RISK FACTORS FOR FALLING IN OLDER MEXICAN AMERICANS

Objective: To estimate the prevalence of falls and the risk factors associated with falls in Mexican-American men and women aged 72 and older, from the Hispanic Established Population for the Epidemiological Study of the Elderly.

Design: A 2-year cohort study.

Setting: Five Southwestern states: Texas, New Mexico, Colorado, Arizona, and California.

Methods: Data on sociodemographic characteristics, health status, cognitive function, affective function, functional status, body mass index, and summary performance measures of lower body function, were obtained (1998–1999). Two years later (2000–2001), falls in the previous 12 months were assessed by self-report. Chi-square, univariate statistics, and multivariate logistic regression analyses were used.

Results: Of the 1,391 participants, 31.8% fell one or more times, and 14.2% reported 2 or more falls. In the logistic regression analysis, aged ≥80 years (adjusted odds ratio [OR]=1.52, 95% confidence interval [CI]=1.17–1.98), being female (OR=1.45, 95% CI 1.13–1.86), having diabetes (OR=1.37, 95% CI 1.06–1.77), having arthritis (OR=1.32, 95% CI 1.04–1.68), experiencing impairment of instrumental activities of daily living (OR=1.05, 95% CI 1.01–1.10), and exhibiting high depressive symptoms (OR=1.59, 95% CI 1.16–2.19), were significant ($P<.05$) independent risk factors for one or more falls. The risk of falling increased linearly with the number of risk factors, from 14% with none, to 41% with 3 or more risk factors ($P<.001$).

Conclusions: Prevalence of falls among older Mexican Americans was similar to that reported in non-Hispanic Caucasians. Potential modifiable conditions, such as functional deficits, arthritis, diabetes, and depressive symptoms were independent risk factors for falls in this population. (*Ethn Dis.* 2004;14:417–422.)

Key Words: Falls, Older Mexican Americans, Prevalence, Risk Factors

From the Division of Geriatrics (CARO, SAS, JL), Sealy Center on Aging (CARO, SAS, JL, LAR, KM), and Department of Preventive Medicine and Community Health (LAR, KM), University of Texas Medical Branch, Galveston, Texas.

Address correspondence and reprint requests to Kyriakos Markides, PhD; Department of Preventive Medicine and Community Health; University of Texas Medical Branch; Galveston, TX 77555-1153; 409-772-2551; 409-772-2573 (fax); kmarkide@utmb.edu

Carlos A. Reyes-Ortiz, MD; Soham Al Snih, MD; José Loera, MD; Laura A. Ray, MPA; Kyriakos Markides, PhD

INTRODUCTION

Approximately 30% of people aged 65 and older, who live in the community fall each year, with this proportion increasing to up to 50% by age 80.[1,2] Although, the majority of falls result in no, or minor, injury, the cost of falling is high to the older individual, and to the healthcare system.[1,3,4] About 50% of the older subjects who fall develop a fear of falling; and about half of these subjects decrease activities, such as shopping or house cleaning, because of this fear.[1] About 7% of persons aged 75 years and older visit emergency rooms for a fall injury event each year, and more than 40% of these visits result in hospital admissions.[3] Fall-related injuries account for 5.3% of all hospitalizations in persons aged 65 years and older, and fallers are more likely to be discharged to a nursing home, compared to non-fallers.[3,4]

There is enough evidence for a multi-factorial etiology of falls among community-living older populations.[1–3,5–14] This includes a combination of intrinsic (eg, gait impairment),[1,2,5,6] extrinsic (eg, polypharmacy),[1,9] and environmental factors (eg, poor lighting).[5,6] Most reports have focused on intrinsic factors. For example, in the Duke Established Population for the Epidemiological Study of the Elderly (EPESE), being of increased age, having arthritis, having diabetes, and reporting a history of frac-tured bones, were independent risk factors for falls.[7] Other studies have found that being female,[11,14] having a history of previous falls,[8,10,11] and exhibiting walking and balance impairments,[1,2,5,6,9,12,13] lower or upper extremity weakness,[1,8,10,11] functional impairment,[6,10] cognitive impairment,[1,5,12] sensory impairment,[11] and some medical conditions, such as depression,[6] urinary incontinence,[13] Parkinson's disease,[5,8] and stroke,[2] were risk factors for falls. Extrinsic factors include use of medications, especially sedatives.[1,9] Environmental hazards include holes in floors, scatter rugs, and slippery bathtubs.[5,6]

