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Physical Activity Among Rural Older Adults With Diabetes

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Abstract

Purpose—This analysis describes physical activity levels and factors associated with physical activity in an ethnically diverse (African American, Native American, white) sample of rural older adults with diabetes.

Method—Data were collected using a population-based, cross-sectional stratified random sample survey of 701 community-dwelling elders with diabetes completed in 2 rural North Carolina counties. Outcome measures were as follows: first, physical activity in the past year, and second, days physically active in the prior week (0-7). Potential correlates included personal and health characteristics and were evaluated for statistical significance using logistic regression models.

Findings—About half (52.5%) of the participants stated that they had engaged in physical activity in the past year. Among those, 42.5% stated that they had no days with at least 30 minutes of continuous physical activity in the prior week, while 21.5% reported daily physical activity. Common activities were walking and housework. Correlates of physical activity in the past year and days active in the prior week included measures of physical health and mobility.

Conclusions—Physical activity in this ethnically diverse sample of rural elders with diabetes is limited. Effort must be invested to increase physical activity in these groups.

Physical activity is important to maintaining health among older adults,^{1,2} particularly for the self-management of common chronic conditions such as diabetes for which it can help delay complications, increase quality of life, and delay mortality.³ Like other components of health self-management, physical activity is influenced by personal, health, and environmental factors.

Older adults with diabetes often have difficulty achieving recommended levels of physical activity precisely because of the combination of physical and mental ailments that they experience with aging.⁴ Older adults residing in rural communities have particular difficulties being physically active.⁵ The Centers for Disease Control and Prevention⁶ found that a lower

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percentage of rural compared to urban/metropolitan adults aged 65 to 74 years participated in leisure-time physical activity. Brownson et al⁷ reported that women aged 40 years and older in rural areas were one third more likely to be physically inactive than were their urban counterparts. Wilcox et al⁸ found that rural women, especially those who were educated and lived in the South, were more sedentary than urban women. Characteristics of the rural built environment,^{5,8} including few protected areas such as sidewalks and parks, make physical activity difficult. The social structure of rural communities includes few organizations to support physical activity, with those few organizations being concentrated in larger towns and inaccessible to those living in the open country and small towns.^{5,9,10} Finally, rural cultural norms sometimes limit the willingness of older adults to be physically active.¹¹

National data on levels of physical activity among older adults by ethnicity are limited and provide contradictory information about physical activity levels among minority elders. Barnes and Schoenborn¹ report lower physical activity among adult African Americans and Hispanics than that among whites, but they do not compare ethnic groups by age. Crespo et al¹² show low levels of age-adjusted leisure-time physical activity among African Americans and Mexican Americans compared to that among whites. Lower physical activity is reported for minority women.^{7,13,14} However, Wood¹⁵ found no ethnic differences in physical activity among adults with diabetes. Physical activity among older adults is also related to several personal (gender, age, ethnicity, education, and economic status) and health characteristics (number of health conditions, health-related quality of life [HRQOL]).^{1,7,12,13}

Information about factors related to physical activity is vital for health educators attempting to shape elders' diabetes self-management programs and improve their health. In this study, we describe the level and types of physical activity among a sample of rural older adults with diabetes. We then determine personal and health factors associated with physical activity.

Research Design and Methods

Data come from the ELDER Study, described previously.¹⁶ This population-based cross-sectional survey of rural adults aged ≥ 65 years with diagnosed diabetes randomly selected participants by gender who had at least 2 outpatient claims for diabetes (ICD-9 250) in 1998-2000 from Medicare claims for 2 North Carolina counties. Recruitment continued to a minimum target number for each of 6 gender-ethnic groups (female and male African Americans, Native Americans, whites). Both of the counties are classified nonmetropolitan.¹⁷ In-home interviews lasting 1.5 hours were conducted from May through October 2002. The overall response rate for eligible participants was 89% (701/787). Three who did not fit the ethnic categories were excluded from this analysis.

Two outcomes were (1) self-reported participation in physical activity in the past year (yes = exercised at least about once per week on average in the past year vs no = less than once per week) and (2) self-reported number of days physically active in the prior week (0-7 days with at least 30 minutes of continuous physical activity) adapted from a summary of diabetes self-care activities scale.¹⁸ Those physically active at least 1 day reported types of routine physical activity.

Independent variables included gender, ethnicity, age, educational attainment, and marital status. Economic status was based on combined information on Medicaid status and 2001 household income. Health factors included body mass index and smoking status. Number of health conditions was the number (excluding diabetes) reported in response to questions about 11 specific conditions and to an open-ended question asking participants if they had any other long-term health condition. HRQOL measures were the physical component (PCS) and mental subscale (MCS) component score subscales of the SF-12.^{19,20} Three mobility measures were obtained from the Medical Outcomes Study scale of mobility²¹: mobility limitations (values

0-100), mobility ability (values 2-10), and satisfaction with physical ability (values 0-100). Higher scores in each of these measures indicated greater perceived health, mobility, and satisfaction.

