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Pain and Disability in Mexican American Older Adults

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Abstract

OBJECTIVES—Limited evidence exists on the prevalence and correlates of pain and the impact on daily life in older Mexican Americans. An association between pain severity and functional disability was examined.

DESIGN—Cross-sectional study (2005–2006), a subsample of the Hispanic Established Population for Epidemiologic Study of the Elderly.

SETTING—Community.

PARTICIPANTS—1,013 Mexican American, ages 74–100 years.

MEASUREMENTS—Bilingual interviewers administered structured questionnaires and physical measures of mobility and frailty (exhaustion, weight loss, walking speed, grip strength and self-reported physical activity). Two items from the SF-36 questionnaire assessed pain experiences in the last four weeks.

RESULTS—Chi square, one-way ANOVA, and least square and negative binomial regressions were computed for 744 participants with complete data to investigate experience of pain and other dimensions of health and functioning. Sixty-nine percent reported pain within 4 weeks of the interview and 56% reported that pain interfered with performance of daily activities. Females, low education, frailty, reduced mobility, disability, and high comorbidity, body mass index, and depressive symptomatology were significantly associated with pain severity and interference. Regression coefficients revealed that pain severity was significantly related to ADL (0.22, $p<.001$) and IADL (0.23, $p<.001$) disability after controlling for socio-demographic and health status characteristics.

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CONCLUSION—The findings expand the pain literature in older Mexican Americans. High pain rates were most prevalent among females and those with co-morbidity, depressive symptomatology, poor mobility, and frailty. Pain also plays a significant role in disability status. In-depth research is needed to understand the pain experiences of aged Mexican Americans and their health and well-being impact.

Keywords

Hispanic; aging; pain; disability; functional status

INTRODUCTION

Pain has been defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or disease."[1,2] The assessment of pain is normally based on self-report, presently considered the most accurate and reliable indication of an individual's experiences of pain.[3–6] Pain represents a complex and multidimensional cause of suffering, disability and poor quality of life. Although treatable, pain is commonly underreported, undertreated, poorly understood in older adults, and generally viewed as a normal part of the aging process.[3,5–7] The need for further investigation of pain's influence on health outcomes in late life is underscored by recent national and international reports.[8–11] For example, the National Center for Health Statistics estimated that 77 million Americans experience pain of any type, and that the social, medical and economic cost of chronic pain is approximately $100 billion annually.[11] The prevalence, severity and costs of pain will likely escalate as the older adult population increases in number and lives longer.

Pain trends will also be affected by the increasing ethnic and racial diversity among older adults.[9] Evidence suggests that the expression, communication and emotional manifestation of pain are influenced by cultural values and beliefs as well as by neuro-physiologic changes in late life.[7,13,14]. To date, few studies have examined pain experiences in older Hispanic populations. Current findings report higher pain prevalence and severity relative to older Caucasians.[15–17] Moreover, evidence provides limited information about pain trends across Hispanic ethnic and racial subgroups. As Mexican Americans represent the largest Hispanic subgroup in the United States, understanding their pain experiences and underlying predictors will advance the knowledge base regarding health disparities.[14–18]

This study examined the presence, severity and interference of pain with performance of daily activities in Mexican American older adults who participated in the Hispanic-Established Populations Epidemiologic Study of the Elderly (Hispanic-EPESE). The second aim explored socio-demographic and health characteristics as correlates of pain severity and pain interference. A third aim determined the independent role of pain in functional disability relative to socio-demographic factors, medical conditions, and physical performance measures. We hypothesized that pain would have a significant effect on disability status after adjusting for age, gender, education and other covarieates.

METHODS

Sample and Procedures

Data were from a sub-sample of the Hispanic-EPESE who participated in a study related to the development of frailty. The Hispanic-EPESE is a longitudinal study of Mexican Americans ages 65 years and older residing in Texas, New Mexico, Colorado, Arizona and California. Participants were originally identified by area probability sampling procedures. The sampling plan assured a sample generalizable to approximately 500,000 older Mexican Americans living in the southwest in the early 1990s and has been previously described.[19]

The present study included 1,013 community-dwelling Mexican Americans, ages 74 years and older participating in the Frailty Study in 2005–2006. Inclusion criteria were participants' cognitive ability to complete the interview and their ability to complete the physical performance measures necessary to compute the frailty index (see description below). No data obtained through proxy were permitted. Participants were interviewed and examined in their homes by raters who received 20 hours of training in the conduct of standard interviews and assessments of physical functioning including balance, gait, and functional daily living skills and the SF-36 Health Survey (see description below). Interviews were conducted in Spanish or English, based on participants' preference. Fifteen percent of each interviewer's work was validated by follow-up telephone contact.