Limited information exists on the prevalence of falls in different ethnic groups. The proportion of falls is lower in some populations, such as Japanese-American elders (11% for men and 17% for women),[14] compared to Caucasian elders (from 27% to 36%, for men and women, respectively),[5,6] and older Mexican-American women (32%).[9] African-American elders had a 23% reduced risk of experiencing a fall, compared to Whites, in the Duke EPESE[7]; however, in another study, the prevalence of falls among older African-American women was similar to that of older White women.[15]

The purpose of this study is to estimate the prevalence and correlates of self-reported falls among Mexican Americans aged 72 and older, using data from the third and fourth waves of the Hispanic EPESE.

METHODS

Sample

Data are from the Hispanic EPESE, a population-based study of 3,050 non-

Although, the majority of falls result in no, or minor, injury, the cost of falling is high to the older individual, and to the healthcare system.[1,3,4]

institutionalized Mexican Americans, aged 65 and older (83% response rate), residing in 5 Southwestern states: Texas, California, New Mexico, Colorado, and Arizona. Sampling and data collection are described elsewhere.[16] Data on falls were obtained at the fourth wave during 2000–2001 from 1,391 subjects, aged 72 and older. In the analysis reported below, we used data from the third wave (1998–1999) to predict falls one to 2 years later (2000–2001).

Measures

Prevalence of falls at the fourth wave (2000–2001) was assessed by the following question: "During the past 12 months, how many times did you fall and land on the floor or ground?" Fall status was dichotomized as no falls vs one or more falls.

Potential predictors of falls were assessed at the third wave (1998–1999). These included:

1. Sociodemographic variables: age, gender, marital status, and years of education.
2. Medical conditions were assessed with a series of questions asking the respondents if they had been told by a doctor that they had arthritis, diabetes mellitus, a heart attack, hypertension, stroke, cancer, or a fracture of any bone.
3. Urinary incontinence was evaluated by the question "In the past month, how often have you had difficulty holding your urine until you could get to a toilet—never, hardly ever,

some of the time, most of the time, or all the time?" If the response was other than never, the subject was considered as experiencing incontinence.

4. Near vision was evaluated by the question "can you see well enough to recognize who is at an arm's length away?" Distant vision was evaluated by "can you see well enough to recognize a friend across the street and across the room?" Hearing was evaluated by "With/without a hearing aid, can you usually hear and understand what a person says without seeing his face, if that person talks in a normal voice to you in a quiet room?"
5. Functional status was assessed by 10 instrumental activities of daily living items (IADL),[17] and by 7 activities of daily living items (ADL).[18] The IADLs included: using the telephone, driving a car or traveling alone, shopping for groceries or clothes, preparing own meals, doing light housework, taking own medicine, handling own money, doing heavy work around the house, walking up and down stairs, and walking half a mile. Respondents were asked to indicate if they could perform the activities: without help, with help, or if they were unable to do the activity. The ADLs included: walking across a small room, bathing, grooming, dressing, eating, transferring from a bed to a chair, and using the toilet. Subjects were asked if they needed no help, needed help, or were unable to perform the activity. Both IADL and ADL were used as continuous variables.
6. Body Mass Index was computed by dividing weight in kilograms by height in meters squared. Anthropometric measurements were collected in the home using the methods and instructions employed in other EPESE studies. Height was measured using a tape placed against the wall, and weight was assessed using a Metro 9800 measuring scale.

