	**Practitioners**	**Consumed[c]**	**Therapies**	**Practitioners**
Foot inspection						
OR	1.6	1.5	1.4	2.4**	1.4	2.1
95% CI	0.9, 2.6	0.7, 3.2	0.6, 2.9	1.4, 4.2	0.4, 5.0	0.3, 17.3
Compliant participants[d]	470	470	468	470	469	
n[e]	609	609	607	609	608	607
Healthful eating plan						
OR	1.8*	2.0*	1.2	1.8**	2.9*	9.6**
95% CI	1.1, 3.1	1.1, 3.5	0.7, 2.3	1.2, 2.7	1.0, 8.2	1.9, 48.3
Compliant participants[d]	202	202	202	202	202	202
n[e]	607	607	605	607	606	605
Medication adherence						
OR	0.6	1.2	0.8	0.9	1.7	0.7
95% CI	0.2, 1.5	0.4, 3.5	0.3, 2.1	0.4, 1.8	0.2, 13.7	0.1, 6.4
Compliant participants[d]	569	569	567	569	568	
n[e]	617	617	615	617	616	615

Note. CAM = complementary and alternative medicine; ELDER = Evaluating Long-term Diabetes Self-management among Elder Rural Adults; OR = odds ratio; CI = confidence interval.

[a] Adjusted for ethnicity, gender, education, living arrangements, poverty status, self-rated health, Short Form–12 physical and mental component score, number of chronic conditions, and number of prescription medications.

[b] For the multivariate analysis, all self-management behavior outcomes were dichotomized. The outcomes of foot inspection and healthful eating plan were dichotomized as 0 days versus >0 days. Compliance with recommended medication was dichotomized as <7 days versus 7 days.

[c] Consumed CAM includes food home remedy, other home remedy, vitamins/minerals, herbs, and popular manufactured products.

[d] Total number of participants compliant with the self-management behavior

[e] Total number of participants included in each model.

* $.01 < p \leq .05$

**$.001 < p \leq .01$

***$p \leq .001$.

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