One hundred eighty-eight participants without information necessary to complete the frailty index were excluded. Also excluded were 53 participants who were missing cognitive status scores and 28 without a complete comorbidity index (see below). Descriptive statistics showed that participants with missing data did not significantly differ in terms of gender, marital status, education, and body mass index. However, those with missing data on one or more study variables were more likely to be older, have more comorbidity, have more pain, and be unable to complete all mobility measures than participants who had complete information. The final sample for analyses included 744 participants.

The university Institutional Review Board on human protection and research ethics approved the study.

Measures

Self-Reported Pain—Pain, the main independent variable, was measured using two questions from the *Medical Outcomes Study Short Form-36* Health Survey (SF-36).[20] The first item was "How much bodily pain have you had during the past 4 weeks?" with possible responses including 'none,' 'very mild,' 'mild', 'moderate', 'severe', & 'very severe'. Categories were collapsed to 'none', 'mild', 'moderate', and 'severe' based on frequency distributions. The second item was "During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)", with responses including 'not at all,' 'a little bit', 'moderately', 'quite a bit', and 'extremely'. According to frequency distributions, response categories were collapsed to include 'not at all', 'a little bit', 'moderately', and 'quite a bit'. The SF-36 has been used extensively to determine general health status and health-related quality of life[20,21] and has very good reliability and validity.[22] Its use has been validated in the Mexican American older adult population.[23]

Functional Disability—As the outcome variable in this study, functional disability was assessed based on the performance of basic activities of daily living (ADL)[24,25] and instrumental activities of daily living (IADL).[26] ADL disability status was measured by asking participants if they could perform seven activities with or without the help of others or special equipment: walking across a small room, bathing, personal grooming, dressing, eating, getting in and out of the bed, and using the toilet. ADL disability was based on a sum of activities participants were unable to perform, ranging from 0 (no limitations) to 7 (limitations in all activities). This measure has good internal consistency in the study sample (Cronbach's alpha =.88).

IADL status was assessed by asking participants if they were able to perform 10 activities without help: using the telephone, driving own car or using other transportation modes, shopping for groceries or clothes, preparing meals, doing light housework, taking medicine, handling money, doing heavy work around the house, walking up and down stairs, and walking half a mile. IADL disability was based on a summation of activities participants were unable to perform, scores ranging from of 0 (no limitations) to 10 (limitations in all activities). The alpha reliability was.89, indicating good internal consistency in this sample.

Covariates

Socio-demographic and Health Characteristics—Socio-demographic characteristics included age, gender (male=1, female=0), education (number of years of schooling), and marital status (married=1, not married=0). Physical health status included a comorbidity index, based on the sum of 'yes' responses to having 14 physician-diagnosed chronic medical conditions: hypertension, diabetes, kidney disease, liver disease, osteoporosis, emphysema or chronic bronchitis, Parkinson's disease, Alzheimer's disease or other dementia, thyroid or other gland problems, anemia or low blood count, eye problems (including cataracts), heart failure or heart disease, arthritis, and cancer. Also, physical status included the body mass index (BMI, weight in kilograms by height in meters squared).

Physical Functioning—The *Short Physical Performance Battery* (SPPB) was used to assess lower extremity physical function.[27] The SPPB score is based on a summary of performance in three areas: standing balance, chair stands, and walking a short distance. Scores range from 0–12, with 0 indicating an absence of mobility and 12 indicating high mobility performance. SPPB validity and reliability have been established and the tool has been used successfully with Mexican American older adults.[27,28]

Frailty Index—Physical frailty status was assessed based on criteria developed by Fried and Walston.[29] The frailty index has a score range of 0 to 5 and includes responses on five items: weight loss, exhaustion, walking speed, grip strength, and physical activity. A low score on this index indicates no frailty and a high rating ≥ 3 indicates frail status. The frailty index has shown good predictive validity for reduced mobility, ADL dysfunction, hospitalization and mortality among white, African American and Hispanic men and women ≥ 65 years of age. 9[29,30]

Cognitive Functioning—The 30-item *Mini Mental State Examination* (MMSE) was used to assess cognitive status.[31] The English and Spanish versions of the MMSE were adopted from the Diagnostic Interview Scale and have been used in prior community surveys.[32] Scores range from 0 to 30[31,33] with scores from 22 to 30 considered to indicate good cognitive ability.[34] The MMSE score was used as a continuous variable (range 0–30) in this study.