7. A summary measure of lower body performance (POMAS) was assessed by 3 independent measures: a standing balance, a timed 8-foot walk, and timed repeated instances of rising from a seated position in a chair, to a standing position.[19,20] Using previously established criteria,[19] performance on each task is classified on a scale ranging from 0 to 4. Subjects unable to perform the particular task received a 0 score, and a 1–4 score was assigned to those able to complete the task. When the 3 tasks were summed, an overall summary performance score ranging from 0 to 12 was created, where higher scores represented better functioning.
8. Cognitive functioning was evaluated using the Mini Mental State Examination (MMSE, score 0 to 30).[21] Depressive symptomatology was measured by the Center for Epidemiologic Studies Depression Scale (CES-D).[22] Persons scoring 16 or higher were categorized as having high depressive symptomatology.[23]

Analysis

Comparisons are between the participants who fell (one or more falls) and subjects who did not report any fall. The chi-square test for categorical variables, and the *t* test statistic for continuous variables, were performed. A stepwise logistic regression analysis was used to estimate the odds of falls at one to 2 years later, comparing people without falls (*N*=949) to people who have fallen at least once (*N*=442). We also examined potential interaction effects among predictors, and evaluated the fit of the regression analysis.

Finally, we examined the risk of falling according to the number of risk factors found in the adjusted analysis. Trends of falls according to risk score were assessed by chi-square test for order of proportions. The relative risks (RR) for falls, according to the number of risk factors, were then calculated directly from the data.[24] Therefore, using 2×2

Table 1. Characteristics of the sample by falls status in older Mexican Americans (N=1,391)

Variables	No Falls (N=949)	One or More Falls (N=442)	P Value
Age, mean ± SD	76.4 ± 5.4	77.4 ± 5.8	.002
Gender, N (%)			
Female	546 (57.5)	307 (69.5)	<.001
Male	403 (42.5)	135 (30.5)	
Unmarried, N (%)	424 (44.7)	251 (56.8)	<.001
Education (years), mean ± SD	5.0 ± 3.9	4.8 ± 3.8	.271
Hypertension, N (%)	447 (47.1)	229 (51.8)	.102
Heart attack, N (%)	44 (4.6)	31 (7.0)	.068
Stroke, N (%)	32 (3.4)	18 (4.1)	.514
Diabetes, N (%)	239 (25.2)	144 (32.6)	.004
Arthritis, N (%)	448 (47.2)	256 (57.9)	<.001
Incontinence, N (%)	212 (22.3)	127 (28.7)	.010
Any fracture history, N (%)	67 (7.1)	42 (9.5)	.115
Cancer, N (%)	46 (4.9)	29 (6.6)	.188
Near vision problem, N (%)	41 (4.3)	20 (4.5)	.862
Distant vision problem, N (%)	115 (12.1)	80 (18.1)	.003
Hearing problem, N (%)	208 (21.9)	95 (21.5)	.858
Depressive symptoms (CES-D=16), N (%)	111 (11.7)	91 (20.6)	<.001
MMSE, mean ± SD	22.8 ± 5.6	21.8 ± 5.8	.005
ADL limitations, mean ± SD	0.47 ± 1.5	0.66 ± 1.6	.028
IADL limitations, mean ± SD	1.6 ± 2.7	2.4 ± 3.1	<.001
POMAS, mean ± SD	7.3 ± 3.6	6.6 ± 3.7	.001
Body mass index (kg/m²), mean ± SD	28.5 ± 5.6	28.6 ± 5.8	.296
Using aid to walk, N (%)	154 (16.2)	111 (25.1)	<.001

SD=standard deviation; CES-D=Center for Epidemiologic Studies Depression Scale (0–60); MMSE=Mini Mental Status Examination score (0–30); ADL=Activities of Daily Living (0–7); IADL=Instrumental Activities of Daily Living (0–10); POMAS=summary performance measures of lower body function score (0–12).

tables for each risk factor category (0, 1, 2, and 3 or more), RR for falls is the ratio of the risk in exposed (a/[a+b]=participants who had one or more risk factors: eg, advanced age, diabetes, etc) divided by the risk in non-exposed (c/[c+d]=participants without the risk factors). For example, for 1 risk factor, RR=(72/[72+257])/(19/[19+113])=1.5. All analyses were performed using the SAS System for Windows, version 8.0 (SAS Institute, Inc., Cary, NC).

RESULTS

Of the 1,391 subjects, 442 (31.8%) reported one or more falls. Of these 442, 244 (17.6%) reported one fall, and 198 (14.2%) reported 2 or more falls, in the previous year. Therefore, the total prevalence of falls was 31.8% in this population. Among women 307 (36%) reported one or more falls, and 145 (17%) experienced 2 or more falls.