Analysis

Statistical analyses evaluated associations between personal and health characteristics and the 2 physical activity outcome variables. The outcomes were analyzed separately as factors associated with physical activity in the past year may differ from those associated with frequent continuous physical activity in the prior week.

Potential correlates were evaluated for statistical significance using simple and multiple logistic regression models. For physical activity in the past year, standard models were used. For number of days physically active in the prior week, polytomous logistic regression models with the proportional odds assumption were used.²² The association between a correlate and the outcome is measured by a single estimated odds ratio across the ordered responses (0-7 days), unless the score test for the proportional odds assumption was statistically significant. Odds ratios from the multiple regression models were adjusted for other correlates included in the model. Potential correlates were selected for the regressions because they were statistically significant in reports on physical activity and self-management. A forward selection procedure was used to further select among these potential correlates. Statistical significance was defined as $P < .05$, and 95% confidence intervals were calculated. Analyses were performed using SAS Statistical Software version 8.2 (SAS Institute, Inc., Cary, NC).

Results

Approximately half the sample were female and married (Table 1). Participants included substantial numbers of African Americans, Native Americans, and whites. The mean ($\pm$ SD) age was 74.1 ($\pm$ 5.4 years). Sixty-five percent of the participants had less than a high school education. More than one third received Medicaid, and an additional 45.5% had annual household incomes of less than \$25,000 per year. The mean body mass index was 29.6 ($\pm$ 5.9 kg/m²). The mean number of health conditions, excluding diabetes, was 4.7 ($\pm$ 2.2).

About half (365, 52.5%) of the participants had engaged in physical activity in the past year (Table 2). However, of those, 42.5% (154) reported no days physically active in the prior week, while 21.5% (78) reported daily physical activity in the prior week. Among those who reported having physical activity during the past year, the most widely reported physical activity was walking (79.7%). About two thirds indicated that housework and gardening or yard work were part of their physical activity. Other physical activities in which more than 10% of participants were involved were stretching or yoga (32.7%), chair exercises (21.7%), and indoor or outdoor bicycle riding (19.8%).

In the simple logistic regression analysis, gender, age, education, economic status, body mass index, and the 5 indicators of HRQOL were significantly associated with physical activity in the past year and days physically active in the prior week (analysis not shown). In the multiple logistic regression analyses, HRQOL measures remained significant correlates for both outcome variables (Table 3). Those with fewer mobility limitations and higher satisfaction with physical ability were more likely to report physical activity in the past year. Those with fewer mobility limitations and more mobility ability had more days being physically active in the prior week. Finally, those with more health conditions had fewer days physically active in the prior week.

Discussion

These older rural adults with diabetes engage in limited physical activity. Almost half were not physically active in the past year. Over 40% of the remainder had not been physically active at all in the week before their interview, and another 20.3% had been active for 1 to 3 days. This contrasts with other published studies. Wood¹⁵ considered exercise among persons with diabetes from all age groups and reported two thirds as physically active. The most common physical activities among those 65 and older in Wood's sample were gardening (30.5% vs 37.1% of our total sample), walking (23.0% vs 47.6%), calisthenics (11.0%), and biking (6.4% vs 11.7%). The sample analyzed by Wilcox et al,⁵ rural women aged 50 and older, was more physically active than our sample. Eyler et al¹⁴ reported approximately half as many inactive participants as our study.

This study highlights walking, either outdoors or on a treadmill, as a major form of physical activity for older adults who live in rural communities.^{11,14,23} However, the lack of appropriate places to walk and more dispersed locations of facilities with equipment like treadmills make it more difficult for rural adults to consistently engage in walking. Lifestyle activities, sources of moderate level physical activity,²⁴ are also prominent forms of physical activity among rural older adults. Health educators need to consider how older adults can be physically active in the rural context.

The positive relationship of HRQOL to physical activity underscores the importance of physical activity. While it is not possible cross-sectionally to state the causal relationship between physical activity and HRQOL, the association argues that greater physical activity is positive for older adults.

Study limitations include cross-sectional survey data, which prevent determining causation, and restriction to 1 area of rural North Carolina, which may limit its generalizability. However, the survey was conducted with a random sample of older adults with diabetes from the list of all older adults with Medicare, the response rate was high, and the study counties are typical of many rural areas.