Depressive Symptomatology—Depressive symptomatology was measured using the *Center for Epidemiologic Studies-Depression Scale* (CES-D).[35] The CES-D scale contains 20 items with potential total scores ranging from 0 to 60. Higher scores on this measure indicate high depressive symptomatology. The alpha reliability for this sample was 0.81, indicating good internal consistency.

Data Analysis

Descriptive statistics were conducted to determine pain prevalence, severity, and interference with performance of activities of daily living. Chi-square and one-way ANOVA were used to assess the association of socio-demographic characteristics, medical conditions, and mental and physical functioning with pain. Prior to performing multivariate analyses, diagnostic computations were performed to determine the distributional characteristics and multicollinearity among variables. Results of variance inflation factors revealed no serious multicollinearity. High correlations were observed only between physical functioning (SPPB) and IADL (r=.67, p=.001), and SPPB and frailty (r=.59, p=.001).

At the multivariate level, least square regression analysis was performed to examine if pain severity maintained its effect on IADL limitations after accounting for the effects of socio-demographic factors, co-morbidity, mental and emotional functioning, mobility performance and frailty. Because ADL disability was skewed, we used negative binominal regression models to determine the relative contribution of pain severity adjusting for the same covariates as in the IADL models. For some models which were slightly over dispersed, the standard errors and test statistics were corrected using the methods proposed by Agresti.[36] Analyses were performed with SAS version 9.1 (SAS Inc., Cary, NC).

RESULTS

The ages of participant ranged from 74 to 100 years, with a mean age of 82 (Standard Deviation [SD] = 4.41). Women comprised 63% (n = 473) of the sample. Over half (58%; n=433) were not married (never married, widow, or separated). Mean years of schooling was 5 (SD = 3.87; range = 0–17 years). An average of 3.34 (SD = 1.79; range = 0–9) chronic health problems were reported by participants. Conditions frequently reported included high blood pressure (67%), cataracts (68%) arthritis (62%), and diabetes (35%). Body mass index (BMI) scores ranged from 13.3 to 48.9, with a mean of 27.4 (SD = 4.96), indicating that respondents were overweight based on national obesity standards advanced by the National Heart, Blood & Lung Institute (http://www.nhlbisupport.com/bmi/).

Physical performance as measured by the SPPB was moderate in this sample with a mean of 6.7 (SD = 2.99; range=0–12). Average scores on the ADL (Mean [M] =.55; SD = 1.17; range = 0–7) and IADL (M = 2.62; SD = 2.63; range = 0–10) measures indicated that some disability in performing activities of daily living. The mean cognitive function score was 21.5 (SD = 3.87; range = 0–26) suggesting low cognitive status. Depressive symptomatology was low as the average CES-D score was 7.50 (SD = 7.98; range = 0–49). Lastly, 28% of the participants were identified as not frail (a score 0). The remaining 72% evidenced some degree of frailty with 19% having the maximum frailty score of 5 (M = 1.35; SD = 1.18).

Prevalence of Pain

Tables 1 and 2 present the prevalence rates for presence and severity of pain, and presence and extent of interference with performance of activities inside and outside the home. Pain was prevalent in 65% of the participants during the previous month. Nearly thirty percent of the sample reported moderate (18%) to severe pain (11%). Pain interference was prevalent in 50%, with 22% of the participants indicating moderate to quite of bit of interference with performance of work inside and outside the home.