Among men 135 (25.1%) reported one or more falls, and 53 (9.9%) fell 2 or more times.

The characteristics of the cohort at the third wave, and the bivariate analyses, are shown in Table 1. Fallers were significantly more likely to be older, female, unmarried, to report arthritis, diabetes mellitus, distant vision problems, incontinence, high depressive symptoms, to be cognitively impaired, functionally impaired (on ADL and IADL), to use aids to walk, and to have low POMAS scores.

The adjusted logistic regression analysis results predicting odds of falls (one or more falls vs no falls) in the 12 months before the fourth wave interview (2000–2001) are shown in Table 2. Age ≥80 years (Odds Ratio [OR]=1.52, 95% Confidence Interval [CI]=1.17–1.98), female gender (OR 1.45, 95% CI=1.13–1.86), arthritis (OR 1.32, 95% CI=1.04–1.68), diabetes mellitus (OR 1.37, 95%

CI=1.06–1.77), IADL impairment (OR 1.05, 95% CI=1.01–1.10), and high depressive symptoms (OR 1.59, 95% CI=1.16–2.19), were significant (P<.05) independent risk factors for experiencing one or more falls.

The occurrence of falls, according to the number of risk factors, is shown in Figure 1. The risk factors included age ≥80 years, female gender, high depressive symptoms (CES-D≥16), arthritis, diabetes mellitus, and IADL impairment. A significant increase (P<.001) in the occurrence of falls was observed as the number of risk factors increased, from 14% for no risk factors, to 41% for 3 or more risk factors. The RR increased from 1.0 to 2.9 as the number of risk factors increased, from no risk factors, to 3 or more risk factors.

DISCUSSION

The estimated prevalence of self-reported falls in this population of older

Table 2. Logistic regression predicting odds of falls (one or more falls vs no falls) among older Mexican Americans (N=1,391)*

Variables	One or More Falls (N=442) Adjusted Odds Ratio (95% Confidence Interval)
Age≥80 years	1.52 (1.17–1.98)
Female gender	1.45 (1.13–1.86)
Arthritis	1.32 (1.04–1.68)
Diabetes	1.37 (1.06–1.77)
IADL limitations†	1.05 (1.01–1.10)
Depressive symptoms (CES-D≥16)	1.59 (1.16–2.19)

IADL=Instrumental Activities of Daily Living (0–10); CES-D=Center for Epidemiologic Studies Depression Scale (0–60).

* Adjusted for marital status, education, hypertension, heart attack, stroke, incontinence, any fracture history, cancer, near vision problem, distant vision problem, hearing problem. Mini Mental State Examination, ADL limitations, summary performance measures of lower body function score, body mass index, and using aid to walk.

† Used as continuous variable, each point increases.

*. . . being 80 years of age and older, being female, and having arthritis, diabetes mellitus, functional impairment, and high depressive symptoms, were significant independent predictors of experiencing falls one to 2 years later.*

Mexican Americans was 31.8%. This prevalence rate is similar to that found among other community older populations, ranging between 27% and 36%,[1,5,6] but higher than that reported in the Duke EPESE (22.2%). However, the Duke EPESE collected data on a somewhat younger (ages 68 years and older) sample than did the Hispanic EPESE (ages 72 years and older). About half the subjects who had fallen experienced multiple falls (2 or more). This distribution is also similar to that observed for other community older populations.[1,5–7] In this cohort study, being 80 years of age and older, being female, and having arthritis, diabetes mellitus, functional impairment, and high depressive symptoms, were significant independent predictors of experiencing falls one to 2 years later.

Also, the risk of falling increased linearly with the number of risk factors. For example, a subject with 3 or more risk factors was 3 times more likely to fall than a subject without any of the above risk factors. This finding suggests, as in other studies[1,2,8] that the predisposition to falls may result from the cumulative effect of multiple conditions.

The findings of age and female gender as risk factors for falls were similar to findings of other studies. Age, especially 80 years and greater, has been reported as a risk factor for falls in longitudinal and cross-sectional studies.[1,2,6,7,9] Female gender has also been reported as a risk factor for falls or serious fall injuries.[11,14,25] In contrast, one study reported that men were 1.3 times and 1.5 times more likely to be at risk of falls, or recurrent falls, respectively.[5]

The prevalence of falls in women in this study (36%) was slightly higher than the prevalence of falls in the previous year reported by Schwartz et al[9] (32%) among Mexican American women, but their population was younger (aged 59 to 69 years) than our population.