These results indicate the characteristics of those most likely not to engage in any physical activity and those who engage in physical activity with limited frequency. Those with other physical health, mental health, and mobility limitations are least likely to engage in physical activity, suggesting that those with the worst health are likely to get even worse. Special effort must be invested in increasing physical activity in these groups. Exercise and physical activity programs must be developed and made available to older adults with diabetes. Walking paths that are safe for older adults (level, shaded, paved, no crime) in rural areas may increase the number who are physically active; gardening programs added to senior centers may also be effective. Such activities as chair exercises must be presented to older adults with diabetes in a format in which those with limited mobility can increase physical activity.

Physical activity is important to health promotion and diabetes self-management among older adults, particularly among those with chronic diseases like diabetes.²⁵ This analysis documents that older adults with diabetes living in the rural study communities have very low levels of physical activity. These results provide support for efforts to develop programs to increase physical activity among rural elders and to make environmental modifications that will facilitate greater physical activity in this segment of the population.

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Table 1
Personal and Health Characteristics of ELDER Study Participants, Overall Sample*

Personal and Health Characteristics	Overall Sample, N = 698	
	Count or Mean	% or $\pm$ SD
Personal		
Female	343	49.1
Ethnicity		
African American	220	31.5
Native American	181	25.9
White	297	42.6
Age (years)	74.1	$\pm$ 5.4
Formal education		
Less than high school	453	65.0
High school	145	20.8
More than high school	99	14.2
Married	350	50.1
Economic status, n = 668		
Medicaid	236	35.3
No Medicaid, income <\$25,000	304	45.5
No Medicaid, income $\geq$ \$25,000	128	19.2
Health		
BMI (kg/m^2)	29.6	$\pm$ 5.9
Smoking status		
Never smoked	351	50.3
Formerly smoked	283	40.5
Currently smoke	64	9.2
Number of health conditions	4.7	$\pm$ 2.2
Diabetes-related health conditions		
Heart disease	318	45.6
Eye disease	282	40.4
Stroke	177	25.4
Neuropathy	158	22.6
Kidney disease	78	11.2
Thrombosis/blood clots in legs	58	8.3
Extremity amputation	20	2.9
PCS	35.1	$\pm$ 11.4
MCS	50.5	$\pm$ 10.8
Mobility limitations	60.3	$\pm$ 20.7
Mobility ability	7.8	$\pm$ 2.9
MOS satisfaction with physical ability	55.8	$\pm$ 26.1

* BMI, body mass index; MOS, Medical Outcomes Study.

Table 2
 Characteristics of Physical Activity Among Older Adults With Diabetes, the ELDER Study

	n (%)
Physical activity in the past year	
Yes	365 (52.5)
No	330 (47.5)
Type of physical activity among participants reporting physical activity in past year*	
Walking	290 (79.7)
Housework	250 (68.7)
Gardening, yard work	236 (64.8)
Stretching or yoga	119 (32.7)
Chair exercises	79 (21.7)
Bike inside or outside	72 (19.8)
Treadmill	34 (9.3)
Weights	29 (8.0)
Dancing or aerobics	14 (3.9)
Swimming	12 (3.3)
Golf or bowling	12 (3.3)
Jogging or running	11 (3.0)
Tennis	2 (0.6)
Other	13 (3.6)
Days physically active in the prior week among participants reporting physical activity in past year*	
0	154 (42.5)
1	18 (5.0)
2	19 (5.3)
3	38 (10.5)
4	18 (5.0)
5	23 (6.3)
6	14 (3.9)
7	78 (21.5)

* Three responses are missing.

Table 3

Associations of Personal and Health Characteristics With Physical Activity in the Past Year and Days (0-7) Physically Active in the Prior Week Among Older Adults With Diabetes, the ELDER Study: Results of Multiple Logistic Regression Analyses^{*†}

Personal and Health Characteristics	Coefficient	SE	χ^2	P Value	Adjusted Odds Ratio	95% CI
Physical activity in the past year, N = 662						
Physical component score, SF-12	-0.026	0.013	3.7	.056	0.98	0.95, 1.00
Mobility limitations	0.038	0.007	26.5	<.0001	1.04	1.02, 1.05
Medical outcomes study satisfaction with physical ability	0.010	0.004	6.1	.013	1.01	1.00, 1.02
Days (0-7) physically active in the prior week, N = 362 [†]						
Number of health Conditions	-0.121	0.052	5.3	.021	0.89	0.80, 0.98
Mobility limitations	0.017	0.006	7.3	.0068	1.02	1.01, 1.03
Mobility ability	0.111	0.051	4.8	.028	1.12	1.01, 1.23

* CI, confidence interval.

[†] Results for days physically active in the prior week assume proportional odds ($P > .05$).