Correlates of Pain

The correlates of pain severity and pain interference are also shown in Tables 1 and 2. Pain severity was significantly associated with gender, education, comorbidity, ADL, IADL, SPPB, depressive symptomatology, and frailty status. Respondents who reported moderate to severe pain were likely to be women, have low educational attainment, report high comorbidity, low ADL and IADL function, low mobility, high depressive symptoms, and frailty. To determine differences between means across pain levels, the Scheffé test showed the following: a) pain levels reported by the highest education group significantly differed from those with the lowest education (p=.04); b) scores on measures of comorbidity, ADL and IADL disability, depressive symptoms, and physical frailty significantly varied between no pain and all other pain levels (p=.02-.001); and c) physical mobility scores significantly differed between no pain and moderate to severe pain groups (p=.02-.001). In addition, Spearman's rho coefficients for nine of the 14 medical conditions were significantly associated with pain severity (p=.01); no significant association was found between pain severity and hypertension, liver disease, Parkinson's disease, Alzheimer's disease, and cancer. Arthritis had the strongest association with pain severity (rho=.34, p=.001).

Similarly, pain interference was significantly associated with gender, education, comorbidity, ADL, IADL, mobility, depressive symptomatology, and physical frailty. Females and those who reported high morbidity, low education attainment, poor ADL and IADL functioning, low SPPB scores, and frail status also reported higher pain interference.

Role of Pain in Functional Disability

Tables 3 and 4 present the results of the negative binomial and the least square regression analyses with ADL and IADL as dependent variables, respectively. As revealed by regression coefficients, pain severity remained independently associated with ADL and IADL disability after adjusting for socio-demographic characteristics (age, gender, education, and marital status), comorbidity, cognitive status, depressive symptomatology, SPPB, and frailty status. The regression model explains approximately 47% of the variance in ADL disability. Table 4 shows that the same predictor variables explain about 51% of variance in IADL disability. Other variables significantly associated with ADL and IADL disability in the regression models included age, level of comorbidity, cognitive status, SPPB scores, and frailty status. Depressive symptomatology was associated with IADL function but not ADL function in the regression models (see Tables 3 and 4).

DISCUSSION

The study findings demonstrate a high prevalence of pain and pain interference in this sample of older Mexican American. High reports of pain experiences were found for females, unmarried persons, and those with high comorbidity, few years of schooling, low cognitive status, disability, poor mobility, high depressive symptoms, and physical frailty. As hypothesized, the association of pain with functional disability persisted after adjustments for relevant socio-demographic and health factors. This finding confirms that pain is independently associated with disability (ADL and IADL) in older Mexican American adults. Furthermore, pain levels appear to represent different experiences depending on socio-demographic and health status indicators.[44] For the most part, the greatest differences were observed between the 'no pain' group and 'mild, moderate and severe pain' groups. Post hoc analyses showed a relationship between pain and cognitive status with ADL disability. The effect of pain on ADL disability was most pronounced in participants with high cognitive ability (MMSE.21; beta=. 48, chi-square-36.5) and less for those scoring below 21 on the MMSE (beta=.05, chi-square=. 37).

Evidence on the prevalence and impact of pain in older populations is rather mixed, although there is agreement that pain is a common, often debilitating occurrence for older adults.[6,37–41] Discrepancies in findings may result from differing pain definitions and measurements, the age groups sampled, body parts examined, and origins of the data (e.g., nursing homes, pain management clinics, hospitals, community).[6–9] The present findings revealed that two-thirds of participants in this population-based sample reported pain within the past four weeks, 36% indicated that pain was moderate to severe. The high pain prevalence and interference in this study were comparable to rates reported by Thomas et al. in a large sample of older adults in England.[6] In addition, studies including older Hispanic adults report high pain prevalence rates. For example, Reyes-Gibby et al.[16,17] found 33–42% of Hispanic participants reported any pain. Bryant et al.[15] reported a rate of 50% for chronic pain in Hispanic aging adults. In a cross-national study of older Hispanic adults with arthritis, Al Snih, et al.[42] found 31% of older Mexican Americans with arthritis reported pain and it increased to 45% when activities involved weight bearing.[43] In another study by Al Snih and colleagues, a prevalence of 32% of older Mexican Americans reporting pain on weight bearing was reported, with women (37%)

and the oldest-old reporting the highest prevalence rates (36%).[44] Additionally, these investigators found that pain on weight bearing was a significant predictor of lower-body ADL disability two years later. This finding is consistent with the present study indicating that general pain is an independent predictor of ADL and IADL disability. The higher pain prevalence found in the present investigation may be due to the advanced age of participants. Previous investigations have included adults as young as age 50 and few reported age-group differences to underscore pain prevalence and interference patterns in the very old and oldest old groups. While the present study showed a slightly higher pain severity for those under age 80, it also showed that increasing age is associated with increased pain.