Having diabetes mellitus was an in-
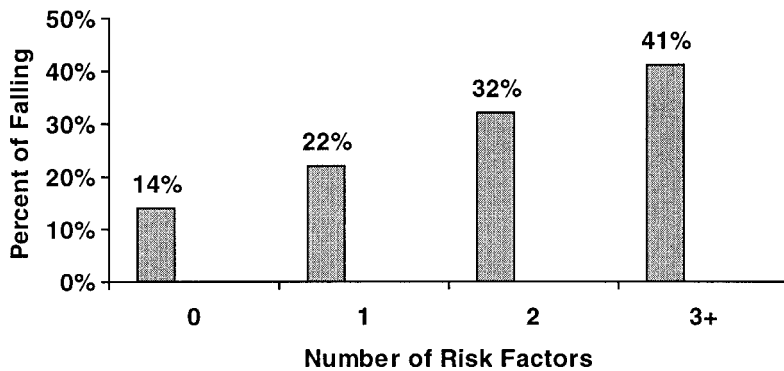
Relative Risk	1.0 (Referent)	1.5	2.3	2.9
N Falling	19	72	113	238
N Subjects	132	329	349	581

Fig 1. Occurrence of falls according to the number of risk factors in Older Mexican Americans (N=1,391). The risk factors included age ≥80 years, female gender, high depressive symptoms (CES-D≥16), arthritis, diabetes mellitus, and instrumental activities of daily living limitations. There was a significant increase in the occurrence of falling (Mantel-Haenszel Chi-squared (X^2)=55.7; P<.001) as the number of risk factors increased

dependent predictor of falls in this study. Diabetes mellitus has also been reported as an independent risk factor for falls in several studies.[7,26] Diabetes mellitus prevalence is high in the Mexican-American population, and is a risk factor for hip fracture.[27] Diabetes mellitus also is a risk factor for falls because it is associated with balance problems, peripheral neuropathy, and poor mobility.[26,27] In contrast, Rodriguez-Saldana et al[28] reported that older Mexicans with diabetes were more likely to be functionally impaired, but no more likely to fall or to have fractures.

Having high depressive symptoms (CES-D≥16) was an independent risk factor for falls, in this study, as it was found to be in other reports.[6,29–31] Although it is not clear how depression is a risk factor for falls, some mechanisms are proposed. First, depression could affect mobility. For example, Biderman et al[31] reported that falls and depression in community-dwelling elders share some risk factors, such as impaired ADLs, and slow walking speed. Second, depression or antidepressive medications may also affect alertness to environmental hazards.[6] However, because this study did not include data on medications, we could not consider whether increased risk of falls with high depressive symptoms was a direct effect of depression, or an effect of antidepressive medications.

In this study, as in other research,[7–9] arthritis was found to be a risk factor for falls. Apparently arthritis, especially when affecting lower limbs, leads to falls due to the decreased stability caused by gait impairment, muscle weakness or pain.[7–9,32,33]

Impairment of instrumental activities of daily living (IADL) was an independent risk factor for falls in this population. Some studies have reported ADL impairment as a risk factor for falls.[6,10,34] Limitation on IADL is also a marker of underlying mobility problems that could cause falls. For example, older Mexican Americans have a high prevalence of disability, related to both ADL and IADL impairments, that is associated with medical conditions such as diabetes mellitus, arthritis, heart disease, cancer, and visual impairment.[35,36]

This study had several limitations. First, its reliance on self-report data for falls and co-morbidities may be problematic, if older people do not want to admit they have experienced a fall because they attribute the fall to consequences of normal aging, or they deny the fall, either because it reminded them of increasing frailty, or because they fear that reporting it would lead to institutionalization.[37] However, one study suggests that falls recall is accurate.[12] Also, self-report of falls has been used in several studies with community-dwelling older people.[2,6–8,11–13] Second, some of the risk factors may have changed during the interval of time (about one year) between the retrospective measurement of risk factors (third wave), and of the outcome, falls (fourth wave). However, to ensure that the sample have not suffered a deterioration, we looked at the data for functional status, medical conditions, and POMAS, and observed almost no differences between wave 3 (1998–1999) and wave 4 (2000–2001), in fallers and nonfallers. Third, we had no information about previous falls, or data on medications, 2 important known risk factors for falls.[8–11]