Earlier research has reported conflicting results regarding the relationship of socio-demographic and performance-based characteristics to self-reported pain in older adults.[11,12,40,41] Generally, women and individuals with high depressive symptoms, chronic morbidity, and poor mobility report greater pain.[6,11,15–17,40] Limited evidence exists on the relationship between pain and educational attainment. In this study, however, lack of formal schooling was associated with greater pain severity and interference, with significant difference between no schooling and ≥12 years of schooling. Ad hoc analyses showed that individuals with no schooling reported the highest depressive symptoms (p=.02), frailty (p=.02), and ADL (p=.001) and IADL (p=.01) disability. Educational attainment was clearly an important indicator of disability status considering it maintained its predictive role in ADL functioning after adjusting for other key factors.

The present study is one of a few to examine general pain and performance-based mobility measures among Mexican Americans at advanced ages.[24,44] This study is also unique because it includes a standardized measure of frailty and examines its relationship to pain. Pain has been shown to be related to both mobility performance and frailty status. As defined by Fried and others,[26,27] physical frailty represents a complex constellation of factors that predict future disability and mortality in older adults. Conversely, pain may be a critical factor that predicts future physical frailty. Additional research is needed to better understand the relationship of frailty to pain in both minority and non-minority populations.

Researchers frequently make a distinction between sex and gender, where sex is indicative of biological differences between males and females, and gender is considered a sociological construct referring to psychological, social and cultural differences. Studies on chronic and experimental pain show greater prevalence of, and sensitivity to, pain in females based on the biological (sex) perspective.[46] The evidence for gender differences is more conflicting.[45] The discussion of differences in pain perception between females and males becomes especially complex when race and ethnicity are added to the analysis. The greater prevalence of reported pain in females in the current study is consistent with the literature; however, the interaction of pain, gender and ADL versus IADL disability requires additional investigation. The effect of pain on basic ADLs was similar for men and women in this study, but its effect on women's performance of IADLs was more pronounced. This may reflect the fact the IADL items such a light house keeping, preparing meals, or shopping are biased toward females, particular in a sample of Mexican American older adults.[45]

A major strength of this study is its examination of a large population-based sample of Mexican American older adults, who represent the fastest growing segment of the aging population. Another strength includes a focus on very old Mexican American. Currently limited evidence exists on the pain experiences in this age group. This study also expands evidence on various health outcomes in a socio-economically disadvantaged population. Finally, the data were collected by trained investigators with experience in community-based research and using well established and validated measures such as the SF-36 Health Survey to collect information on health status and pain.

This investigation also has some limitations. Measures of comorbid conditions and activities of daily living were based on participant self-report. Pain assessment from the SF-36 does not provide an extensive profile of pain experience such as chronicity, source of pain, or location. Nor were any physiological indicators of pain collected in the study. Another limitation is the cross-sectional nature of our analysis. A final limitation relates to missing data on three major correlates: physical functioning, frailty status, and body mass index. As the primary focus of the parent study is the development of physical frailty as Mexican Americans age, the present paper reveals that many older participants were unable to perform the objective measures. In such instances, incomplete data will be unavoidable.

CONCLUSION

Pain has significant socioeconomic, health, and quality-of-life implications for the older adult population. There has been little published information on the experience of pain in older adults at the population level, particularly in minority and disadvantaged older adults.[14] By the year 2030, the number of Hispanic older adults is expected to increase by 76%, compared to 38% for non-Hispanic Whites and 34% for African Americans.[47] The Hispanic population is known to have unique health characteristics and risk factors such as increased diabetes, low levels of physical activity, and higher rates of obesity that may predispose them to increased risk for disability, morbidity and mortality. Knowledge about the incidence and impact of pain on disability and other health outcomes in this population is still relatively sparse. Additional research is needed to determine racial and ethnic differences in the identification, perception, and treatment of pain in Hispanic older adults. This is the first step in recognizing potential pain disparities and developing appropriate prevention and intervention programs.

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Table 1

Pain Severity by Socio-demographic and Health Characteristics

Characteristics	No Pain	Mild Pain	Moderate Pain	Severe Pain
Total, n (%)	263 (35.4)	261 (35.1)	136 (18.3)	84 (11.3)
Age, M ± SD*	82.1 ± 4.6	82.1 ± 4.5	82.1 ± 4.2	80.6 ± 3.4
Gender, n (%)‡				
Male	115 (42.4)	99 (36.5)	43 (15.9)	14 (5.2)
Female	148 (31.3)	162 (34.3)	93 (19.7)	70 (14.8)
Marital status, n (%)				
Married	115 (37.0)	107 (34.4)	55 (17.7)	34 (10.9)
Not married	148 (34.2)	154 (35.6)	81 (18.7)	50 (11.6)
Education§, M ± SD*	5.5 ± 4.0	5.0 ± 3.9	5.0 ± 3.9	4.2 ± 3.3
Comorbidity¶, M ± SD‡	2.6 ± 1.7	3.4 ± 1.6	3.9 ± 1.8	4.6 ± 1.7
Body Mass Index, M ± SD*	27.1 ± 4.7	27.2 ± 4.9	27.4 ± 5.3	28.8 ± 5.4
Cognitive Status, M ± SD	21.8 ± 3.9	21.3 ± 3.7	21.5 ± 4.3	21.2 ± 3.6
ADL Disability, M ± SD‡	0.3 ± 0.8	0.5 ± 1.0	0.8 ± 1.6	1.1 ± 1.5
IADL Disability, M ± SD‡	1.8 ± 2.4	2.6 ± 2.5	3.5 ± 2.8	3.8 ± 2.4
SPPB, M ± SD‡	7.4 ± 2.9	6.7 ± 2.9	5.9 ± 2.9	5.5 ± 2.8
Depressive symptoms, M ± SD‡	4.7 ± 6.5	7.2 ± 7.0	9.9 ± 7.68	13.3 ± 11.1
Physical Frailty, n (%)‡	1.0 ± 1.0	1.3 ± 1.1	1.7 ± 1.3	1.9 ± 1.3

Note: Scale ranges: Comorbidity, 0–9; Body Mass Index, 13.3–48.9; Cognitive Status (MMSE), 0–26; ADL Disability, 0–7; IADL Disability, 0–10; SPPB, 1–12; Depressive Symptomatology (CESD), 0–49; Physical Frailty, 0–5).

*p <.05

†p <.01

‡p <.001

§Total years of schooling

¶Total number of 14 chronic conditions

Chi-square and ANOVA statistics used to test differences across pain ratings.

ADL = Activities of daily living

IADL = Instrumental activities of daily living

SPPB = Short Physical Performance Battery

Table 2

Pain Interference by Socio-demographic and Health Characteristics

Characteristics	Not at all	A little bit	Moderately	Quite a bit
Total, n (%)	374 (50.3)	204 (27.4)	62 (8.3)	104 (14.0)
Age, M ± SD	82.1 ± 4.5	81.5 ± 4.2	82.1 ± 4.1	82.0 ± 4.6
Gender, n (%)‡				
Male	162 (59.8)	683 (25.1)	186 (6.6)	23 (8.5)
Female	212 (44.8)	136 (28.8)	44 (9.3)	81 (17.1)
Marital status, n (%)*				
Married	169 (54.3)	83 (26.7)	28 (9.0)	31 (10.0)
Not married	205 (47.3)	121 (27.9)	34 (7.9)	73 (16.9)
Education§, M ± SD‡	5.4 ± 4.0	4.7 ± 3.8	6.1 ± 4.2	4.1 ± 3.1
Comorbidity¶, M ± SD‡	2.8 ± 1.7	3.5 ± 1.7	4.2 ± 1.7	4.3 ± 1.8
Body Mass Index, M ± SD*	26.8 ± 4.3	27.8 ± 5.5	27.6 ± 5.54	28.3 ± 5.7
Cognitive Status, M ± SD*	21.9 ± 3.7	21.4 ± 3.6	21.0 ± 5.0	20.7 ± 4.2
ADL Function, M ± SD‡	0.3 ± 0.8	0.5 ± 1.0	0.9 ± 1.6	1.4 ± 1.8
IADL Function, M ± SD‡	1.7 ± 2.3	2.8 ± 2.4	3.6 ± 2.8	4.9 ± 2.4
SPPB, M ± SD‡	7.7 ± 2.9	6.4 ± 2.6	5.4 ± 2.8	4.5 ± 2.6
Depressive symptoms, M ± SD‡	4.7 ± 6.1	8.5 ± 7.2	11.8 ± 8.7	12.9 ± 10.3
Physical Frailty, n (%)†	1.0 ± 1.0	1.3 ± 1.1	2.1 ± 1.0	2.3 ± 1.2