In summary, similar to other reports, this study shows that the predisposition to falls may result from the cumulative effect of multiple conditions; this also suggests that the syndrome of falls is a marker of frailty in older people. The unique contribution of this study is that falls are associated with disability and medical conditions of high prevalence in older Mexican Americans, such as diabetes, arthritis, and symptoms of depression. A major implication of this study is that early evaluation and management of these risk factors for falls may help to decrease the number of falls, and to prevent complications of falls, in older Mexican Americans.

REFERENCES

1. Tinetti ME, Speechley M, Ginter SF. Risk factors for falls among elderly persons living in the community. *N Engl J Med.* 1988; 319(26):1701–1707.
2. O'Loughlin JL, Robitaille Y, Boivin JF, Suissa S. Incidence of and risk factors for falls and injurious falls among the community-dwelling elderly. *Am J Epidemiol.* 1993;137(3): 342–354.
3. Sattin RW, Lambert-Huber DA, DeVito CA, et al. The incidence of fall injury events among the elderly in a defined population. *Am J Epidemiol.* 1990;131(6):1028–1037.
4. Alexander BH, Rivara FP, Wolf ME. The cost and frequency of hospitalization for fall-related injuries in older adults. *Am J Public Health.* 1992;82(7):1020–1023.
5. Fletcher PC, Hirdes JP. Risk factors for falling among community-based seniors using home care services. *J Gerontol Med Sci.* 2002; 57A(8):M504–M510.
6. Cesari M, Landi F, Torre S, Onder G, Lattanzio F, Bernabei R. Prevalence and risk factors for falls in an older community-dwelling population. *J Gerontol Med Sci.* 2002; 57A(11):M722–M726.
7. Hanlon JT, Landerman LR, Fillenbaum GG, Studenski S. Falls in African-American and White community-dwelling elderly residents. *J Gerontol Med Sci.* 2002;57A(7):M473–M478.
8. Nevitt MC, Cummings SR, Kidd S, Black D. Risk factors for recurrent nonsyncopal falls: a prospective study. *JAMA.* 1989;261(18): 2663–2668.
9. Schwartz AV, Villa ML, Prill M, et al. Falls in older Mexican-American women. *J Am Geriatr Soc.* 1999;47(11):1371–1378.
10. Davis JW, Ross PD, Nevitt MC, Wasnich RD. Risk factors for falls and for serious injuries on falling among older Japanese women

in Hawaii. *J Am Geriatr Soc.* 1999;47(7):792–798.

11. Nevitt MC, Cummings SR, Hudes ES. Risk factors for injurious falls: a prospective study. *J Gerontol.* 1991;46(5):M164–M170.

12. Tinetti ME, Doucette J, Claus E, Marottoli R. Risk factors for serious injury during falls by older persons in the community. *J Am Geriatr Soc.* 1995;43(11):1214–1221.

13. Rekeneire N, Visser M, Peila R, et al. Is a fall just a fall: correlates of falling in healthy older persons. The Health, Aging and Body Composition Study. *J Am Geriatr Soc.* 2003;51(6):841–846.

14. Aoyagi K, Ross PD, Davis JW, Wasnich RD, Hayashi T, Takemoto T-I. Falls among community-dwelling elderly in Japan. *J Bone Miner Res.* 1998;13(9):1468–1474.

15. Means KM, O'Sullivan PS, Rodell DE. Balance, mobility, and falls among elderly African-American women. *Am J Phys Med Rehabil.* 2000;79(1):30–39.

16. Markides KS, Rudkin L, Angel RJ, Espino DV. Health status of Hispanic elderly. In: Martin LJ, Soldo B, eds. *Racial and Ethnic Differences in the Health of Older Americans.* Washington, DC: National Academy Press; 1997:285–300.