* $p < .05$

† $p < .01$

‡ $p < .001$

§ Total years of schooling

¶ Total number of 14 chronic conditions

Chi-square and ANOVA statistics used to test differences across pain interference ratings.

ADL = Activities of daily living

IADL = Instrumental activities of daily living

SPPB = Short Physical Performance Battery

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Table 3

Role of Self-reported Pain Severity in ADL Disability (N=744)

Predictor	Model 1		Model 2		Model 3		Model 4	
	β	χ^2	β	χ^2	β	χ^2	β	χ^2
Pain	.46	53.4‡	.50	62.2‡	.37	31.6‡	.22	15.4‡
Age			.09	41.3‡	.09	41.4‡	.02	2.7
Gender§			−.21	2.0	−.07	0.2	.10	0.6
Marital status¶			−.20	2.0	−.15	1.2	.02	0.0
Education#			−.05	8.2†	−.03	3.7	−.03	4.8*
Comorbidity					.21	30.1‡	.15	20.8‡
BMI					.01	0.6	−.03	9.3†
Cognitive status					−.08	29.2‡	−.03	5.3*
Depressive symptoms					.02	2.5	.00	0.1
Level of frailty							.15	8.1†
SPPB**							−.32	168.2‡
Generalized R^2††		0.11‡		0.20‡		0.27‡		0.47‡

Note: Scale ranges: Comorbidity, 0–9; Body Mass Index, 13.3–48.9; Cognitive Status (MMSE), 0–26; ADL Disability, 0–7; IADL Disability, 0–10; SPPB, 1–12; Depressive Symptomatology (CESD), 0–49; Physical Frailty, 0–5).

* $p<.05$

† $p<.01$

‡ $p<.001$

§ Gender dummy coded: 1=male, 0=female

¶ Marital status dummy coded: 1=married, 0=not married.

Education coded as total years of schooling.

** SPPB: Short Physical Performance Battery

†† Generalized R^2 was calculated for the maximum likelihood estimated models using the formula as 1 – exp (−2*(log likelihood from the model with covariates – log likelihood from the null model)/ sample size)

Table 4

Role of Self-reported Pain Severity in IADL Disability (N=744)

Predictor	Model 1		Model 2		Model 3		Model 4	
	β	χ^2	β	χ^2	β	χ^2	β	χ^2
Pain	.78	64.5‡	.70	64.3‡	.41	21.5‡	.23	8.6†
Age			.16	66.9‡	.16	70.4‡	.08	21.4‡
Gender§			−.74	14.3‡	−.55	9.2†	−.55	12.0‡
Education¶			−.10	19.0‡	−.02	1.1	−.03	2.8
Marital status#			−.34	3.3	−.21	1.5	−.06	0.2
Comorbidity					.20	17.5‡	.11	7.2†
BMI					.04	6.7†	.00	0.1
Cognitive status					−.21	92.6‡	−.15	62.0‡
Depressive symptoms					.05	26.1‡	.01	0.7
Level of frailty							.63	74.2‡
SPPB**							−.24	68.5‡
Generalized R^2 ††		0.08‡		0.21‡		0.35‡		0.51‡

* p <.05

† p <.01

‡ p <.001

§ Gender dummy coded: 1=male, 0=female

¶ Education coded as total years of schooling.

\# Marital status dummy coded: 1=married, 0=not married.

** SPPB: Short Physical Performance Battery

†† Generalized R^2 was calculated for the maximum likelihood estimated models using the formula as 1 – exp (−2*(log likelihood from the model with covariates – log likelihood from the null model)/sample size)