17. Fillenbaum GG. Screening the elderly: a brief instrumental activities of daily living measure. *J Am Geriatr Soc.* 1985;33(10):698–706.

18. Katz SC, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW. Studies of illness in the aged: the index of ADL, a standardized measure of biological and psychosocial function. *JAMA.* 1963;185:914–919.

19. Guralnik JM, Ferrucci F, Simonsick EM, Salive ME, Wallace RB. Lower-extremity function in persons over the age of 70 years as predictor of subsequent disability. *N Engl J Med.* 1995;332(9):556–561.

20. Markides KS, Black SA, Ostir GV, Angel RJ, Guralnik JM, Lichtenstein M. Lower body function and mortality in Mexican-American elderly people. *J Gerontol Med Sci.* 2001;56A(4):M243–M247.

21. Folstein MF, Folstein SE, McHugh PR. Mini-Mental State: a practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res.* 1975;12(3):189–198.

22. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas.* 1977;1:385–401.

23. Boyd JH, Weissman M, Thompson W, Myers JK. Screening for depression in a community sample. *Arch Gen Psychiatry.* 1982;39(10):1195–1200.

24. Gordis L. *Epidemiology.* 2nd ed. Philadelphia, Pa: WB Saunders Co; 2000:160–162.

25. Campbell AJ, Spears GF, Borrie MJ. Examination by logistic regression modelling of the variables which increase the relative risk of elderly women falling compared to elderly men. *J Clin Epidemiol.* 1990;43(12):1415–1420.

26. Schwartz AV, Hillier TA, Sellmeyer DE, et al. Older women with diabetes have a higher risk of falls: a prospective study. *Diabetes Care.* 2002;25(10):1749–1754.

27. Ottenbacher KJ, Ostir GV, Peek MK, Goodwin JS, Markides KS. Diabetes mellitus as a risk factor for hip fracture in Mexican-American older adults. *J Gerontol A Biol Sci Med Sci.* 2002;57(10):M648–M653.

28. Rodriguez-Saldana J, Morley JE, Reynoso MT, et al. Diabetes mellitus in a subgroup of older Mexicans: prevalence, association with cardiovascular risk factors, functional and cognitive impairment, and mortality. *J Am Geriatr Soc.* 2002;50(1):111–116.

29. Whooley MA, Kip KE, Cauley JA, Ensrud KE, Nevitt M, Browner WS. Depression, falls, and risk of fracture in older women. Study of Osteoporotic Fractures Research Group. *Arch Intern Med.* 1999;159(5):484–490.

30. Stalenhoef PA, Diederiks JPM, Knottnerus JA, Kester ADM, Crebolder HFJM. A risk model for the prediction of recurrent falls in community-dwelling elderly: a prospective cohort study. *J Clin Epidemiol.* 2002;55(11):1088–1094.

31. Biderman A, Cwikel J, Fried AV, Galinsky D. Depression and falls among community dwelling elderly people: a search for common risk factors. *J Epidemiol Community Health.* 2002;56(8):631–636.

32. Arden NK, Nevitt MC, Lane NE, et al. Osteoarthritis and risk of falls, rates of bone loss, and osteoporotic fractures. Study of Osteoporotic Fractures Research Group. *Arthritis Rheum.* 1999;42(7):1378–1385.

33. Al Snih S, Markides K, Ray L, Goodwin JS. Impact of pain on disability among older Mexican Americans. *J Gerontol A Biol Sci Med Sci.* 2001;56A(7):M400–M404.

34. Langlois JA, Smith GS, Nelson DE, Sattin RW, Stevens JA, DeVito CA. Dependence in activities of daily living as a risk factor for fall injury events among older people living in the community. *J Am Geriatr Soc.* 1995;43(3):275–278.

35. Perkowski LC, Stroup-Benham CA, Markides KS, et al. Lower-extremity functioning in older Mexican Americans and its association with medical problems. *J Am Geriatr Soc.* 1998;46(4):411–418.

36. Al Snih S, Markides K, Ray L, Freeman JL, Goodwin JS. Prevalence of arthritis in older Mexican Americans. *Arthritis Care Res.* 2000;13(6):409–416.

37. Tideiksaar R. *Falling in Old Age: Its Prevention and Treatment.* New York, NY: Springer; 1989.